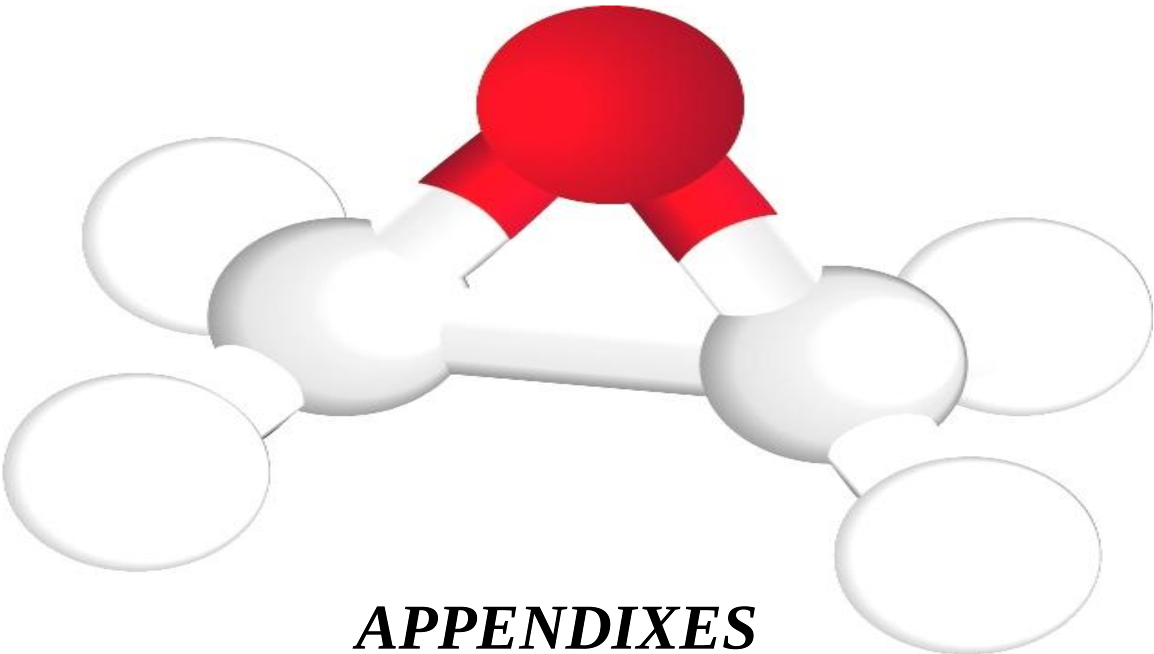

APPENDIXES

Appendix A

Appendix to Chapter 1

Key Paper Evaluation

EXPERT REVIEWS

Ethylene oxide potential toxicity

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Evaluation of: Butterworth BE, Chapman JR. Exposure of hematopoietic stem cells to ethylene oxide during processing represents a potential carcinogenic risk for transplant recipients. *Regul. Toxicol. Pharmacol.* 49(1), 149–153 (2007).

The future of ethylene oxide (EO) sterilization has been questioned, due to its associated toxicity. EO has been around for more than 60 years, mainly due to its recognized characteristics of reliability and effectiveness, coupled with the process flexibility, as well as its compatibility with most of the devices. Despite the well known EO toxicity, the undesirable effects of medical devices' EO residues on the patient's health have not yet been well established. There are limitations related to the current risk-assessment studies. To overcome these drawbacks, demands on greater safety are increasing, which lead to improvements in sterilizers and aeration equipment, as well as processes design. The paper under evaluation highlights risks related to EO sterilization of materials used during processing of stem cells for transplantation, but is an example of a study where the dose of the residues in the devices is not considered.

KEYWORDS: ethylene oxide residue • ethylene oxide sterilization • medical devices • process design • toxicity

The paper under evaluation relates ethylene oxide (EO)sterilization of medical disposable sets, used to collect, purify and store hematopoietic stem cells for transplantation, with cell-derived leukemia (CDL) in patients receiving the transplantation [1].

This article provides a comprehensive review in the context of toxicity related to medical devices (MDs) sterilized by EO. The first part presents an overview of the advantages of this sterilization technology over the other two industrial sterilization technologies most widely used. The second part summarizes the regulated limits for residual EO and its by-products on MDs. The third part outlines the activity mechanism and the inherent toxicity of the sterilizing agent, giving emphasis to the risk-assessment studies related to the significance of EO levels in MDs on patient's health. Finally, we address the importance of developing advanced EO diffusion process models in order to allow prediction and efficient reduction of MD EO residues.

EO sterilization: advantages & uses

EO sterilization provides a long-history of extensive use as an effective method. EO is compatible with nearly every device, basically due to the flexibility created by the large number of process variables. Moreover, EO has undergone significant advances in order to overcome potential hazards to employee, patient and environmental safety.

The use of EO gas has assumed a dominant position in the field of industrial sterilization and its volume is increasing basically due the growth of single-use medical devices and specifically because there has been a transition to customized packs for use in specific medical and surgical procedures. The diversity of product designs, material types and packaging applications demanded EO sterilization developments [2-6].

Steam or high-energy irradiation sterilization results in extensive material degradation due to temperature effects and because the energy of γ-radiation is five orders of magnitude greater than that of any carbon chemical bond. EO has been used effectively for the sterilization of heat-, moisture- and/or radiation-sensitive medical devices [2,7,8].

There are many examples that demonstrate the preference of EO sterilization over the other methods and some of them are explained below. The use of EO for the sterilization of bone transplants, as well as clinically used demineralized bone matrices, has been reported with excellent

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results. EO sterilization is effective, because it completely penetrates into bone, destroying bacteria and viruses, and has a less detrimental effect on the tissues compared with alternative sterilization methods, such as irradiation or autoclaving. EO was reported as a safe, inexpensive and effective sterilant for bone and tissues, since care was taken to reduce the concentration of residual gases to acceptable levels [2,9,10].

A similar conclusion was also reported for the banking of skin for allografts and collagen sponges prepared for tissue engineering. Moist heat damages the structure of the skin tissue, due to collagen denaturation. On the other hand, γ-irradiation raises the question of effectiveness, because small viruses and spore-forming bacteria are quite resistant to this method and the high doses that would be required to inactivate HIV would cause the same problems as moist heat. It has been demonstrated that collagen can maintain its structural integrity and stability after EO sterilization and adequate aeration. The aeration procedure complied with regulatory limits and was enough to reduce residual EO to a noncytotoxic level [11,12].

Concerning the sterilization of ultrahigh-molecular-weight polyethylene (UHMWPE), which remains the material of choice used in orthopedic prosthetic surgery, the mechanical properties and structural integrity of UHMWPE are very critical because they may interfere with the consequent performance and long-term structural integrity of orthopedic implants. The studies recognize that steam sterilization is not convenient because it can affect dimensional stability of the polyethylenes (PEs), and ionizing radiation alters the polymer structure through oxidation, scission and cross-linking. The formation of free radicals renders UHMWPE unstable, because oxygen diffusion into the polymer and its reaction with free radicals causes chain scission. This is accompanied by internal cross-linking reactions, with the overall result being a change in physical properties of the polymer, and hence a change in wear performance. Wear debris produces inflammatory response and bone lysis, which leads to loss of of the implant [7,13–15].

Different studies also suggest that EO is the industrial method of choice to sterilize polyurethane (PU). PU undergoes significant degradation when subjected to γ-radiation or autoclaving, and among the substances produced from PU degradation a carcinogen, 4,4´-methylenedianiline (MDA), has been reported. Moreover, high-energy radiation may cause material degradation and cross-linking, which leads to mechanical property losses and increases in tensile strength, respectively. [12,16–18]

Control of ethylene oxide residues in medical devices

Despite the concerns over the EO toxicity and its by-products, it was only in 1978 that the US FDA established recommendations on minimum-allowed levels for EO, ethylene chorohydrin (ECH) and ethylene glycol (EG) residual concentrations on sterilized products. Moreover, the first regulatory document of the series of biological evaluation of MDs, related to EO sterilization residuals (ISO 10993-7), was edited in 1995 [2,19].

The first conclusion that can be drawn is that human exposures to potentially toxic effects was for a long time not established, justifying the large quantity of publications reporting toxic EO effects, without considering the exposure dose. This question is addressed in more detail below.

The ISO 10993-7 specifies the allowable limits for residual EO and its by-product, ECH, which is formed due to the EO reaction with chlorinated compounds, during MDs EO sterilization. EO may also react with water vapor to form EG, but no limits are specified for this chemical, because the risk assessment described in ISO 10993-7 indicates that calculated allowable levels are higher than those likely to occur in a MD.

The standard describes the methods of analysis via gas liquid chromatography and allowable limits based on an examination of toxicological risks of the residue, according to the type and period of time the patient is likely to be exposed to the device. Accordingly, the products are categorized as limited exposure, prolonged exposure, permanent contact and special situations are also defined. Limits are expressed as maximum average daily doses received by the patient (mg/day) for each type of device, and additional limits for prolonged or permanent-exposure device are also added; that is, prolonged exposure devices must meet their own category limit and that of the limited exposure device. However, EO-sterilized devices that have no patient contact, which includes *in vitro* diagnostic devices, are not covered by this standard [19,20].

Analyzing the paper under evaluation, it can be concluded that the medical disposable components used during processing of stem cells are not under the regulatory limits defined by ISO 10993-7 [1,19,20].

For further safety, and despite data demonstrating the effects of exposure to EO residues on MDs, the most recent revised ISO 10993-7 draft indicates that the acceptable residual levels will be reduced in the future, thus requiring even longer aeration times and/or the redesign of the sterilization process [19,20].

Ethylene oxide sterilization mechanism & toxicity

After sterilization, some EO may remain adsorbed on the device surface or dissolved into its construction materials. Once the device contacts directly or indirectly with the body, the residual EO can potentially dissipate from the device into the body at a rate depending on the materials of the MDs, the degree of aeration and other factors. EO and its reaction products, ECH and EG, have shown to cause chronic toxicity or reproductive effects in laboratory animals at relatively high doses. In addition, EO is an alkylating agent compound that reacts with the DNA of the microorganisms rendering them nonviable. According to the same mechanism, it has mutagenic and carcinogenic properties. EO has been demonstrated to be genotoxic in a wide variety of biological systems, and carcinogenic in rats and mice. Since EO has caused toxicity in humans at high doses and because occupational exposure to lower, but still substantial levels of EO is related to cancer and other adverse effects, health risk doubts arise concerning the effects of much lower and generally brief doses that patients can receive from exposure to sterilized MDs.

In this context, at the end of the 1980s the Heath Industry Manufacturers Association (HIMA) has requested Environ to investigate the risks from exposure to EO residues on MDs. The scope of this study included only risks to patients, and only the risks associated with MDs delivered sterile to hospitals, physicians or the patient.

It is recognized that the mutagenic potential of EO strengthens the weight of the evidence for its carcinogenicity. However, the current understanding on this topic is insufficient to establish quantitatively the significance of EO's mutagenic activity to human health risk.

Environ has performed a risk assessment that quantified the effects from exposure to EO sterilized MDs, adopting assumptions that yield the highest estimated risk or, in other words, assuming a conservative position in assessing cancer risks.

The estimated cancer risks are hypothetical and are not predictions of any direct evidence of human cancers attributable to EO exposures. They were extrapolated based on data from experimental animals to humans and also from high-to-low exposures, which are totally distinct from the true risks of large numbers of people exposed to the same agent at much lower levels. The study considered the total dose from all kinds of devices that a typical individual might receive during his/her lifetime, and also that residues of EO and its reaction products are present on MDs at levels proposed by the FDA in 1978, which are certainly above the real exposure.

Environ has estimated the upper probability of human risk from cancer caused by EO and the number found was seven in a million, a figure that is rarely considered significant in regulatory decisions, and that is usually considered trivial in causes where the benefits of medical treatment are obvious [21–23].

The paper under evaluation states that there is a "no effect" dose to be considered, since the risk of cancer always exists independently of the residual EO levels, despite recognizing that there does not exist any data demonstrating the genotoxic effects of EO residues in devices for the processing of human stem cells [1]. This study is not in agreement with Rodricks *et al.* who state that the risk of cancer is related to the level of exposure to a carcinogen and the residues of EO should be kept as low as feasible because the probability of cancer occurring becomes trivially small if doses are sufficiently low [21–23]. There are large cumulative uncertainties associated with extrapolation of adverse effects, but the actual risk is most likely to be lower than the defined upper limit. The conclusion was that exposure to EO-sterilized MDs is unlikely to cause significant risk to human health and the true risk of cancer from low EO doses may be zero. Regarding other chronic toxicity, as well as reproductive effects, Environ concluded that no concern about the possible health effects in humans exists [21–23].

Although a number of studies on the adverse effects of EO have appeared in the literature, none of the investigations alter ENVIRON's conclusions about the toxicity of EO or its by-products, nor conclusions about risks to health from exposure to EO residues on sterilized MDs. Besides the main EO health concern, that is carcinogenicity, allergic reactions, an anaphylactide type of reaction, as well as other hypersensitivity reactions are commonly described as a consequence from exposure to an EO-sterilized device. However, although most of the reports consider the relevance of decreasing the residues concentration, no quantitative consideration of dose aspects is addressed [2,21,24–34]. There are exceptions such as the study of Anand *et al.*, as well as Horst-Dieter Lemke, which conclude based on concentration that the residues below certain level do result in safe use [35,36].

There is much to do to improve the current situation and this question deserves closer investigation in the future.

Reducing ethylene oxide residues on medical devices

One big challenge is related to reducing the EO residues below its toxicity and in the shortest possible period of time. In fact, despite little evidence available to indicate the levels of EO at which toxic reactions occur, EO sterilization is continuing its development towards a 'technology-neutral' solution [3,4,37].

Traditionally, aeration was achieved by leaving the product for a period of time in ambient conditions. However, nowadays the improvement of the product aeration methods is being carried according to two different perspectives: design of the cycle and aeration. Under the perspective of the design of the cycle, there is a tentative to reduce the EO concentration used in the gas dwell phase, which minimizes residue levels in product even after its transference into the aeration phase. More efficient aeration is achieved using elevated temperatures and high air-change rates, as well as by combinations of gases, pressure set points, vacuum rates and gas-injection rates. Methods to be considered for the future will include the use of steam addition and removal, and newer developments such as microwave desorption [3,4,37].

Despite the major interest on minimizing the residual amount of EO in the devices, investigations related yo the efficiency of the different aeration technologies are missing [6,38].

The modeling of the EO diffusion through different substrates, including the packaging, and taking into account different environmental conditions both for sterilization and aeration is still a challenge. The diffusion rates vary greatly among the various materials in MDs according to their materials of construction, their volume and surface area, as well as according to the packaging specification. The ability to predict the dynamic distribution of EO concentration within the load, besides allowing the prediction of the sterilization lethality, would also allow estimating the dissipation of the residues after sterilization in order to estimate the required aeration time to reduce residues to a desired level.

Discussion & conclusion

The authors of the paper under evaluation relate EO sterilization of medical disposable sets, used during processing of hematopoietic stem cells for transplantation, with CDL on patients receiving the transplantation [1]. This fact is because EO is a direct-acting mutagen that has been demonstrated to induce cancer.

The paper under evaluation states that there is a 'no effect' dose to be considered, since the risk of cancer always exists independently of the residual EO levels, despite recognizing that there does not exist any data demonstrating the genotoxic effects of EO residues in devices for the processing of human stem cells [1]. In recent reports from Rodricks *et al.*, not yet overcome by others investigations, despite recognition that there are large uncertainties associated with the quantitative risk assessment performed, the mutagenic activity to human health was always estimated conservatively, which means that risks should be overestimated. The studies recognize that the probability of developing cancer is dose-related and it becomes trivially small if doses from exposure to EO-sterilized MDs are sufficiently low and can truly be zero [21–23].

Despite their conclusions, the authors recognize that other possible factors could be also addressed with CDL, and also recognize some fragility on their investigation. In fact, like many other studies that indicate significant disadvantages of EO sterilization, a quantitative risk assessment was not performed. The authors recognize that there is a need for a systematic review of all cases of donor-cell derived hematologic malignancies in stem cell products and identification of all donors' conditions, in order to estimate the extent of the problem and the degree to which EO may have played a role in CDL. They also recognize that the degree to which EO DNA adducts are produced in stem cells was not examined [1].

There is also an important factor that should be addressed. The authors write that the EO residuals remaining in processing sets under discussion are regulated by governmental mandated standards and assume the same limits as the ones defined for limited exposure devices. But in fact, *in vitro* diagnostic devices are not covered by ISO 10993-7, and according to that the medical disposable components used during processing of stem cells are not under regulatory limits defined by ISO 10993-7 [1,19,20]. The technical committee should consider the regulation of the limits for this and other *in vitro* diagnostic devices, which indirectly can interfere with human health.

The paper under evaluation totally dissuades the use of EO to sterilize materials used during processing and storage of stem cells [1]. If there are alternatives, they should be considered but, like in other studies it is evident that the mutagenic properties of EO are interfering with the authors' conclusions. This drawback can significantly limit the precise and accurate analysis of the condition under evaluation.

EO represents the dominant mode of sterilization and there is a recognized history of reliability. However, further quantitative risk assessments related to the risk of using EO-sterilized devices should be performed in order to confirm and develop the results of previous studies on this matter. The conclusions taken for one device shall be very carefully extrapolated for another.

Key issues

- The future of ethylene oxide (EO) sterilization has been questioned due to the toxicity associated with the sterilizing agent, but the developments to overcome its weaknesses, coupled with its undeniable advantages in comparison with other available industrial sterilization methods, converted EO in to the dominant mode of industrial sterilization.
- Regulated limits for residual EO and its by-products on medical devices (MDs) are defined by ISO 10993-7. The residue levels are defined according to the type and period of time the patient is likely to be exposed to the device and *in vitro* devices are not under the scope.
- Despite the mutagenic and carcinogenic properties of EO, the significance of EO levels in MDs on patient's health shall be defined by appropriate risk assessment studies.
- The undesirable effects of EO residues in MDs on the patient's health have not been well established. There are limitations related to the current studies on risk assessment.
- Environ has estimated conservatively the upper probability of human risk from cancer caused by EO and the number found was seven in a million. According to the same investigation, the residues of EO should be kept as low as feasible, because the probability of occurring cancer becomes trivially small or even zero if doses are sufficiently low.
- The paper under evaluation states that there is a "no effect" dose to be considered, since the risk of cancer always exists independently of the residual EO levels, despite recognizing that there does not exist any data demonstrating the genotoxic effects of EO residues in devices for the processing of human stem cells.
- Although a number of studies on the adverse health effects of EO have appeared in the literature, none of the investigations alter ENVIRON's conclusions about the toxicity of EO or its by-products.
- The paper under evaluation highlights the risks related with EO sterilization of materials used during processing and storage of stem cells for transplantation, but there are fragilities and it is an example of a study that does not take into consideration the residues dose in the devices.
- Nowadays, a new challenge in the context of EO sterilization is the development of models for EO diffusion, in order to allow the prediction and improvement of efficient removal of EO residues from MDs.
- A comprehensive quantitative risk assessment related with the health effects of EO residues on MDs would allow overcoming the deficiencies of the investigations currently available.

Five-year view

Considering the advantages of EO sterilization over the other industrial methods, as well as the latest developments that have been performed in this technology, EO will remain an essential element in sterilization technology.

Further developments are needed in the way of understanding desorption of EO residuals in exposed MDs under different aeration conditions, which would allow the design and development of a more efficient process.

Regulatory limits defined by ISO 10993-7 have been defined based on examination of toxicological risks of the residues of EO sterilization, but there are limitations related with current studies on risk assessment that were explained before. If other and more detailed risk assessments would be available, they would probably give more assurance to the individuals somehow linked with EO sterilized MDs.

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Appendix B

Appendix to Chapter 2

B.1 Running cycles conditions

A preliminary effort was undertaken to stabilize and set constant conditions through each cycle experiment, in particular for temperature, ethylene oxide (EO) concentration, relative humidity (see Table B.1) and time (see Table B.2; the time maximum variability was 6 %, from the first EO injection until the end of the first exhaustion vacuum, excluding exposition).

Table B.1 Conditions attained for each run through each cycle experiment

RUN no. 1			
Cycle no.	T (°C)	RH (%)	C (mg L^{-1})
608	59.1	64	239
609	59.5	54	204
610	58.9	71	195
618	62.9	62	219
625	58.2	64	255
626	59.1	64	260
629	58.8	63	255
Mean	59.50	63.1	232.5
Standard deviation	1.44	5.0	24.5
Standard deviation /Mean (%)	2.4	7.9	10.6

RUN no. 2			
Cicle no.	T (°C)	RH (%)	C (mg L^{-1})
337	43.9	86	223
338	44.2	89	222
345	44.1	89	235
346	43.8	92	222
552	42.5	75	250
554	43.7	78	269
555	42.5	82	265
669	44.9	94	282
673	43.6	80	316
675	43.3	90	286
Mean	43.65	85.5	257.0
Standard deviation	0.70	6.4	30.5
Standard deviation /Mean (%)	1.6	7.5	11.9

Table B.1 (continued) Conditions attained for each run through each cycle experiment

RUN no. 3			
Cicle no.	T (°C)	RH (%)	C (mg L^{-1})
335	34.2	55	201
360	35.1	59	221
362	35.2	58	217
364	35.7	54	217
367	34.2	58	225
370	34.8	61	225
371	34.6	60	229
410	34.7	59	223
515	32.9	72	234
516	32.9	69	222
545	33.0	54	223
Mean	34.30	59.9	221.5
Standard deviation	0.93	5.8	8.0
Standard deviation /Mean (%)	2.7	9.6	3.6

RUN no. 4			
Cicle no.	T (°C)	RH (%)	C (mg L^{-1})
449	41.3	90	969
450	41.9	93	964
489	39.4	93	974
500	40.8	90	981
501	40.1	92	1000
512	40.3	90	985
535	39.2	85	1004
546	40.1	96	932
597	39.6	84	1011
Mean	40.30	90.3	980.0
Standard deviation	0.84	3.8	22.8
Standard deviation /Mean (%)	2.1	4.3	2.3

Table B.1 (continued) Conditions attained for each run through each cycle experiment

RUN no. 5			
Cicle no.	T (°C)	RH (%)	C (mg L^{-1})
631	58.8	84	278
633	59.5	81	234
634	58.4	81	254
636	58.8	82	242
638	58.9	91	303
689	57.8	81	282
Mean	58.70	83.3	265.5
Standard deviation	0.52	3.9	24.2
Standard deviation /Mean (%)	0.9	4.7	9.1

RUN no. 6			
Cicle no.	T (°C)	RH (%)	C (mg L^{-1})
434	34.9	47	963
463	33.4	61	948
471	34.3	65	959
472	33.2	70	933
483	33.4	63	970
486	33.1	71	968
508	34.1	67	908
509	33.8	67	982
510	34.1	44	943
518	34.5	58	920
520	32.4	50	908
680	31.0	64	959
681	31.4	64	854
Mean	33.35	60.8	940.0
Standard deviation	1.12	8.7	33.4
Standard deviation /Mean (%)	3.4	14.3	3.6

Table B.1 (continued) Conditions attained for each run through each cycle experiment

RUN no. 7			
Cicle no.	T (°C)	RH (%)	C (mg L^{-1})
646	59.4	97	1006
647	60.7	98	1017
648	60.4	98	1009
649	58.8	96	989
661	58.2	97	1013
664	59.6	98	992
684	59.1	99	1002
Mean	59.45	97.6	1004.0
Standard deviation	0.81	1.0	9.7
Standard deviation /Mean (%)	1.4	1.0	1.0

RUN no. 9			
Cicle no.	T (°C)	RH (%)	C (mg L^{-1})
816	34.6	86	692
817	37.0	74	669
818	36.7	71	684
819	37.4	73	695
824	37.8	61	685
869	37.8	76	653
870	37.7	78	664
871	36.7	69	660
872	37.7	81	665
873	36.6	65	676
Mean	37.00	73.4	674.0
Standard deviation	0.92	7.4	13.5
Standard deviation /Mean (%)	2.5	10.1	2.0

Table B.1 (continued) Conditions attained for each run through each cycle experiment

RUN no. 10			
Cicle no.	T (°C)	RH (%)	C (mg L^{-1})
807	37.6	75	456
808	37.2	77	473
809	37.0	85	460
810	37.6	78	449
812	36.4	82	465
813	37.1	76	481
814	36.5	83	460
815	36.4	84	453
874	36.1	79	441
875	37.5	80	438
876	37.6	81	440
Mean	37.00	80.0	456.0
Standard deviation	0.54	3.3	13.1
Standard deviation /Mean (%)	1.4	4.2	2.9

RUN no. 11			
Cicle no.	T (°C)	RH (%)	C (mg L^{-1})
838	50.0	80	229
839	51.5	81	266
847	51.6	73	189
848	52.5	88	244
849	51.4	80	259
851	50.5	83	259
854	50.7	77	256
855	50.6	86	255
856	50.2	74	266
Mean	51.00	80.2	247.0
Standard deviation	0.76	5.0	23.2
Standard deviation /Mean (%)	1.5	6.3	9.4

Table B.1 (continued) Conditions attained for each run through each cycle experiment

RUN no. 12			
Cicle no.	T (°C)	RH (%)	C (mg L^{-1})
988	50.3	67	437
989	51.0	69	452
991	50.8	70	444
992	51.0	66	451
993	50.5	64	451
Mean	50.72	67.2	447.0
Standard deviation	0.28	2.4	5.8
Standard deviation /Mean (%)	0.5	3.6	1.3

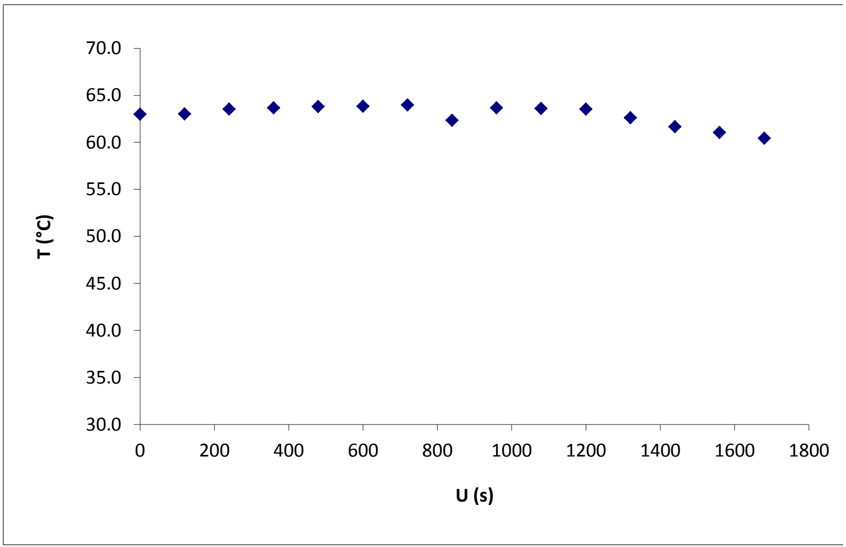
RUN no. 13			
Cicle no.	T (°C)	RH (%)	C (mg L^{-1})
980	49.8	73	666
984	49.9	72	688
985	50.0	67	682
986	50.0	71	674
987	49.9	79	662
Mean	49.93	72.4	674.5
Standard deviation	0.07	4.3	9.7
Standard deviation /Mean (%)	0.1	6.0	1.4

RUN no. 14			
Cicle no.	T (°C)	RH (%)	C (mg L^{-1})
994	61.2	69	705
996	60.9	74	742
997	61.8	76	749
999	57.7	64	746
1001	58.8	72	745
Mean	60.08	71.0	738.4
Standard deviation	1.56	4.7	16.4
Standard deviation /Mean (%)	2.6	6.6	2.2

Table B.1 (continued) Conditions attained for each run through each cycle experiment

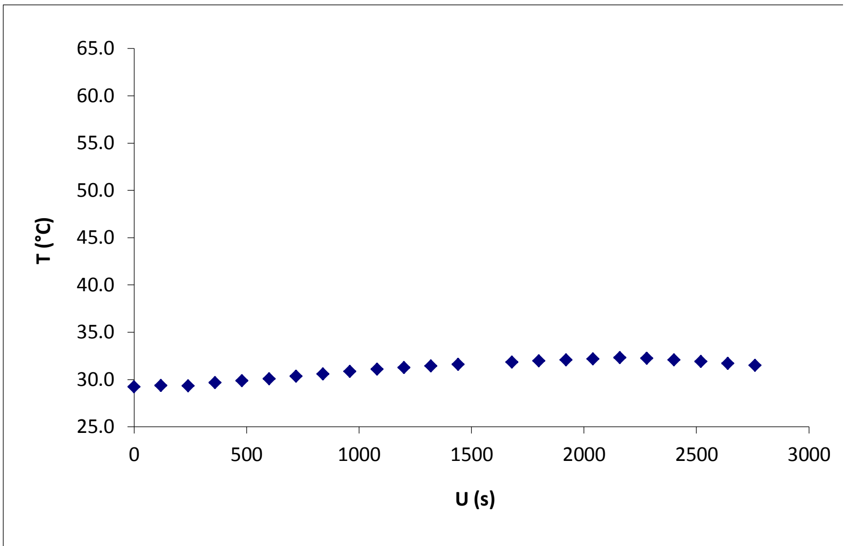
	RUN no. 15		
Cicle no.	T (°C)	RH (%)	C (mg L^{-1})
1004	61.1	77	501
1005	63.8	78	478
1006	61.2	75	516
1007	62.1	74	504
1011	61.7	81	491
Mean	61.98	77.0	498.0
Standard deviation	0.98	2.7	12.8
Standard deviation /Mean (%)	1.6	3.6	2.6

For clarifying the experimental conditions attained, two examples of extreme conditions (representative cycle of RUN 1 - high temperatures and low EO concentrations, and of RUN 6 - low temperatures and high EO concentrations) are presented in the figures bellow (Figures B.1.1 and B.1.2). The data demonstrated that temperature was constant throughout equivalent time, *U*, for all cycles carried out. The cases presented are the worse extreme situations. Since uniform temperature histories (from the first EO injection until the end of the first exhaustion vacuum) were observed, the integration of temperature change during the cycle is useless.



U (s)	T (ºC)
0	63.0
120	63.0
240	63.5
360	63.7
480	63.8
600	63.8
720	64.0
840	62.3
960	63.6
1080	63.6
1200	63.5
1320	62.6
1440	61.6
1560	61.0
1680	60.4

Figure B.1.1 Temperature history through equivalent time for a representative cycle of high temperatures and low EO concentrations conditions.



U (s)	T (ºC)
0	29.2
120	29.4
240	29.3
360	29.7
480	29.9
600	30.1
720	30.3
840	30.6
960	30.9
1080	31.1
1200	31.3
1320	31.4
1440	31.6
1560	22.4
1680	31.9
1800	32.0
1920	32.1
2040	32.2
2160	32.3
2280	32.2
2400	32.1
2520	31.9
2640	31.7
2760	31.5

Figure B.1.2. Temperature history through equivalent time for a representative cycle of low temperatures and high EO concentrations conditions.

B.2 Enumeration of viable spores of *B. subtilis*

Table B.2.1 Enumeration of viable spores for cycles of RUN 1 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
610	412	94	3	445	525.5	$3.60x10^{6}$	$4.91x10^{+5}$	$1.37x10^{-1}$	-0.8648
							$4.57x10^{+5}$	$1.27x10^{-1}$	-0.8963
							$4.93x10^{+5}$	$1.37x10^{-1}$	-0.8636
							$8.14x10^{+5}$	$2.26x10^{-1}$	-0.6455
							$8.29x10^{+5}$	$2.30x10^{-1}$	-0.6380
							$8.29x10^{+5}$	$2.30x10^{-1}$	-0.6380
							$6.86x10^{+5}$	$1.90x10^{-1}$	-0.7202
							$6.14x10^{+5}$	$1.71x10^{-1}$	-0.7679
							$6.57x10^{+5}$	$1.83x10^{-1}$	-0.7386
625	397	90	224	434	729.5	$3.60x10^{6}$	$1.11x10^{+5}$	$3.10x10^{-2}$	-1.5093
							$1.13x10^{+5}$	$3.13x10^{-2}$	-1.5038
							$1.11x10^{+5}$	$3.10x10^{-2}$	-1.5093
							$7.86x10^{+4}$	$2.18x10^{-2}$	-1.6610
							$6.57x10^{+4}$	$1.83x10^{-2}$	-1.7386
							$5.43x10^{+4}$	$1.51x10^{-2}$	-1.8216
							$8.86x10^{+4}$	$2.46x10^{-2}$	-1.6090
							$9.57x10^{+4}$	$2.66x10^{-2}$	-1.5753
							$8.29x10^{+4}$	$2.30x10^{-2}$	-1.6380
626	382	90	282	395	760.5	$3.60x10^{6}$	$4.57x10^{+4}$	$1.27x10^{-2}$	-1.8963
							$4.43x10^{+4}$	$1.23x10^{-2}$	-1.9100
							$4.86x10^{+4}$	$1.35x10^{-2}$	-1.8699
							$4.80x10^{+4}$	$1.33x10^{-2}$	-1.8751
							$5.29x10^{+4}$	$1.47x10^{-2}$	-1.8332
							$5.16x10^{+4}$	$1.43x10^{-2}$	-1.8439
							$9.41x10^{+4}$	$2.62x10^{-2}$	-1.5825
							$9.46x10^{+4}$	$2.63x10^{-2}$	-1.5805
							$9.60x10^{+4}$	$2.67x10^{-2}$	-1.5740

Table B.2.1 (continued) Enumeration of viable spores for cycles of RUN 1 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
							$1.14x10^{+4}$	$3.17x10^{-3}$	-2.4983
							$7.86x10^{+3}$	$2.18x10^{-3}$	-2.6610
							$7.71x10^{+3}$	$2.14x10^{-3}$	-2.6690
							$1.07x10^{+4}$	$2.98x10^{-3}$	-2.5263
618	410	90	442	395	934.5	$3.60x10^{6}$	$1.27x10^{+4}$	$3.53x10^{-3}$	-2.4520
							$1.14x10^{+4}$	$3.17x10^{-3}$	-2.4983
							$9.86x10^{+3}$	$2.74x10^{-3}$	-2.5626
							$1.03x10^{+4}$	$2.86x10^{-3}$	-2.5441
							$1.07x10^{+4}$	$2.98x10^{-3}$	-2.5263
							$5.43x10^{+2}$	$1.51x10^{-4}$	-3.8216
							$5.00x10^{+2}$	$1.39x10^{-4}$	-3.8573
							$4.14x10^{+2}$	$1.15x10^{-4}$	-3.9390
							$7.00x10^{+2}$	$1.94x10^{-4}$	-3.7112
609	416	94	703	454	1232.0	$3.60x10^{6}$	$5.43x10^{+2}$	$1.51x10^{-4}$	-3.8216
							$6.00x10^{+2}$	$1.67x10^{-4}$	-3.7782
							$5.57x10^{+2}$	$1.55x10^{-4}$	-3.8103
							$6.71x10^{+2}$	$1.87x10^{-4}$	-3.7293
							$7.14x10^{+2}$	$1.98x10^{-4}$	-3.7024
							$7.14x10^{+2}$	$1.98x10^{-4}$	-3.7024
							$5.71x10^{+2}$	$1.59x10^{-4}$	-3.7993
							$3.00x10^{+2}$	$8.33x10^{-5}$	-4.0792
							$5.29x10^{+2}$	$1.47x10^{-4}$	-3.8332
629	405	91	764	449	1282.0	$3.60x10^{6}$	$5.00x10^{+2}$	$1.39x10^{-4}$	-3.8573
							$5.57x10^{+2}$	$1.55x10^{-4}$	-3.8103
							$5.86x10^{+2}$	$1.63x10^{-4}$	-3.7886
							$5.29x10^{+2}$	$1.47x10^{-4}$	-3.8332
							$4.71x10^{+2}$	$1.31x10^{-4}$	-3.8829

Table B.2.1 (continued) Enumeration of viable spores for cycles of RUN 1 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
608	416	94	1020	430	1537.0	3.60×10^{6}	$5.71 \times 10^{+1}$	1.59×10^{-5}	-4.7993
							$4.29 \times 10^{+1}$	1.19×10^{-5}	-4.9243
							$1.43 \times 10^{+1}$	3.97×10^{-6}	-5.4014
							$2.86 \times 10^{+1}$	7.94×10^{-6}	-5.1004
							$1.43 \times 10^{+1}$	3.97×10^{-6}	-5.4014
							$4.29 \times 10^{+1}$	1.19×10^{-5}	-4.9243
							$2.86 \times 10^{+1}$	7.94×10^{-6}	-5.1004
							$2.86 \times 10^{+1}$	7.94×10^{-6}	-5.1004
							$4.29 \times 10^{+1}$	1.19×10^{-5}	-4.9243

Table B.2.2 Enumeration of viable spores for cycles of RUN 2 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
675	400	92	3	428	509.0	2.50×10^{6}	$1.21 \times 10^{+6}$	4.86×10^{-1}	-0.3136
							$1.09 \times 10^{+6}$	4.34×10^{-1}	-0.3622
							$1.19 \times 10^{+6}$	4.74×10^{-1}	-0.3240
							$1.41 \times 10^{+6}$	5.66×10^{-1}	-0.2474
							$1.17 \times 10^{+6}$	4.69×10^{-1}	-0.3292
							$1.46 \times 10^{+6}$	5.83×10^{-1}	-0.2344
							$1.36 \times 10^{+6}$	5.43×10^{-1}	-0.2653
							$1.10 \times 10^{+6}$	4.40×10^{-1}	-0.3565
							$1.13 \times 10^{+6}$	4.51×10^{-1}	-0.3454
338	441	95	407	405	925.0	2.20×10^{6}	$7.29 \times 10^{+5}$	3.31×10^{-1}	-0.4800
							$6.00 \times 10^{+5}$	2.73×10^{-1}	-0.5643
							$6.57 \times 10^{+5}$	2.99×10^{-1}	-0.5248
							$8.00 \times 10^{+5}$	3.64×10^{-1}	-0.4393
							$5.43 \times 10^{+5}$	2.47×10^{-1}	-0.6077
							$6.14 \times 10^{+5}$	2.79×10^{-1}	-0.5541
							$7.43 \times 10^{+5}$	3.38×10^{-1}	-0.4715
							$7.00 \times 10^{+5}$	3.18×10^{-1}	-0.4973
							$8.71 \times 10^{+5}$	3.96×10^{-1}	-0.4022
673	413	92	662	439	1180.0	2.50×10^{6}	$5.86 \times 10^{+5}$	2.34×10^{-1}	-0.6303
							$4.57 \times 10^{+5}$	1.83×10^{-1}	-0.7379
							$5.14 \times 10^{+5}$	2.06×10^{-1}	-0.6867
							$1.01 \times 10^{+6}$	4.06×10^{-1}	-0.3918
							$7.57 \times 10^{+5}$	3.03×10^{-1}	-0.5188
							$8.29 \times 10^{+5}$	3.31×10^{-1}	-0.4796
							$9.57 \times 10^{+5}$	3.83×10^{-1}	-0.4170
							$9.14 \times 10^{+5}$	3.66×10^{-1}	-0.4369
							$1.09 \times 10^{+6}$	4.34×10^{-1}	-0.3622

Table B.2.2 (continued) Enumeration of viable spores for cycles of RUN 2 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
552	374	101	840	452	1354.0	$2.50x10^{6}$	$3.29x10^{+5}$	$1.31x10^{-1}$	-0.8813
							$3.06x10^{+5}$	$1.22x10^{-1}$	-0.9126
							$3.46x10^{+5}$	$1.38x10^{-1}$	-0.8592
							$3.36x10^{+5}$	$1.34x10^{-1}$	-0.8720
							$3.13x10^{+5}$	$1.25x10^{-1}$	-0.9026
							$2.97x10^{+5}$	$1.19x10^{-1}$	-0.9250
							$2.86x10^{+5}$	$1.14x10^{-1}$	-0.9420
							$3.29x10^{+5}$	$1.31x10^{-1}$	-0.8813
							$2.84x10^{+5}$	$1.14x10^{-1}$	-0.9442
669	416	91	1140	440	1659.0	$2.50x10^{6}$	$1.33x10^{+5}$	$5.31x10^{-2}$	-1.2746
							$1.44x10^{+5}$	$5.77x10^{-2}$	-1.2387
							$1.69x10^{+5}$	$6.74x10^{-2}$	-1.1712
							$1.83x10^{+5}$	$7.31x10^{-2}$	-1.1358
							$1.87x10^{+5}$	$7.49x10^{-2}$	-1.1258
							$1.73x10^{+5}$	$6.91x10^{-2}$	-1.1603
							$1.46x10^{+5}$	$5.83x10^{-2}$	-1.2344
							$1.54x10^{+5}$	$6.17x10^{-2}$	-1.2096
							$1.67x10^{+5}$	$6.69x10^{-2}$	-1.1749
346	378	96	1440	385	1917.5	$1.60x10^{6}$	$3.29x10^{+4}$	$2.05x10^{-2}$	-1.6875
							$4.43x10^{+4}$	$2.77x10^{-2}$	-1.5579
							$2.57x10^{+4}$	$1.61x10^{-2}$	-1.7939
							$5.43x10^{+4}$	$3.39x10^{-2}$	-1.4694
							$5.86x10^{+4}$	$3.66x10^{-2}$	-1.4364
							$4.43x10^{+4}$	$2.77x10^{-2}$	-1.5579
							$3.29x10^{+4}$	$2.05x10^{-2}$	-1.6875
							$2.86x10^{+4}$	$1.79x10^{-2}$	-1.7482
							$3.86x10^{+4}$	$2.41x10^{-2}$	-1.6179

Table B.2.2 (continued) Enumeration of viable spores for cycles of RUN 2 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
337	430	95	1800	398	2309.0	2.20×10^{6}	$5.43 \times 10^{+3}$	2.47×10^{-3}	-2.6077
							$6.29 \times 10^{+3}$	2.86×10^{-3}	-2.5441
							$8.29 \times 10^{+3}$	3.77×10^{-3}	-2.4241
							$8.43 \times 10^{+3}$	3.83×10^{-3}	-2.4167
							$6.86 \times 10^{+3}$	3.12×10^{-3}	-2.5063
							$4.57 \times 10^{+3}$	2.08×10^{-3}	-2.6824
							$7.29 \times 10^{+3}$	3.31×10^{-3}	-2.4800
							$4.43 \times 10^{+3}$	2.01×10^{-3}	-2.6962
							$5.00 \times 10^{+3}$	2.27×10^{-3}	-2.6435
554	349	102	2160	437	2655.0	2.50×10^{6}	$2.36 \times 10^{+3}$	9.43×10^{-4}	-3.0256
							$2.00 \times 10^{+3}$	8.00×10^{-4}	-3.0969
							$2.16 \times 10^{+3}$	8.63×10^{-4}	-3.0641
							$1.86 \times 10^{+3}$	7.43×10^{-4}	-3.1291
							$2.07 \times 10^{+3}$	8.29×10^{-4}	-3.0817
							$1.69 \times 10^{+3}$	6.74×10^{-4}	-3.1712
							$1.43 \times 10^{+3}$	5.71×10^{-4}	-3.2430
							$1.46 \times 10^{+3}$	5.83×10^{-4}	-3.2344
							$1.71 \times 10^{+3}$	6.86×10^{-4}	-3.1639
345	410	93	2520	388	3012.0	1.60×10^{6}	$7.14 \times 10^{+1}$	4.46×10^{-5}	-4.3502
							$8.57 \times 10^{+1}$	5.36×10^{-5}	-4.2711
							$7.14 \times 10^{+1}$	4.46×10^{-5}	-4.3502
							$8.57 \times 10^{+1}$	5.36×10^{-5}	-4.2711
							$1.14 \times 10^{+2}$	7.14×10^{-5}	-4.1461
							$1.14 \times 10^{+2}$	7.14×10^{-5}	-4.1461
							$1.14 \times 10^{+2}$	7.14×10^{-5}	-4.1461
							$1.00 \times 10^{+2}$	6.25×10^{-5}	-4.2041
							$7.14 \times 10^{+1}$	4.46×10^{-5}	-4.3502

Table B.2.2 (continued) Enumeration of viable spores for cycles of RUN 2 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
555	354	101	2940	434	3435.0	$2.50x10^{6}$	$1.43x10^{+1}$	$5.71x10^{-6}$	-5.2430
							$2.86x10^{+1}$	$1.14x10^{-5}$	-4.9420
							$2.86x10^{+1}$	$1.14x10^{-5}$	-4.9420
							$5.71x10^{+1}$	$2.29x10^{-5}$	-4.6410
							$4.29x10^{+1}$	$1.71x10^{-5}$	-4.7659
							$2.86x10^{+1}$	$1.14x10^{-5}$	-4.9420
							$1.43x10^{+1}$	$5.71x10^{-6}$	-5.2430
							$1.43x10^{+1}$	$5.71x10^{-6}$	-5.2430
							$4.29x10^{+1}$	$1.71x10^{-5}$	-4.7659

Table B.2.3 Enumeration of viable spores for cycles of RUN 3 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	$\log(N/N_0)$
							$8.14 \times 10^{+5}$	5.09×10^{-1}	-0.2933
							$8.29 \times 10^{+5}$	5.18×10^{-1}	-0.2858
							$8.86 \times 10^{+5}$	5.54×10^{-1}	-0.2568
							$8.14 \times 10^{+5}$	5.09×10^{-1}	-0.2933
370	385	95	2	329	454.0	1.60×10^{6}	$6.71 \times 10^{+5}$	4.20×10^{-1}	-0.3771
							$8.29 \times 10^{+5}$	5.18×10^{-1}	-0.2858
							$8.14 \times 10^{+5}$	5.09×10^{-1}	-0.2933
							$8.29 \times 10^{+5}$	5.18×10^{-1}	-0.2858
							$7.86 \times 10^{+5}$	4.91×10^{-1}	-0.3089
							$6.00 \times 10^{+5}$	3.75×10^{-1}	-0.4260
							$5.71 \times 10^{+5}$	3.57×10^{-1}	-0.4472
							$7.71 \times 10^{+5}$	4.82×10^{-1}	-0.3168
							$5.86 \times 10^{+5}$	3.66×10^{-1}	-0.4364
410	483	94	747	330	1247.5	1.60×10^{6}	$6.29 \times 10^{+5}$	3.93×10^{-1}	-0.4058
							$5.43 \times 10^{+5}$	3.39×10^{-1}	-0.4694
							$7.00 \times 10^{+5}$	4.38×10^{-1}	-0.3590
							$6.86 \times 10^{+5}$	4.29×10^{-1}	-0.3680
							$7.43 \times 10^{+5}$	4.64×10^{-1}	-0.3332
							$4.57 \times 10^{+5}$	2.86×10^{-1}	-0.5441
							$3.57 \times 10^{+5}$	2.23×10^{-1}	-0.6513
							$5.00 \times 10^{+5}$	3.13×10^{-1}	-0.5051
							$5.14 \times 10^{+5}$	3.21×10^{-1}	-0.4929
367	386	95	1020	335	1475.5	1.60×10^{6}	$4.29 \times 10^{+5}$	2.68×10^{-1}	-0.5721
							$4.00 \times 10^{+5}$	2.50×10^{-1}	-0.6021
							$4.43 \times 10^{+5}$	2.77×10^{-1}	-0.5579
							$4.00 \times 10^{+5}$	2.50×10^{-1}	-0.6021
							$4.86 \times 10^{+5}$	3.04×10^{-1}	-0.5177

Table B.2.3 (continued) Enumeration of viable spores for cycles of RUN 3 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
							$2.06 \times 10^{+5}$	1.29×10^{-1}	-0.8909
							$1.91 \times 10^{+5}$	1.20×10^{-1}	-0.9221
							$2.03 \times 10^{+5}$	1.27×10^{-1}	-0.8969
							$2.20 \times 10^{+5}$	1.38×10^{-1}	-0.8617
364	391	95	1620	330	2075.5	1.60×10^{6}	$2.14 \times 10^{+5}$	1.34×10^{-1}	-0.8731
							$2.11 \times 10^{+5}$	1.32×10^{-1}	-0.8790
							$1.91 \times 10^{+5}$	1.20×10^{-1}	-0.9221
							$2.03 \times 10^{+5}$	1.27×10^{-1}	-0.8969
							$2.04 \times 10^{+5}$	1.28×10^{-1}	-0.8939
							$4.49 \times 10^{+4}$	2.80×10^{-2}	-1.5523
							$4.43 \times 10^{+4}$	2.77×10^{-2}	-1.5579
							$4.46 \times 10^{+4}$	2.79×10^{-2}	-1.5551
							$4.26 \times 10^{+4}$	2.66×10^{-2}	-1.5750
362	389	95	2400	331	2855.0	1.60×10^{6}	$4.39 \times 10^{+4}$	2.74×10^{-2}	-1.5621
							$4.30 \times 10^{+4}$	2.69×10^{-2}	-1.5707
							$4.60 \times 10^{+4}$	2.88×10^{-2}	-1.5414
							$4.53 \times 10^{+4}$	2.83×10^{-2}	-1.5482
							$4.66 \times 10^{+4}$	2.91×10^{-2}	-1.5360
							$1.39 \times 10^{+4}$	8.66×10^{-3}	-2.0624
							$1.30 \times 10^{+4}$	8.13×10^{-3}	-2.0901
							$1.26 \times 10^{+4}$	7.86×10^{-3}	-2.1047
							$1.49 \times 10^{+4}$	9.29×10^{-3}	-2.0322
360	462	93	2460	331	2949.5	1.60×10^{6}	$1.59 \times 10^{+4}$	9.91×10^{-3}	-2.0039
							$1.69 \times 10^{+4}$	1.05×10^{-3}	-1.9773
							$1.23 \times 10^{+4}$	7.68×10^{-3}	-2.1147
							$2.20 \times 10^{+4}$	7.50×10^{-3}	-2.1249
							$1.27 \times 10^{+4}$	7.95×10^{-3}	-2.0998

Table B.2.3 (continued) Enumeration of viable spores for cycles of RUN 3 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
335	427	95	3540	337	4017.0	$2.20x10^{6}$	$2.09x10^{+3}$	$9.48x10^{-4}$	-3.0232
							$2.40x10^{+3}$	$1.09x10^{-3}$	-2.9622
							$2.20x10^{+3}$	$1.00x10^{-3}$	-3.0000
							$2.04x10^{+3}$	$9.29x10^{-4}$	-3.0322
							$1.99x10^{+3}$	$9.03x10^{-4}$	-3.0445
							$1.93x10^{+3}$	$8.77x10^{-4}$	-3.0572
							$2.16x10^{+3}$	$9.81x10^{-4}$	-3.0085
							$2.07x10^{+3}$	$9.42x10^{-4}$	-3.0262
							$1.93x10^{+3}$	$8.77x10^{-4}$	-3.0572
371	381	95	3720	315	4163.0	$1.60x10^{6}$	$1.00x10^{+3}$	$6.25x10^{-4}$	-3.2041
							$1.14x10^{+3}$	$7.14x10^{-4}$	-3.1461
							$1.00x10^{+3}$	$6.25x10^{-4}$	-3.2041
							$1.14x10^{+3}$	$7.14x10^{-4}$	-3.1461
							$1.43x10^{+3}$	$8.93x10^{-4}$	-3.0492
							$1.71x10^{+3}$	$1.07x10^{-3}$	-2.9700
							$1.29x10^{+3}$	$8.04x10^{-3}$	-3.0950
							$1.19x10^{+3}$	$7.41x10^{-4}$	-3.1301
							$1.24x10^{+3}$	$7.77x10^{-4}$	-3.1097
516	394	101	4500	404	5000.0	$2.50x10^{6}$	$4.86x10^{+2}$	$1.94x10^{-4}$	-3.7116
							$5.29x10^{+2}$	$2.11x10^{-4}$	-3.6748
							$5.71x10^{+2}$	$2.29x10^{-4}$	-3.6410
							$4.71x10^{+2}$	$1.89x10^{-4}$	-3.7245
							$4.57x10^{+2}$	$1.83x10^{-4}$	-3.7379
							$5.43x10^{+2}$	$2.17x10^{-4}$	-3.6633
							$5.29x10^{+2}$	$2.11x10^{-4}$	-3.6748
							$4.71x10^{+2}$	$1.89x10^{-4}$	-3.7245
							$4.57x10^{+2}$	$1.83x10^{-4}$	-3.7379

Table B.2.3 (continued) Enumeration of viable spores for cycles of RUN 3 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
							$2.00x10^{+2}$	$8.00x10^{-5}$	-4.0969
							$2.29x10^{+2}$	$9.14x10^{-5}$	-4.0389
							$1.86x10^{+2}$	$7.43x10^{-5}$	-4.1291
							$4.00x10^{+2}$	$1.60x10^{-4}$	-3.7959
545	396	116	4860	412	5380.0	$2.50x10^{6}$	$3.86x10^{+2}$	$1.54x10^{-4}$	-3.8117
							$3.29x10^{+2}$	$1.31x10^{-4}$	-3.8816
							$3.86x10^{+2}$	$1.54x10^{-4}$	-3.8117
							$4.29x10^{+2}$	$1.71x10^{-4}$	-3.7659
							$3.29x10^{+2}$	$1.31x10^{-4}$	-3.8813
							$8.57x10^{+1}$	$3.43x10^{-5}$	-4.4649
							$1.00x10^{+2}$	$4.00x10^{-5}$	-4.3979
							$8.57x10^{+1}$	$3.43x10^{-5}$	-4.4649
							$8.57x10^{+1}$	$3.43x10^{-5}$	-4.4649
515	380	93	5400	394	5880.0	$2.50x10^{6}$	$8.57x10^{+1}$	$3.43x10^{-5}$	-4.4649
							$1.00x10^{+2}$	$4.00x10^{-5}$	-4.3979
							$8.57x10^{+1}$	$3.43x10^{-5}$	-4.4649
							$8.57x10^{+1}$	$3.43x10^{-5}$	-4.4649
							$1.00x10^{+2}$	$4.00x10^{-5}$	-4.3979

Table B.2.4 Enumeration of viable spores for cycles of RUN 4 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
489	505	110	0	507	616.0	$2.50x10^6$	$4.71x10^{+5}$	$1.89x10^{-1}$	-0.7245
							$4.93x10^{+5}$	$1.97x10^{-1}$	-0.7052
							$4.91x10^{+5}$	$1.97x10^{-1}$	-0.7065
							$4.04x10^{+5}$	$1.62x10^{-1}$	-0.7913
							$4.63x10^{+5}$	$1.85x10^{-1}$	-0.7325
							$4.44x10^{+5}$	$1.78x10^{-1}$	-0.7503
							$4.09x10^{+5}$	$1.63x10^{-1}$	-0.7867
							$4.24x10^{+5}$	$1.70x10^{-1}$	-0.7703
							$3.94x10^{+5}$	$1.58x10^{-1}$	-0.8021
535	563	102	5	583	680.0	$2.50x10^6$	$2.57x10^{+5}$	$1.03x10^{-1}$	-0.9878
							$2.79x10^{+5}$	$1.11x10^{-1}$	-0.9530
							$2.49x10^{+5}$	$9.94x10^{-2}$	-1.0025
							$2.61x10^{+5}$	$1.05x10^{-1}$	-0.9806
							$2.49x10^{+5}$	$9.94x10^{-2}$	-1.0025
							$2.30x10^{+5}$	$9.20x10^{-2}$	-1.0362
							$2.66x10^{+5}$	$1.06x10^{-1}$	-0.9735
							$2.81x10^{+5}$	$1.13x10^{-1}$	-0.9486
							$2.80x10^{+5}$	$1.12x10^{-1}$	-0.9508
597	640	106	90	588	810.0	$3.60x10^6$	$1.54x10^{+5}$	$4.29x10^{-2}$	-1.3680
							$1.31x10^{+5}$	$3.65x10^{-2}$	-1.4376
							$1.57x10^{+5}$	$4.37x10^{-2}$	-1.3600
							$1.43x10^{+5}$	$3.97x10^{-2}$	-1.4014
							$1.56x10^{+5}$	$4.33x10^{-2}$	-1.3640
							$1.61x10^{+5}$	$4.48x10^{-2}$	-1.3483
							$1.90x10^{+5}$	$5.28x10^{-2}$	-1.2775
							$1.54x10^{+5}$	$4.29x10^{-2}$	-1.3680
							$1.84x10^{+5}$	$5.12x10^{-2}$	-1.2908

Table B.2.4 (continued) Enumeration of viable spores for cycles of RUN 4 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
449	652	94	211	548	905.0	$1.60x10^6$	$2.43x10^{+4}$	$1.52x10^{-2}$	-1.8188
							$2.51x10^{+4}$	$1.57x10^{-2}$	-1.8037
							$2.33x10^{+4}$	$1.46x10^{-2}$	-1.8370
							$2.16x10^{+4}$	$1.35x10^{-2}$	-1.8702
							$1.63x10^{+4}$	$1.02x10^{-2}$	-1.9923
							$1.51x10^{+4}$	$9.46x10^{-3}$	-2.0239
							$2.51x10^{+4}$	$1.57x10^{-2}$	-1.8037
							$2.87x10^{+4}$	$1.79x10^{-2}$	-1.7460
							$3.27x10^{+4}$	$2.04x10^{-2}$	-1.6894
450	669	94	392	552	1096.5	$1.60x10^6$	$4.29x10^{+3}$	$2.68x10^{-3}$	-2.5721
							$3.71x10^{+3}$	$2.32x10^{-3}$	-2.6342
							$4.57x10^{+3}$	$2.86x10^{-3}$	-2.5441
							$4.86x10^{+3}$	$3.04x10^{-3}$	-2.5177
							$4.71x10^{+3}$	$2.95x10^{-3}$	-2.5307
							$4.43x10^{+3}$	$2.77x10^{-3}$	-2.5579
							$5.00x10^{+3}$	$3.13x10^{-3}$	-2.5051
							$4.71x10^{+3}$	$2.95x10^{-3}$	-2.5307
							$4.29x10^{+3}$	$2.68x10^{-3}$	-2.5721
500	539	92	543	603	1206.0	$2.50x10^6$	$3.23x10^{+3}$	$1.29x10^{-3}$	-2.8889
							$3.13x10^{+3}$	$1.25x10^{-3}$	-2.9026
							$3.04x10^{+3}$	$1.22x10^{-3}$	-2.9147
							$3.10x10^{+3}$	$1.24x10^{-3}$	-2.9066
							$2.67x10^{+3}$	$1.07x10^{-3}$	-2.9712
							$3.13x10^{+3}$	$1.25x10^{-3}$	-2.9026
							$3.04x10^{+3}$	$1.22x10^{-3}$	-2.9147
							$3.03x10^{+3}$	$1.21x10^{-3}$	-2.9167
							$2.60x10^{+3}$	$1.04x10^{-3}$	-2.9830

Table B.2.4 (continued) Enumeration of viable spores for cycles of RUN 4 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
512	554	89	721	616	1395.0	$2.50x10^6$	$1.11x10^{+3}$	$4.46x10^{-4}$	-3.3509
							$1.24x10^{+3}$	$4.97x10^{-4}$	-3.3035
							$1.21x10^{+3}$	$4.86x10^{-4}$	-3.3136
							$1.23x10^{+3}$	$4.91x10^{-4}$	-3.3085
							$1.20x10^{+3}$	$4.80x10^{-4}$	-3.3188
							$1.19x10^{+3}$	$4.74x10^{-4}$	-3.3240
							$1.21x10^{+3}$	$4.86x10^{-4}$	-3.3136
							$1.13x10^{+3}$	$4.51x10^{-4}$	-3.3454
							$1.21x10^{+3}$	$4.86x10^{-4}$	-3.3136
546	560	102	899	628	1595.0	$2.50x10^6$	$3.14x10^{+2}$	$1.26x10^{-4}$	-3.9006
							$3.29x10^{+2}$	$1.31x10^{-4}$	-3.8813
							$2.14x10^{+2}$	$8.57x10^{-5}$	-4.0669
							$1.86x10^{+2}$	$7.43x10^{-5}$	-4.1291
							$1.57x10^{+2}$	$6.29x10^{-5}$	-4.2016
							$1.57x10^{+2}$	$6.29x10^{-5}$	-4.2016
							$3.29x10^{+2}$	$1.31x10^{-4}$	-3.8813
							$1.86x10^{+2}$	$7.43x10^{-5}$	-4.1291
							$3.00x10^{+2}$	$1.20x10^{-4}$	-3.9208
501	507	91	1200	603	1846.0	$2.50x10^6$	$5.71x10^{+1}$	$2.29x10^{-5}$	-4.6410
							$5.71x10^{+1}$	$2.29x10^{-5}$	-4.6410
							$4.29x10^{+1}$	$1.71x10^{-5}$	-4.7659
							$2.86x10^{+1}$	$1.14x10^{-5}$	-4.9420
							$5.71x10^{+1}$	$2.29x10^{-5}$	-4.6410
							$5.71x10^{+1}$	$2.29x10^{-5}$	-4.6410
							$7.14x10^{+1}$	$2.86x10^{-5}$	-4.5441
							$5.71x10^{+1}$	$2.29x10^{-5}$	-4.6410
							$4.29x10^{+1}$	$1.71x10^{-5}$	-4.7659

Table B.2.5 Enumeration of viable spores for cycles of RUN 5 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
							$5.71x10^{+5}$	$1.59x10^{-1}$	-0.7993
							$3.86x10^{+5}$	$1.07x10^{-1}$	-0.9700
							$3.00x10^{+5}$	$8.33x10^{-2}$	-1.0792
							$6.00x10^{+5}$	$1.67x10^{-1}$	-0.7782
636	406	90	5	480	538.0	$3.60x10^{6}$	$6.57x10^{+5}$	$1.83x10^{-1}$	-0.7386
							$6.00x10^{+5}$	$1.67x10^{-1}$	-0.7782
							$5.14x10^{+5}$	$1.43x10^{-1}$	-0.8451
							$5.00x10^{+5}$	$1.39x10^{-1}$	-0.8573
							$5.43x10^{+5}$	$1.51x10^{-1}$	-0.8216
							$8.86x10^{+4}$	$2.46x10^{-2}$	-1.6090
							$8.14x10^{+4}$	$2.26x10^{-2}$	-1.6455
							$8.43x10^{+4}$	$2.34x10^{-2}$	-1.6305
							$7.29x10^{+4}$	$2.02x10^{-2}$	-1.6938
638	394	90	164	466	684.0	$3.60x10^{6}$	$9.71x10^{+4}$	$2.70x10^{-2}$	-1.5689
							$7.14x10^{+4}$	$1.98x10^{-2}$	-1.7024
							$8.71x10^{+4}$	$2.42x10^{-2}$	-1.6161
							$9.86x10^{+4}$	$2.74x10^{-2}$	-1.5626
							$8.14x10^{+4}$	$2.26x10^{-2}$	-1.6455
							$2.17x10^{+4}$	$6.03x10^{-3}$	-2.2196
							$2.26x10^{+4}$	$6.27x10^{-3}$	-2.2027
							$2.14x10^{+4}$	$5.95x10^{-3}$	-2.2253
							$2.40x10^{+4}$	$6.67x10^{-3}$	-2.1761
633	413	91	315	500	862.5	$3.60x10^{6}$	$2.06x10^{+4}$	$5.71x10^{-3}$	-2.2430
							$2.23x10^{+4}$	$6.19x10^{-3}$	-2.2083
							$2.40x10^{+4}$	$6.67x10^{-3}$	-2.1761
							$2.21x10^{+4}$	$6.15x10^{-3}$	-2.2111
							$2.07x10^{+4}$	$5.75x10^{-3}$	-2.2400

Table B.2.5 (continued) Enumeration of viable spores for cycles of RUN 5 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
							$7.86x10^{+2}$	$2.18x10^{-4}$	-3.6610
							$9.00x10^{+2}$	$2.50x10^{-4}$	-3.6021
							$9.57x10^{+2}$	$2.66x10^{-4}$	-3.5753
							$6.14x10^{+2}$	$1.71x10^{-4}$	-3.7679
631	387	91	604	446	1111.5	$3.60x10^{6}$	$7.29x10^{+2}$	$2.02x10^{-4}$	-3.6938
							$9.71x10^{+2}$	$2.70x10^{-4}$	-3.5689
							$8.14x10^{+2}$	$2.26x10^{-4}$	-3.6455
							$8.29x10^{+2}$	$2.30x10^{-4}$	-3.6380
							$8.29x10^{+2}$	$2.30x10^{-4}$	-3.6380
							$2.86x10^{+2}$	$7.94x10^{-5}$	-4.1004
							$2.86x10^{+2}$	$7.94x10^{-5}$	-4.1004
							$2.86x10^{+2}$	$7.94x10^{-5}$	-4.1004
							$4.29x10^{+2}$	$1.19x10^{-4}$	-3.9243
634	400	91	757	500	1298.0	$3.60x10^{6}$	$4.29x10^{+2}$	$1.19x10^{-4}$	-3.9243
							$2.86x10^{+2}$	$7.94x10^{-5}$	-4.1004
							$3.43x10^{+2}$	$9.52x10^{-5}$	-4.0212
							$2.57x10^{+2}$	$7.14x10^{-5}$	-4.1461
							$2.57x10^{+2}$	$7.14x10^{-5}$	-4.1461
							$7.14x10^{+1}$	$2.46x10^{-5}$	-4.6085
							$5.71x10^{+1}$	$1.97x10^{-5}$	-4.7054
							$1.00x10^{+2}$	$3.45x10^{-5}$	-4.4624
							$1.29x10^{+2}$	$4.43x10^{-5}$	-4.3533
689	427	89	900	467	1436.0	$2.90x10^{6}$	$7.14x10^{+1}$	$2.46x10^{-5}$	-4.6085
							$7.14x10^{+1}$	$2.46x10^{-5}$	-4.6085
							$7.14x10^{+1}$	$2.46x10^{-5}$	-4.6085
							$7.14x10^{+1}$	$2.46x10^{-5}$	-4.6085
							$8.57x10^{+1}$	$2.96x10^{-5}$	-4.5293

Table B.2.6 Enumeration of viable spores for cycles of RUN 6 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
							$7.00x10^{+5}$	$4.38x10^{-1}$	-0.3590
							$7.29x10^{+5}$	$4.55x10^{-1}$	-0.3416
							$7.86x10^{+5}$	$4.91x10^{-1}$	-0.3089
							$6.71x10^{+5}$	$4.20x10^{-1}$	-0.3771
434	605	92	3	530	662.5	$1.60x10^{6}$	$6.00x10^{+5}$	$3.75x10^{-1}$	-0.4260
							$7.29x10^{+5}$	$4.55x10^{-1}$	-0.3416
							$7.29x10^{+5}$	$4.55x10^{-1}$	-0.3416
							$7.57x10^{+5}$	$4.73x10^{-1}$	-0.3249
							$8.71x10^{+5}$	$5.45x10^{-1}$	-0.2639
							$3.83x10^{+5}$	$2.39x10^{-1}$	-0.6211
							$3.89x10^{+5}$	$2.43x10^{-1}$	-0.6146
							$4.09x10^{+5}$	$2.55x10^{-1}$	-0.5929
							$3.26x10^{+5}$	$2.04x10^{-1}$	-0.6913
463	623	90	180	591	877.0	$1.60x10^{6}$	$3.10x10^{+5}$	$1.94x10^{-1}$	-0.7128
							$3.46x10^{+5}$	$2.16x10^{-1}$	-0.6654
							$3.19x10^{+5}$	$1.99x10^{-1}$	-0.7009
							$3.37x10^{+5}$	$2.11x10^{-1}$	-0.6763
							$3.53x10^{+5}$	$2.21x10^{-1}$	-0.6565
							$2.21x10^{+5}$	$8.86x10^{-2}$	-1.0527
							$2.46x10^{+5}$	$9.83x10^{-2}$	-1.0075
							$2.13x10^{+5}$	$8.51x10^{-2}$	-1.0669
							$1.93x10^{+5}$	$7.71x10^{-2}$	-1.1127
471	560	88	420	538	1057.0	$2.50x10^{6}$	$2.11x10^{+5}$	$8.46x10^{-2}$	-1.0728
							$1.73x10^{+5}$	$6.91x10^{-2}$	-1.1603
							$2.49x10^{+5}$	$9.94x10^{-2}$	-1.0025
							$2.74x10^{+5}$	$1.10x10^{-1}$	-0.9597
							$2.93x10^{+5}$	$1.17x10^{-1}$	-0.9313

Table B.2.6 (continued) Enumeration of viable spores for cycles of RUN 6 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
							$9.29x10^{+4}$	$3.71x10^{-2}$	-1.4301
							$8.00x10^{+4}$	$3.20x10^{-2}$	-1.4949
							$8.71x10^{+4}$	$3.49x10^{-2}$	-1.4577
							$1.01x10^{+5}$	$4.06x10^{-2}$	-1.3918
483	592	85	548	540	1199.0	$2.50x10^{6}$	$1.17x10^{+5}$	$4.69x10^{-2}$	-1.3292
							$1.10x10^{+5}$	$4.40x10^{-2}$	-1.3565
							$1.30x10^{+5}$	$5.20x10^{-2}$	-1.2840
							$1.27x10^{+5}$	$5.09x10^{-2}$	-1.2936
							$1.46x10^{+5}$	$5.83x10^{-2}$	-1.2344
							$4.86x10^{+4}$	$1.94x10^{-2}$	-1.7116
							$4.00x10^{+4}$	$1.60x10^{-2}$	-1.7959
							$4.71x10^{+4}$	$1.89x10^{-2}$	-1.7245
							$4.57x10^{+4}$	$1.83x10^{-2}$	-1.7379
486	630	91	660	531	1331.5	$2.50x10^{6}$	$5.14x10^{+4}$	$2.06x10^{-2}$	-1.6867
							$5.86x10^{+4}$	$2.34x10^{-2}$	-1.6303
							$6.29x10^{+4}$	$2.51x10^{-2}$	-1.5996
							$6.14x10^{+4}$	$2.46x10^{-2}$	-1.6096
							$5.57x10^{+4}$	$2.23x10^{-2}$	-1.6520
							$1.80x10^{+4}$	$7.20x10^{-3}$	-2.1427
							$1.70x10^{+4}$	$6.80x10^{-3}$	-2.1675
							$1.90x10^{+4}$	$7.60x10^{-3}$	-2.1192
							$2.29x10^{+4}$	$9.14x10^{-3}$	-2.0389
472	547	92	834	548	1473.5	$2.50x10^{6}$	$2.20x10^{+4}$	$8.80x10^{-3}$	-2.0555
							$2.49x10^{+4}$	$9.94x10^{-3}$	-2.0025
							$2.21x10^{+4}$	$8.86x10^{-3}$	-2.0527
							$2.33x10^{+4}$	$9.31x10^{-3}$	-2.0309
							$2.10x10^{+4}$	$8.40x10^{-3}$	-2.0757

Table B.2.6 (continued) Enumeration of viable spores for cycles of RUN 6 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
518	584	105	900	607	1600.5	$2.50x10^{6}$	$1.06x10^{+4}$	$4.23x10^{-3}$	-2.3738
							$1.16x10^{+4}$	$4.63x10^{-3}$	-2.3346
							$9.86x10^{+3}$	$3.94x10^{-3}$	-2.4042
							$8.71x10^{+3}$	$3.49x10^{-3}$	-2.4577
							$1.01x10^{+4}$	$4.06x10^{-3}$	-2.3918
							$8.29x10^{+3}$	$3.31x10^{-3}$	-2.4796
							$1.33x10^{+4}$	$5.31x10^{-3}$	-2.2746
							$9.43x10^{+3}$	$3.77x10^{-3}$	-2.4235
							$1.16x10^{+4}$	$4.63x10^{-3}$	-2.3346
509	550	90	1140	590	1800.0	$2.50x10^{6}$	$5.40x10^{+3}$	$2.16x10^{-3}$	-2.6655
							$4.90x10^{+3}$	$1.96x10^{-3}$	-2.7077
							$5.23x10^{+3}$	$2.09x10^{-3}$	-2.6796
							$5.14x10^{+3}$	$2.06x10^{-3}$	-2.6867
							$5.34x10^{+3}$	$2.14x10^{-3}$	-2.6702
							$5.20x10^{+3}$	$2.08x10^{-3}$	-2.6819
							$5.29x10^{+3}$	$2.11x10^{-3}$	-2.6748
							$5.19x10^{+3}$	$2.07x10^{-3}$	-2.6831
							$5.24x10^{+3}$	$2.10x10^{-3}$	-2.6784
680	715	85	1260	601	2003.0	$1.60x10^{6}$	$1.51x10^{+3}$	$9.46x10^{-4}$	-3.0239
							$1.71x10^{+3}$	$1.07x10^{-3}$	-2.9700
							$1.57x10^{+3}$	$9.82x10^{-4}$	-3.0078
							$2.34x10^{+3}$	$1.46x10^{-3}$	-2.8344
							$2.21x10^{+3}$	$1.38x10^{-3}$	-2.8589
							$2.40x10^{+3}$	$1.50x10^{-3}$	-2.8239
							$2.06x10^{+3}$	$1.29x10^{-3}$	-2.8909
							$2.09x10^{+3}$	$1.30x10^{-3}$	-2.8849
							$1.94x10^{+3}$	$1.21x10^{-3}$	-2.9157

Table B.2.6 (continued) Enumeration of viable spores for cycles of RUN 6 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
							$4.86 \times 10^{+2}$	3.04×10^{-4}	-3.5177
							$4.00 \times 10^{+2}$	2.50×10^{-4}	-3.6021
							$4.43 \times 10^{+2}$	2.77×10^{-4}	-3.5579
							$6.00 \times 10^{+2}$	3.75×10^{-4}	-3.4260
681	711	95	1500	599	2250.0	1.60×10^{6}	$5.29 \times 10^{+2}$	3.30×10^{-4}	-3.4810
							$6.86 \times 10^{+2}$	4.29×10^{-4}	-3.3680
							$3.14 \times 10^{+2}$	1.96×10^{-4}	-3.7068
							$3.57 \times 10^{+2}$	2.23×10^{-4}	-3.6513
							$4.29 \times 10^{+2}$	2.68×10^{-4}	-3.5721
							$1.29 \times 10^{+2}$	8.04×10^{-5}	-4.0950
							$1.14 \times 10^{+2}$	7.14×10^{-5}	-4.1461
							$1.57 \times 10^{+2}$	9.82×10^{-5}	-4.0078
							$1.00 \times 10^{+2}$	6.25×10^{-5}	-4.2041
508	700	100	1800	580	2540.0	1.60×10^{6}	$7.14 \times 10^{+1}$	4.46×10^{-5}	-4.3502
							$1.43 \times 10^{+2}$	8.93×10^{-5}	-4.0492
							$1.29 \times 10^{+2}$	8.04×10^{-5}	-4.0950
							$1.00 \times 10^{+2}$	6.25×10^{-5}	-4.2041
							$1.14 \times 10^{+2}$	7.14×10^{-5}	-4.1461
							$5.71 \times 10^{+1}$	3.57×10^{-5}	-4.4472
							$4.29 \times 10^{+1}$	2.68×10^{-5}	-4.5721
							$8.57 \times 10^{+1}$	5.36×10^{-5}	-4.2711
							$2.86 \times 10^{+1}$	1.79×10^{-5}	-4.7482
510	684	88	2100	560	2810.0	1.60×10^{6}	$7.14 \times 10^{+1}$	4.46×10^{-5}	-4.3502
							$5.71 \times 10^{+1}$	3.57×10^{-5}	-4.4472
							$4.29 \times 10^{+1}$	2.68×10^{-5}	-4.5721
							$8.57 \times 10^{+1}$	5.36×10^{-5}	-4.2711
							$7.14 \times 10^{+1}$	4.46×10^{-5}	-4.3502

Table B.2.6 (continued) Enumeration of viable spores for cycles of RUN 6 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
520	613	86	2220	575	2900.0	$1.60x10^{6}$	$1.43x10^{+1}$	$8.93x10^{-6}$	-5.0492
							$1.43x10^{+1}$	$8.93x10^{-6}$	-5.0492
							$2.86x10^{+1}$	$1.79x10^{-5}$	-4.7482
							$4.29x10^{+1}$	$2.68x10^{-5}$	-4.5721
							$1.43x10^{+1}$	$8.93x10^{-6}$	-5.0492
							$2.86x10^{+1}$	$1.79x10^{-5}$	-4.7482
							$4.29x10^{+1}$	$2.68x10^{-5}$	-4.5721
							$5.71x10^{+1}$	$3.57x10^{-5}$	-4.4472
							$2.86x10^{+1}$	$1.79x10^{-5}$	-4.7482

Table B.2.7 Enumeration of viable spores for cycles of RUN 7 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
							$7.14 \times 10^{+2}$	2.86×10^{-4}	-3.5441
							$7.29 \times 10^{+2}$	2.91×10^{-4}	-3.5355
							$8.43 \times 10^{+2}$	3.37×10^{-4}	-3.4722
							$1.06 \times 10^{+3}$	4.23×10^{-4}	-3.3738
649	532	89	2	651	682.5	2.50×10^{6}	$1.33 \times 10^{+3}$	5.31×10^{-4}	-3.2746
							$1.46 \times 10^{+3}$	5.83×10^{-4}	-3.2344
							$1.69 \times 10^{+3}$	6.74×10^{-4}	-3.1712
							$1.63 \times 10^{+3}$	6.51×10^{-4}	-3.1861
							$1.53 \times 10^{+3}$	6.11×10^{-4}	-3.2137
							$1.43 \times 10^{+3}$	3.97×10^{-4}	-3.4014
							$1.49 \times 10^{+3}$	4.13×10^{-4}	-3.3844
							$1.47 \times 10^{+3}$	4.09×10^{-4}	-3.3886
							$1.46 \times 10^{+3}$	4.05×10^{-4}	-3.3928
648	577	88	20	641	717.0	3.60×10^{6}	$1.66 \times 10^{+3}$	4.60×10^{-4}	-3.3369
							$1.61 \times 10^{+3}$	4.48×10^{-4}	-3.3483
							$1.44 \times 10^{+3}$	4.01×10^{-4}	-3.3971
							$1.49 \times 10^{+3}$	4.13×10^{-4}	-3.3844
							$1.74 \times 10^{+3}$	4.84×10^{-4}	-3.3150
							$8.43 \times 10^{+2}$	3.37×10^{-4}	-3.4722
							$5.43 \times 10^{+2}$	2.17×10^{-4}	-3.6633
							$4.86 \times 10^{+2}$	1.94×10^{-4}	-3.7116
							$7.43 \times 10^{+2}$	2.97×10^{-4}	-3.5270
646	582	88	50	641	749.5	2.50×10^{6}	$1.00 \times 10^{+3}$	4.00×10^{-4}	-3.3979
							$5.00 \times 10^{+2}$	2.00×10^{-4}	-3.6990
							$7.71 \times 10^{+2}$	3.09×10^{-4}	-3.5106
							$7.43 \times 10^{+2}$	2.97×10^{-4}	-3.5270
							$1.16 \times 10^{+3}$	4.63×10^{-4}	-3.3346

Table B.2.7 (continued) Enumeration of viable spores for cycles of RUN 7 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
664	552	88	80	637	762.5	$2.50x10^{6}$	$3.14x10^{+2}$	$1.26x10^{-4}$	-3.9006
							$5.00x10^{+2}$	$2.00x10^{-4}$	-3.6990
							$4.00x10^{+2}$	$1.60x10^{-4}$	-3.7959
							$4.14x10^{+2}$	$1.66x10^{-4}$	-3.7806
							$3.57x10^{+2}$	$1.43x10^{-4}$	-3.8451
							$4.14x10^{+2}$	$1.66x10^{-4}$	-3.7806
							$3.43x10^{+2}$	$1.37x10^{-4}$	-3.8628
							$3.29x10^{+2}$	$1.31x10^{-4}$	-3.8813
							$3.86x10^{+2}$	$1.54x10^{-4}$	-3.8117
684	592	88	130	631	829.5	$3.60x10^{6}$	$1.43x10^{+2}$	$3.97x10^{-5}$	-4.4014
							$3.29x10^{+2}$	$9.13x10^{-5}$	-4.0397
							$2.00x10^{+2}$	$5.56x10^{-5}$	-4.2553
							$2.43x10^{+2}$	$6.75x10^{-5}$	-4.1710
							$2.29x10^{+2}$	$6.35x10^{-5}$	-4.1973
							$1.71x10^{+2}$	$4.76x10^{-5}$	-4.3122
							$2.14x10^{+2}$	$5.95x10^{-5}$	-4.2253
							$2.57x10^{+2}$	$7.14x10^{-5}$	-4.1461
							$1.86x10^{+2}$	$5.16x10^{-5}$	-4.2875
647	586	88	180	660	891.0	$3.60x10^{6}$	$1.86x10^{+2}$	$5.16x10^{-5}$	-4.2875
							$1.71.x10^{+2}$	$4.76x10^{-5}$	-4.3222
							$1.86x10^{+2}$	$5.16x10^{-5}$	-4.2875
							$1.29x10^{+2}$	$3.57x10^{-5}$	-4.4472
							$1.14x10^{+2}$	$3.17x10^{-5}$	-4.4983
							$1.71x10^{+2}$	$4.76x10^{-5}$	-4.3222
							$2.86x10^{+1}$	$7.94x10^{-6}$	-5.1004
							$5.71x10^{+1}$	$1.59x10^{-5}$	-4.7993
							$2.00x10^{+2}$	$5.56x10^{-5}$	-4.2553

Table B.2.7 (continued) Enumeration of viable spores for cycles of RUN 7 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
661	542	88	230	647	912.5	$3.60x10^{6}$	$1.43x10^{+1}$	$3.97x10^{-6}$	-5.4014
							$4.29x10^{+1}$	$1.19x10^{-5}$	-4.9243
							$5.71x10^{+1}$	$1.59x10^{-5}$	-4.7993
							$4.29x10^{+1}$	$1.19x10^{-5}$	-4.9243
							$4.29x10^{+1}$	$1.19x10^{-5}$	-4.9243
							$7.14x10^{+1}$	$1.98x10^{-5}$	-4.7024
							$2.86x10^{+1}$	$7.94x10^{-6}$	-5.1004
							$2.86x10^{+1}$	$7.94x10^{-6}$	-5.1004
							$5.71x10^{+1}$	$1.59x10^{-5}$	-4.7993

Table B.2.8 Enumeration of viable spores for cycles of RUN 9 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	$\log(N/N_0)$
							$1.11\times10^{+6}$	3.84×10^{-1}	-0.4154
							$1.06\times10^{+6}$	3.65×10^{-1}	-0.4383
							$9.71\times10^{+5}$	3.35×10^{-1}	-0.4750
							$1.23\times10^{+6}$	4.24×10^{-1}	-0.3730
819	726	93	7	596	761.0	2.90×10^{6}	$1.17\times10^{+6}$	4.04×10^{-1}	-0.3937
							$1.09\times10^{+6}$	3.74×10^{-1}	-0.4267
							$8.43\times10^{+5}$	2.91×10^{-1}	-0.5366
							$1.03\times10^{+6}$	3.55×10^{-1}	-0.4502
							$9.29\times10^{+5}$	3.20×10^{-1}	-0.4946
							$3.99\times10^{+5}$	1.37×10^{-1}	-0.8619
							$4.16\times10^{+5}$	1.43×10^{-1}	-0.8436
							$4.26\times10^{+5}$	1.47×10^{-1}	-0.8333
							$4.47\times10^{+5}$	1.54×10^{-1}	-0.8120
824	785	94	245	591	1027.0	2.90×10^{6}	$4.41\times10^{+5}$	1.52×10^{-1}	-0.8175
							$4.60\times10^{+5}$	1.59×10^{-1}	-0.7996
							$3.83\times10^{+5}$	1.32×10^{-1}	-0.8794
							$4.06\times10^{+5}$	1.40×10^{-1}	-0.8542
							$4.20\times10^{+5}$	1.45×10^{-1}	-0.8391
							$1.60\times10^{+5}$	5.52×10^{-2}	-1.2583
							$1.46\times10^{+5}$	5.02×10^{-2}	-1.2989
							$1.40\times10^{+5}$	4.83×10^{-2}	-1.3163
							$2.14\times10^{+5}$	7.39×10^{-2}	-1.1314
816	726	94	489	596	1244.0	2.90×10^{6}	$2.73\times10^{+5}$	9.41×10^{-2}	-1.0265
							$2.43\times10^{+5}$	8.37×10^{-2}	-1.0770
							$2.04\times10^{+5}$	7.04×10^{-2}	-1.1522
							$1.81\times10^{+5}$	6.26×10^{-2}	-1.2037
							$2.27\times10^{+5}$	7.83×10^{-2}	-1.1061

Table B.2.8 (continued) Enumeration of viable spores for cycles of RUN 9 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
818	738	94	899	589	1656.5	$2.90x10^6$	$5.14x10^{+4}$	$1.77x10^{-2}$	-1.7512
							$6.71x10^{+4}$	$2.32x10^{-2}$	-1.6354
							$4.86x10^{+4}$	$1.67x10^{-2}$	-1.7760
							$5.86x10^{+4}$	$2.02x10^{-2}$	-1.6947
							$5.43x10^{+4}$	$1.87x10^{-2}$	-1.7277
							$6.29x10^{+4}$	$2.17x10^{-2}$	-1.6640
							$6.57x10^{+4}$	$2.27x10^{-2}$	-1.6447
							$4.71x10^{+4}$	$1.63x10^{-2}$	-1.7890
							$5.43x10^{+4}$	$1.87x10^{-2}$	-1.7277
873	744	94	900	631	1681.5	$2.90x10^6$	$4.29x10^{+4}$	$1.48x10^{-2}$	-1.8304
							$5.57x10^{+4}$	$1.92x10^{-2}$	-1.7164
							$6.71x10^{+4}$	$2.32x10^{-2}$	-1.6354
							$4.43x10^{+4}$	$1.53x10^{-2}$	-1.8161
							$3.00x10^{+4}$	$1.03x10^{-2}$	-1.9853
							$3.29x10^{+4}$	$1.13x10^{-2}$	-1.9458
							$2.71x10^{+4}$	$9.36x10^{-3}$	-2.0287
							$2.43x10^{+4}$	$8.37x10^{-3}$	-2.0770
							$3.43x10^{+4}$	$1.18x10^{-2}$	-1.9273
817	751	93	1199	590	1962.5	$2.90x10^6$	$4.71x10^{+3}$	$1.63x10^{-3}$	-2.7890
							$4.19x10^{+3}$	$1.44x10^{-3}$	-2.8406
							$4.36x10^{+3}$	$1.50x10^{-3}$	-2.8232
							$8.24x10^{+3}$	$2.84x10^{-3}$	-2.5463
							$7.10x10^{+3}$	$2.45x10^{-3}$	-2.6111
							$8.00x10^{+3}$	$2.76x10^{-3}$	-2.5593
							$6.14x10^{+3}$	$2.12x10^{-3}$	-2.6740
							$7.43x10^{+3}$	$2.56x10^{-3}$	-2.5915
							$8.14x10^{+3}$	$2.81x10^{-3}$	-2.5516

Table B.2.8 (continued) Enumeration of viable spores for cycles of RUN 9 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
							$4.16x10^{+3}$	$1.43x10^{-3}$	-2.8436
							$4.59x10^{+3}$	$1.58x10^{-3}$	-2.8010
							$4.83x10^{+3}$	$1.67x10^{-3}$	-2.7786
							$3.06x10^{+3}$	$1.05x10^{-3}$	-2.9771
869	719	96	1319	637	2093.0	$2.90x10^{6}$	$2.80x10^{+3}$	$9.66x10^{-4}$	-3.0152
							$2.71x10^{+3}$	$9.36x10^{-4}$	-3.0287
							$4.69x10^{+3}$	$1.62x10^{-3}$	-2.7916
							$4.19x10^{+3}$	$1.44x10^{-3}$	-2.8406
							$4.71x10^{+3}$	$1.63x10^{-3}$	-2.7890
							$1.11x10^{+3}$	$3.84x10^{-4}$	-3.4154
							$1.49x10^{+3}$	$5.12x10^{-4}$	-3.2905
							$1.21x10^{+3}$	$4.19x10^{-4}$	-3.3781
							$7.14x10^{+2}$	$2.46x10^{-4}$	-3.6085
870	728	92	1619	638	2394.0	$2.90x10^{6}$	$6.86x10^{+2}$	$2.36x10^{-4}$	-3.6263
							$1.00x10^{+3}$	$3.45x10^{-4}$	-3.4624
							$1.47x10^{+3}$	$5.07x10^{-4}$	-3.2947
							$1.40x10^{+3}$	$4.83x10^{-4}$	-3.3163
							$1.17x10^{+3}$	$4.04x10^{-4}$	-3.3937
							$6.14x10^{+2}$	$2.12x10^{-4}$	-3.6740
							$5.00x10^{+2}$	$1.72x10^{-4}$	-3.7634
							$6.57x10^{+2}$	$2.27x10^{-4}$	-3.6447
							$6.14x10^{+2}$	$2.12x10^{-4}$	-3.6740
871	712	92	1680	606	2431.0	$2.90x10^{6}$	$5.00x10^{+2}$	$1.72x10^{-4}$	-3.7634
							$4.57x10^{+2}$	$1.58x10^{-4}$	-3.8023
							$5.71x10^{+2}$	$1.97x10^{-4}$	-3.7054
							$6.29x10^{+2}$	$2.17x10^{-4}$	-3.6640
							$6.57x10^{+2}$	$2.27x10^{-4}$	-3.6447

Table B.2.8 (continued) Enumeration of viable spores for cycles of RUN 9 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
872	757	98	1980	645	2779.0	$2.90x10^{6}$	$1.14x10^{+2}$	$3.94x10^{-5}$	-4.4044
							$1.14x10^{+2}$	$3.94x10^{-5}$	-4.4044
							$5.71x10^{+1}$	$1.97x10^{-5}$	-4.7054
							$1.71x10^{+2}$	$5.91x10^{-5}$	-4.2283
							$1.14x10^{+2}$	$3.94x10^{-5}$	-4.4044
							$1.00x10^{+2}$	$3.45x10^{-5}$	-4.4624
							$8.57x10^{+1}$	$2.96x10^{-5}$	-4.5293
							$8.57x10^{+1}$	$2.96x10^{-5}$	-4.5293
							$1.29x10^{+2}$	$4.43x10^{-5}$	-4.3533

Table B.2.9 Enumeration of viable spores for cycles of RUN 10 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
							$1.57x10^{+6}$	$5.42x10^{-1}$	-0.2661
							$1.57x10^{+6}$	$5.42x10^{-1}$	-0.2661
							$2.00x10^{+6}$	$6.90x10^{-1}$	-0.1614
							$1.77x10^{+6}$	$6.11x10^{-1}$	-0.2141
807	661	94	3	531	693.0	$2.90x10^{6}$	$1.53x10^{+6}$	$5.27x10^{-1}$	-0.2781
							$1.49x10^{+6}$	$5.12x10^{-1}$	-0.2905
							$1.66x10^{+6}$	$5.71x10^{-1}$	-0.2430
							$1.59x10^{+6}$	$5.47x10^{-1}$	-0.2622
							$1.73x10^{+6}$	$5.96x10^{-1}$	-0.2247
							$7.29x10^{+5}$	$2.51x10^{-1}$	-0.5999
							$9.43x10^{+5}$	$3.25x10^{-1}$	-0.4880
							$8.86x10^{+5}$	$3.05x10^{-1}$	-0.5151
							$1.01x10^{+6}$	$3.50x10^{-1}$	-0.4562
813	646	94	201	532	884.0	$2.90x10^{6}$	$8.57x10^{+5}$	$2.96x10^{-1}$	-0.5293
							$9.86x10^{+5}$	$3.40x10^{-1}$	-0.4686
							$8.86x10^{+5}$	$3.05x10^{-1}$	-0.5151
							$9.57x10^{+5}$	$3.30x10^{-1}$	-0.4814
							$8.57x10^{+5}$	$2.96x10^{-1}$	-0.5293
							$2.97x10^{+5}$	$1.02x10^{-1}$	-0.9894
							$3.46x10^{+5}$	$1.19x10^{-1}$	-0.9237
							$2.96x10^{+5}$	$1.02x10^{-1}$	-0.9915
							$4.43x10^{+5}$	$1.53x10^{-1}$	-0.8161
810	642	95	419	538	1104.0	$2.90x10^{6}$	$4.09x10^{+5}$	$1.41x10^{-1}$	-0.8511
							$4.40x10^{+5}$	$1.52x10^{-1}$	-0.8189
							$4.71x10^{+5}$	$1.63x10^{-1}$	-0.7890
							$4.43x10^{+5}$	$1.53x10^{-1}$	-0.8161
							$4.86x10^{+5}$	$1.67x10^{-1}$	-0.7760

Table B.2.9 (continued) Enumeration of viable spores for cycles of RUN 10 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
809	633	95	593	527	1268.0	$2.90x10^{6}$	$2.24x10^{+5}$	$7.73x10^{-2}$	-1.1116
							$2.16x10^{+5}$	$7.44x10^{-2}$	-1.1285
							$2.07x10^{+5}$	$7.14x10^{-2}$	-1.1461
							$2.19x10^{+5}$	$7.54x10^{-2}$	-1.1228
							$1.91x10^{+5}$	$6.60x10^{-2}$	-1.1804
							$1.90x10^{+5}$	$6.55x10^{-2}$	-1.1836
							$2.07x10^{+5}$	$7.14x10^{-2}$	-1.1461
							$2.13x10^{+5}$	$7.34x10^{-2}$	-1.1343
							$2.00x10^{+5}$	$6.90x10^{-2}$	-1.1614
812	650	94	900	522	1580.0	$2.90x10^{6}$	$1.46x10^{+5}$	$5.02x10^{-2}$	-1.2989
							$1.19x10^{+5}$	$4.09x10^{-2}$	-1.3884
							$1.37x10^{+5}$	$4.73x10^{-2}$	-1.3252
							$8.86x10^{+4}$	$3.05x10^{-2}$	-1.5151
							$1.00x10^{+5}$	$3.45x10^{-2}$	-1.4624
							$1.34x10^{+5}$	$4.63x10^{-2}$	-1.3344
							$1.46x10^{+5}$	$5.02x10^{-2}$	-1.2989
							$8.14x10^{+4}$	$2.81x10^{-2}$	-1.5516
							$6.86x10^{+4}$	$2.36x10^{-2}$	-1.6263
808	662	94	1200	529	1889.5	$2.90x10^{6}$	$2.01x10^{+4}$	$6.95x10^{-3}$	-2.1583
							$2.06x10^{+4}$	$7.09x10^{-3}$	-2.1491
							$2.09x10^{+4}$	$7.19x10^{-3}$	-2.1431
							$2.59x10^{+4}$	$8.92x10^{-3}$	-2.0498
							$3.00x10^{+4}$	$1.03x10^{-2}$	-1.9853
							$2.29x10^{+4}$	$7.88x10^{-3}$	-2.1034
							$2.34x10^{+4}$	$8.08x10^{-3}$	-2.0927
							$2.44x10^{+4}$	$8.42x10^{-3}$	-2.0745
							$2.24x10^{+4}$	$7.73x10^{-3}$	-2.1116

Table B.2.9 (continued) Enumeration of viable spores for cycles of RUN 10 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
815	635	95	1499	537	2180.0	$2.90x10^{6}$	$1.34x10^{+4}$	$4.63x10^{-3}$	-2.3344
							$1.51x10^{+4}$	$5.22x10^{-3}$	-2.2822
							$1.60x10^{+4}$	$5.52x10^{-3}$	-2.2583
							$1.46x10^{+4}$	$5.02x10^{-3}$	-2.2989
							$1.66x10^{+4}$	$5.71x10^{-3}$	-2.2430
							$1.73x10^{+4}$	$5.96x10^{-3}$	-2.2247
							$1.27x10^{+4}$	$4.38x10^{-3}$	-2.3581
							$1.61x10^{+4}$	$5.57x10^{-3}$	-2.2544
							$1.50x10^{+4}$	$5.17x10^{-3}$	-2.2863
814	646	94	1679	580	2386.0	$2.90x10^{6}$	$2.89x10^{+3}$	$9.95x10^{-4}$	-3.0021
							$2.40x10^{+3}$	$8.28x10^{-4}$	-3.0822
							$2.53x10^{+3}$	$8.72x10^{-4}$	-3.0595
							$2.70x10^{+3}$	$9.31x10^{-4}$	-3.0310
							$3.09x10^{+3}$	$1.06x10^{-3}$	-2.9730
							$4.33x10^{+3}$	$1.49x10^{-3}$	-2.8261
							$5.06x10^{+3}$	$1.74x10^{-3}$	-2.7585
							$5.34x10^{+3}$	$1.84x10^{-3}$	-2.7346
							$5.14x10^{+3}$	$1.77x10^{-3}$	-2.7512
874	652	94	1980	556	2678.0	$2.90x10^{6}$	$1.69x10^{+3}$	$5.81x10^{-4}$	-3.2356
							$1.89x10^{+3}$	$6.50x10^{-4}$	-3.1869
							$1.71x10^{+3}$	$5.91x10^{-4}$	-3.2283
							$1.14x10^{+3}$	$3.94x10^{-4}$	-3.4044
							$1.23x10^{+3}$	$4.24x10^{-4}$	-3.3730
							$1.54x10^{+3}$	$5.32x10^{-4}$	-3.2741
							$1.29x10^{+3}$	$4.43x10^{-4}$	-3.3533
							$1.13x10^{+3}$	$3.89x10^{-4}$	-3.4099
							$1.34x10^{+3}$	$4.63x10^{-4}$	-3.3344

Table B.2.9 (continued) Enumeration of viable spores for cycles of RUN 10 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
875	647	95	2280	578	2987.5	$2.90x10^{6}$	$2.86x10^{+2}$	$9.85x10^{-5}$	-4.0065
							$2.14x10^{+2}$	$7.39x10^{-5}$	-4.1314
							$2.43x10^{+2}$	$8.37x10^{-5}$	-4.0770
							$5.14x10^{+2}$	$1.77x10^{-4}$	-3.7512
							$5.57x10^{+2}$	$1.92x10^{-4}$	-3.7164
							$3.57x10^{+2}$	$1.23x10^{-4}$	-3.9096
							$3.86x10^{+2}$	$1.33x10^{-4}$	-3.8761
							$4.00x10^{+2}$	$1.38x10^{-4}$	-3.8603
							$3.29x10^{+2}$	$1.13x10^{-4}$	-3.9458
876	651	94	2580	569	3284.0	$2.90x10^{6}$	$1.00x10^{+2}$	$3.45x10^{-5}$	-4.4624
							$8.57x10^{+1}$	$2.96x10^{-5}$	-4.5293
							$5.71x10^{+1}$	$1.97x10^{-5}$	-4.7054
							$1.71x10^{+2}$	$5.91x10^{-5}$	-4.2283
							$1.57x10^{+2}$	$5.42x10^{-5}$	-4.2661
							$8.57x10^{+1}$	$2.96x10^{-5}$	-4.5293
							$5.71x10^{+1}$	$1.97x10^{-5}$	-4.7054
							$8.57x10^{+1}$	$2.96x10^{-5}$	-4.5293
							$1.00x10^{+2}$	$3.45x10^{-5}$	-4.4624

Table B.2.10 Enumeration of viable spores for cycles of RUN 11 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
							$1.17x10^{+6}$	$4.04x10^{-1}$	-0.3937
							$1.30x10^{+6}$	$4.48x10^{-1}$	-0.3485
							$1.13x10^{+6}$	$3.89x10^{-1}$	-0.4099
							$1.21x10^{+6}$	$4.19x10^{-1}$	-0.3781
847	346	78	0	498	500.0	$2.90x10^{6}$	$9.14x10^{+5}$	$3.15x10^{-1}$	-0.5013
							$9.86x10^{+5}$	$3.40x10^{-1}$	-0.4686
							$1.46x10^{+6}$	$5.02x10^{-1}$	-0.2989
							$1.50x10^{+6}$	$5.17x10^{-1}$	-0.2863
							$1.27x10^{+6}$	$4.38x10^{-1}$	-0.3581
							$6.71x10^{+5}$	$2.32x10^{-1}$	-0.6354
							$1.04x10^{+6}$	$3.60x10^{-1}$	-0.4442
							$9.00x10^{+5}$	$3.10x10^{-1}$	-0.5082
							$8.00x10^{+5}$	$2.76x10^{-1}$	-0.5593
856	421	89	30	551	605.0	$2.90x10^{6}$	$7.00x10^{+5}$	$2.41x10^{-1}$	-0.6173
							$7.14x10^{+5}$	$2.46x10^{-1}$	-0.6085
							$7.43x10^{+5}$	$2.56x10^{-1}$	-0.5915
							$7.00x10^{+5}$	$2.41x10^{-1}$	-0.6173
							$7.14x10^{+5}$	$2.46x10^{-1}$	-0.6085
							$2.30x10^{+5}$	$7.93x10^{-2}$	-1.1007
							$2.47x10^{+5}$	$8.52x10^{-2}$	-1.0694
							$2.23x10^{+5}$	$7.68x10^{-2}$	-1.1144
							$2.93x10^{+5}$	$1.01x10^{-1}$	-0.9957
855	416	94	240	520	802.0	$2.90x10^{6}$	$2.51x10^{+5}$	$8.67x10^{-2}$	-1.0620
							$2.60x10^{+5}$	$8.97x10^{-2}$	-1.0474
							$1.94x10^{+5}$	$6.70x10^{-2}$	-1.1740
							$2.43x10^{+5}$	$8.37x10^{-2}$	-1.0770
							$2.07x10^{+5}$	$7.14x10^{-2}$	-1.1461

Table B.2.10 (continued) Enumeration of viable spores for cycles of RUN 11 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
839	421	95	360	543	937.0	$2.90x10^6$	$4.86x10^{+4}$	$1.67+x10^{-2}$	-1.7760
							$4.57x10^{+4}$	$1.58x10^{-2}$	-1.8023
							$5.14x10^{+4}$	$1.77x10^{-2}$	-1.7512
							$5.86x10^{+4}$	$2.02x10^{-2}$	-1.6947
							$5.86x10^{+4}$	$2.02x10^{-2}$	-1.6947
							$5.57x10^{+4}$	$1.92x10^{-2}$	-1.7164
							$5.71x10^{+4}$	$1.97x10^{-2}$	-1.7054
							$5.43x10^{+4}$	$1.87x10^{-2}$	-1.7277
							$5.43x10^{+4}$	$1.87x10^{-2}$	-1.7277
849	391	95	597	533	1154.0	$2.90x10^6$	$1.27x10^{+4}$	$4.38x10^{-3}$	-2.3581
							$1.37x10^{+4}$	$4.73x10^{-3}$	-2.3252
							$1.09x10^{+4}$	$3.74x10^{-3}$	-2.4267
							$1.36x10^{+4}$	$4.68x10^{-3}$	-2.3298
							$1.60x10^{+4}$	$5.52x10^{-3}$	-2.2583
							$1.41x10^{+4}$	$4.88x10^{-3}$	-2.3119
							$1.23x10^{+4}$	$4.24x10^{-3}$	-2.3730
							$1.00x10^{+4}$	$3.45x10^{-3}$	-2.4624
							$1.07x10^{+4}$	$3.69x10^{-3}$	-2.4324
838	414	94	899	530	1465.0	$2.90x10^6$	$2.27x10^{+3}$	$7.83x10^{-4}$	-3.1061
							$2.89x10^{+3}$	$9.95x10^{-4}$	-3.0021
							$2.80x10^{+3}$	$9.66x10^{-4}$	-3.0152
							$2.64x10^{+3}$	$9.11x10^{-4}$	-3.0403
							$2.74x10^{+3}$	$9.46x10^{-4}$	-3.0242
							$2.56x10^{+3}$	$8.82x10^{-4}$	-30546
							$2.61x10^{+3}$	$9.01x10^{-4}$	-3.0450
							$2.97x10^{+3}$	$1.02x10^{-3}$	-2.9894
							$2.39x10^{+3}$	$8.23x10^{-4}$	-3.0848

Table B.2.10 (continued) Enumeration of viable spores for cycles of RUN 11 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
848	343	94	1199	520	1724.5	$2.90x10^{6}$	$6.00x10^{+2}$	$2.07x10^{-4}$	-3.6842
							$6.57x10^{+2}$	$2.27x10^{-4}$	-3.6447
							$4.00x10^{+2}$	$1.38x10^{-4}$	-3.8603
							$5.14x10^{+2}$	$1.77x10^{-4}$	-3.7512
							$3.71x10^{+2}$	$1.28x10^{-4}$	-3.8925
							$5.00x10^{+2}$	$1.72x10^{-4}$	-3.7634
							$4.57x10^{+2}$	$1.58x10^{-4}$	-3.8023
							$5.00x10^{+2}$	$1.72x10^{-4}$	-3.7634
							$5.57x10^{+2}$	$1.92x10^{-4}$	-3.7164
851	392	94	1199	510	1744.0	$2.90x10^{6}$	$1.29x10^{+2}$	$4.43x10^{-5}$	-4.3533
							$1.43x10^{+2}$	$4.93x10^{-5}$	-4.3075
							$1.71x10^{+2}$	$5.91x10^{-5}$	-4.2283
							$1.14x10^{+2}$	$3.94x10^{-5}$	-4.4044
							$2.00x10^{+2}$	$6.90x10^{-5}$	-4.1614
							$1.71x10^{+2}$	$5.91x10^{-5}$	-4.2283
							$1.00x10^{+2}$	$3.45x10^{-5}$	-4.4624
							$2.86x10^{+2}$	$9.85x10^{-5}$	-4.0065
							$1.43x10^{+2}$	$4.93x10^{-5}$	-4.3075
854	390	92	1440	506	1980.0	$2.90x10^{6}$	$7.14x10^{+1}$	$2.46x10^{-5}$	-4.6085
							$4.29x10^{+1}$	$1.48x10^{-5}$	-4.8304
							$4.29x10^{+1}$	$1.48x10^{-5}$	-4.8304
							$7.14x10^{+1}$	$2.46x10^{-5}$	-4.6085
							$8.57x10^{+1}$	$2.96x10^{-5}$	-4.5293
							$1.14x10^{+2}$	$3.94x10^{-5}$	-4.4044
							$8.57x10^{+1}$	$2.96x10^{-5}$	-4.5293
							$5.71x10^{+1}$	$1.97x10^{-5}$	-4.7054
							$1.43x10^{+2}$	$4.93x10^{-5}$	-4.3075

Table B.2.11 Enumeration of viable spores for cycles of RUN 12 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
991	617	94	4	521	667.0	$2.90x10^6$	$7.00x10^{+4}$	$2.41x10^{-2}$	-1.6173
							$6.43x10^{+4}$	$2.22x10^{-2}$	-1.6543
							$7.71x10^{+4}$	$2.66x10^{-2}$	-1.5751
							$8.71x10^{+4}$	$3.00x10^{-2}$	-1.5222
							$7.00x10^{+4}$	$2.41x10^{-2}$	-1.6173
							$6.71x10^{+4}$	$2.32x10^{-2}$	-1.6354
							$5.29x10^{+4}$	$1.82x10^{-2}$	-1.7393
							$4.29x10^{+4}$	$1.48x10^{-2}$	-1.8304
							$4.86x10^{+4}$	$1.67x10^{-2}$	-1.7760
993	611	94	150	532	815.5	$2.90x10^6$	$2.33x10^{+4}$	$8.03x10^{-3}$	-2.0953
							$2.34x10^{+4}$	$8.08x10^{-3}$	-2.0927
							$2.64x10^{+4}$	$9.11x10^{-3}$	-2.0403
							$2.66x10^{+4}$	$9.16x10^{-3}$	-2.0380
							$2.43x10^{+4}$	$8.37x10^{-3}$	-2.0770
							$2.31x10^{+4}$	$7.98x10^{-3}$	-2.0980
							$2.43x10^{+4}$	$8.37x10^{-3}$	-2.0770
							$2.30x10^{+4}$	$7.93x10^{-3}$	-2.1007
							$2.57x10^{+4}$	$8.87x10^{-3}$	-2.0522
992	633	94	300	569	995.0	$2.90x10^6$	$4.06x10^{+3}$	$1.40x10^{-3}$	-2.8542
							$3.89x10^{+3}$	$1.34x10^{-3}$	-2.8729
							$4.43x10^{+3}$	$1.53x10^{-3}$	-2.8161
							$4.84x10^{+3}$	$1.67x10^{-3}$	-2.7773
							$4.51x10^{+3}$	$1.56x10^{-3}$	-2.8078
							$4.74x10^{+3}$	$1.64x10^{-3}$	-2.7864
							$4.43x10^{+3}$	$1.53x10^{-3}$	-2.8161
							$4.24x10^{+3}$	$1.46x10^{-3}$	-2.8347
							$4.09x10^{+3}$	$1.41x10^{-3}$	-2.8511

Table B.2.11 (continued) Enumeration of viable spores for cycles of RUN 12 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
989	632	94	601	546	1284.0	$2.90x10^{6}$	$3.57x10^{+2}$	$1.23x10^{-4}$	-3.9096
							$2.86x10^{+2}$	$9.85x10^{-5}$	-4.0065
							$4.43x10^{+2}$	$1.53x10^{-4}$	-3.8161
							$3.14x10^{+2}$	$1.08x10^{-4}$	-3.9651
							$3.43x10^{+2}$	$1.18x10^{-4}$	-3.9273
							$3.86x10^{+2}$	$1.33x10^{-4}$	-3.8761
							$5.00x10^{+2}$	$1.72x10^{-4}$	-3.7634
							$4.00x10^{+2}$	$1.38x10^{-4}$	-3.8603
							$4.57x10^{+2}$	$1.58x10^{-4}$	-3.8023
988	636	94	799	496	1459.0	$2.90x10^{6}$	$7.14x10^{+1}$	$2.46x10^{-5}$	-4.6085
							$8.57x10^{+1}$	$2.96x10^{-5}$	-4.5293
							$5.71x10^{+1}$	$1.97x10^{-5}$	-4.7054
							$4.29x10^{+1}$	$1.48x10^{-5}$	-4.8304
							$4.29x10^{+1}$	$1.48x10^{-5}$	-4.8304
							$7.14x10^{+1}$	$2.46x10^{-5}$	-4.6085
							$8.57x10^{+1}$	$2.96x10^{-5}$	-4.5293
							$5.71x10^{+1}$	$1.97x10^{-5}$	-4.7054
							$2.86x10^{+1}$	$9.85x10^{-6}$	-5.0065

Table B.2.12 Enumeration of viable spores for cycles of RUN 13 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
							$8.14\times10^{+3}$	2.81×10^{-3}	-2.5516
							$9.00\times10^{+3}$	3.10×10^{-3}	-2.5082
							$9.71\times10^{+3}$	3.35×10^{-3}	-2.4750
							$9.43\times10^{+3}$	3.25×10^{-3}	-2.4880
984	632	96	2	640	734.0	2.90×10^{6}	$9.43\times10^{+3}$	3.25×10^{-3}	-2.4880
							$1.06\times10^{+4}$	3.65×10^{-3}	-2.4383
							$8.14\times10^{+3}$	2.81×10^{-3}	-2.5516
							$8.29\times10^{+3}$	2.86×10^{-3}	-2.5441
							$9.29\times10^{+3}$	3.20×10^{-3}	-2.4946
							$1.29\times10^{+3}$	4.43×10^{-4}	-3.3533
							$1.26\times10^{+3}$	4.33×10^{-4}	-3.3630
							$1.33\times10^{+3}$	4.58×10^{-4}	-3.3390
							$1.17\times10^{+3}$	4.04×10^{-4}	-3.3937
985	644	94	206	634	939.0	2.90×10^{6}	$1.26\times10^{+3}$	4.33×10^{-4}	-3.3630
							$1.34\times10^{+3}$	4.63×10^{-4}	-3.3344
							$1.19\times10^{+3}$	4.09×10^{-4}	-3.3884
							$1.13\times10^{+3}$	3.89×10^{-4}	-3.4099
							$1.00\times10^{+3}$	3.45×10^{-4}	-3.4624
							$4.86\times10^{+2}$	1.67×10^{-4}	-3.7760
							$3.71\times10^{+2}$	1.28×10^{-4}	-3.8925
							$3.43\times10^{+2}$	1.18×10^{-4}	-3.9273
							$4.00\times10^{+2}$	1.38×10^{-4}	-3.8603
986	634	96	327	646	1063.0	2.90×10^{6}	$5.14\times10^{+2}$	1.77×10^{-4}	-3.7512
							$4.43\times10^{+2}$	1.53×10^{-4}	-3.8161
							$3.57\times10^{+2}$	1.23×10^{-4}	-3.9096
							$3.29\times10^{+2}$	1.13×10^{-4}	-3.9458
							$2.14\times10^{+2}$	7.39×10^{-5}	-4.1314

Table B.2.12 (continued) Enumeration of viable spores for cycles of RUN 13 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
980	607	95	397	641	1116.0	$2.90x10^6$	$1.14x10^{+2}$	$3.94x10^{-5}$	-4.4044
							$1.00x10^{+2}$	$3.45x10^{-5}$	-4.4624
							$1.57x10^{+2}$	$5.42x10^{-5}$	-4.2661
							$1.57x10^{+2}$	$5.42x10^{-5}$	-4.2661
							$2.14x10^{+2}$	$7.39x10^{-5}$	-4.1314
							$1.57x10^{+2}$	$5.42x10^{-5}$	-4.2661
							$1.43x10^{+2}$	$4.93x10^{-5}$	-4.3075
							$1.00x10^{+2}$	$3.45x10^{-5}$	-4.4624
							$8.57x10^{+1}$	$2.96x10^{-5}$	-4.5293
987	607	95	547	631	1261.0	$2.90x10^6$	$2.86x10^{+1}$	$9.85x10^{-6}$	-5.0065
							$1.43x10^{+1}$	$4.93x10^{-6}$	-5.3075
							$2.86x10^{+1}$	$9.85x10^{-6}$	-5.0065
							$5.71x10^{+1}$	$1.97x10^{-5}$	-4.7054
							$4.29x10^{+1}$	$1.48x10^{-5}$	-4.8304
							$4.29x10^{+1}$	$1.48x10^{-5}$	-4.8304
							$2.86x10^{+1}$	$9.85x10^{-6}$	-5.0065
							$4.29x10^{+1}$	$1.48x10^{-5}$	-4.8304
							$8.57x10^{+1}$	$2.96x10^{-5}$	-4.5293

Table B.2.13 Enumeration of viable spores for cycles of RUN 14 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
							$1.43 \times 10^{+3}$	4.93×10^{-4}	-3.3075
							$1.43 \times 10^{+3}$	4.93×10^{-4}	-3.3075
							$8.57 \times 10^{+2}$	2.96×10^{-4}	-3.5293
							$1.00 \times 10^{+3}$	3.45×10^{-4}	-3.4624
994	596	91	1	676	728.0	2.90×10^{6}	$1.14 \times 10^{+3}$	3.94×10^{-4}	-3.4044
							$5.71 \times 10^{+2}$	1.97×10^{-4}	-3.7054
							$1.29 \times 10^{+3}$	4.43×10^{-4}	-3.3533
							$1.29 \times 10^{+3}$	4.43×10^{-4}	-3.3533
							$7.14 \times 10^{+2}$	2.46×10^{-4}	-3.6085
							$4.00 \times 10^{+2}$	1.38×10^{-4}	-3.8603
							$4.57 \times 10^{+2}$	1.58×10^{-4}	-3.8023
							$3.57 \times 10^{+2}$	1.23×10^{-4}	-3.9096
							$2.57 \times 10^{+2}$	8.87×10^{-5}	-4.0522
1001	580	94	40	712	780.0	2.90×10^{6}	$2.86 \times 10^{+2}$	9.85×10^{-5}	-4.0065
							$3.29 \times 10^{+2}$	1.13×10^{-4}	-3.9458
							$4.14 \times 10^{+2}$	1.43×10^{-4}	-3.8451
							$4.57 \times 10^{+2}$	1.58×10^{-4}	-3.8023
							$5.00 \times 10^{+2}$	1.72×10^{-4}	-3.7634
							$3.14 \times 10^{+2}$	1.08×10^{-4}	-3.9651
							$2.29 \times 10^{+2}$	7.88×10^{-5}	-4.1034
							$1.71 \times 10^{+2}$	5.91×10^{-5}	-4.2283
							$3.57 \times 10^{+2}$	1.23×10^{-4}	-3.9096
999	643	94	60	700	825.5	2.90×10^{6}	$3.00 \times 10^{+2}$	1.03×10^{-4}	-3.9853
							$2.71 \times 10^{+2}$	9.36×10^{-5}	-4.0287
							$2.43 \times 10^{+2}$	8.37×10^{-5}	-4.0770
							$2.57 \times 10^{+2}$	8.87×10^{-5}	-4.0522
							$1.43 \times 10^{+2}$	4.93×10^{-5}	-4.3075

Table B.2.13 (continued) Enumeration of viable spores for cycles of RUN 14 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
997	640	95	122	681	877.5	2.90×10^{6}	$1.43\times10^{+2}$	4.93×10^{-5}	-4.3075
							$1.14\times10^{+2}$	3.94×10^{-5}	-4.4044
							$1.86\times10^{+2}$	6.40×10^{-5}	-4.1936
							$7.14\times10^{+1}$	2.46×10^{-5}	-4.6085
							$8.57\times10^{+1}$	2.96×10^{-5}	-4.5293
							$5.71\times10^{+1}$	1.97×10^{-5}	-4.7054
							$1.00\times10^{+2}$	3.45×10^{-5}	-4.4624
							$8.57\times10^{+1}$	2.96×10^{-5}	-4.5293
							$5.71\times10^{+1}$	1.97×10^{-5}	-4.7054
996	639	95	160	710	929.5	2.90×10^{6}	$7.14\times10^{+1}$	2.46×10^{-5}	-4.6085
							$1.00\times10^{+2}$	3.45×10^{-5}	-4.4624
							$4.29\times10^{+1}$	1.48×10^{-5}	-4.8304
							$5.71\times10^{+1}$	1.97×10^{-5}	-4.7054
							$2.86\times10^{+1}$	9.85×10^{-6}	-5.0065
							$5.71\times10^{+1}$	1.97×10^{-5}	-4.7054
							$4.29\times10^{+1}$	1.48×10^{-5}	-4.8304
							$5.71\times10^{+1}$	1.97×10^{-5}	-4.7054
							$4.29\times10^{+1}$	1.48×10^{-5}	-4.8304

Table B.2.14 Enumeration of viable spores for cycles of RUN 15 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
1005	457	84	1	731	679.0	1.00×10^{6}	$4.67 \times 10^{+3}$	4.67×10^{-3}	-2.3306
							$4.89 \times 10^{+3}$	4.89×10^{-3}	-2.3111
							$4.79 \times 10^{+3}$	4.79×10^{-3}	-2.3201
							$3.33 \times 10^{+3}$	3.33×10^{-3}	-2.4777
							$3.56 \times 10^{+3}$	3.56×10^{-3}	-2.4489
							$3.51 \times 10^{+3}$	3.51×10^{-3}	-2.4542
							$3.00 \times 10^{+3}$	3.00×10^{-3}	-2.5229
							$3.19 \times 10^{+3}$	3.19×10^{-3}	-2.4968
							$3.19 \times 10^{+3}$	3.19×10^{-3}	-2.4968
1007	536	92	15	790	770.0	1.00×10^{6}	$2.03 \times 10^{+3}$	2.03×10^{-3}	-2.6928
							$1.64 \times 10^{+3}$	1.64×10^{-3}	-2.7844
							$1.86 \times 10^{+3}$	1.86×10^{-3}	-2.7312
							$2.43 \times 10^{+3}$	2.43×10^{-3}	-2.6146
							$2.17 \times 10^{+3}$	2.17×10^{-3}	-2.6633
							$2.07 \times 10^{+3}$	2.07×10^{-3}	-2.6837
							$1.40 \times 10^{+3}$	1.40×10^{-3}	-2.8539
							$1.16 \times 10^{+3}$	1.16×10^{-3}	-2.9366
							$1.29 \times 10^{+3}$	1.29×10^{-3}	-2.8909
1006	539	95	81	793	842.0	1.00×10^{6}	$1.04 \times 10^{+3}$	1.04×10^{-3}	-2.9818
							$9.57 \times 10^{+2}$	9.57×10^{-4}	-3.0190
							$1.09 \times 10^{+3}$	1.09×10^{-3}	-2.9643
							$8.57 \times 10^{+2}$	8.57×10^{-4}	-3.0669
							$8.29 \times 10^{+2}$	8.29×10^{-4}	-3.0817
							$8.57 \times 10^{+2}$	8.57×10^{-4}	-3.0669
							$6.86 \times 10^{+2}$	6.86×10^{-4}	-3.1639
							$5.57 \times 10^{+2}$	5.57×10^{-4}	-3.2540
							$6.29 \times 10^{+2}$	6.29×10^{-4}	-3.2016

Table B.2.14 (continued) Enumeration of viable spores for cycles of RUN 15 condition

Cicle no.	Injection time (s)	Nitrogen overlay time (s)	Exposure time (s)	Exhaust time (s)	Equivalent time, U (s)	N_0	N	N/N_0	log (N/N_0)
							$1.00x10^{+2}$	$1.00x10^{-4}$	-4.0000
							$1.57x10^{+2}$	$1.57x10^{-4}$	-3.8037
							$1.29x10^{+2}$	$1.29x10^{-4}$	-3.8909
							$1.29x10^{+2}$	$1.29x10^{-4}$	-3.8909
1004	492	93	230	762	950.0	$1.00x10^{6}$	$2.00x10^{+2}$	$2.00x10^{-4}$	-3.6990
							$1.71x10^{+2}$	$1.71x10^{-4}$	-3.7659
							$1.00x10^{+2}$	$1.00x10^{-4}$	-4.0000
							$1.71x10^{+2}$	$1.71x10^{-4}$	-3.7659
							$1.43x10^{+2}$	$1.43x10^{-4}$	-3.8451
							$1.43x10^{+1}$	$1.43x10^{-5}$	-4.8451
							$1.43x10^{+1}$	$1.43x10^{-5}$	-4.8451
							$2.86x10^{+1}$	$2.86x10^{-5}$	-4.5441
							$5.71x10^{+1}$	$5.71x10^{-5}$	-4.2430
1011	497	94	330	795	1070.0	$1.00x10^{6}$	$5.71x10^{+1}$	$5.71x10^{-5}$	-4.2430
							$2.86x10^{+1}$	$2.86x10^{-5}$	-4.5441
							$4.29x10^{+1}$	$4.29x10^{-5}$	-4.3680
							$1.43x10^{+1}$	$1.43x10^{-5}$	-4.8451
							$2.86x10^{+1}$	$2.86x10^{-5}$	-4.5441

B.3 Results of *B. subtilis* inactivation, as predicted by the Gompertz model and by the model expressed only in terms of the relevant process variables

Table B.3.1 Predicted results of *B.subtilis* inactivation by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 1

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 59.50 C (mg L^{-1}) = 232.5	T (°C) = 61.88 C (mg L^{-1}) = 265.1	T (°C) = 57.12 C (mg L^{-1}) = 200.0
0	-0.0420	-0.0826	-0.1325	-0.0525
100	-0.0924	-0.1639	-0.2609	-0.1031
200	-0.1804	-0.2930	-0.4583	-0.1847
300	-0.3182	-0.4794	-0.7325	-0.3056
400	-0.5147	-0.7280	-1.0821	-0.4723
500	-0.7737	-1.0376	-1.4974	-0.6879
600	-1.0932	-1.4013	-1.9621	-0.9520
700	-1.4655	-1.8080	-2.4571	-1.2606
800	-1.8789	-2.2441	-2.9630	-1.6066
900	-2.3194	-2.6956	-3.4625	-1.9812
1000	-2.7730	-3.1489	-3.9419	-2.3744
1100	-3.2263	-3.5926	-4.3911	-2.7765
1200	-3.6683	-4.0176	-4.8037	-3.1783
1300	-4.0901	-4.4172	-5.1765	-3.5720
1400	-4.4854	-4.7871	-5.5087	-3.9512
1500	-4.8504	-5.1250	-5.8014	-4.3111
1600	-5.1830	-5.4302	-6.0568	-4.6483
1700	-5.4829	-5.7032	-6.2779	-4.9608
1800	-5.7506	-5.9455	-6.4681	-5.2477
1900	-5.9878	-6.1590	-6.6307	-5.5089
2000	-6.1965	-6.3461	-6.7692	-5.7450
2100	-6.3792	-6.5092	-6.8866	-5.9571
2200	-6.5383	-6.6508	-6.9859	-6.1467
2300	-6.6763	-6.7733	-7.0696	-6.3153
2400	-6.7955	-6.8790	-7.1401	-6.4647
2500	-6.8983	-6.9699	-7.1992	-6.5966

Table B.3.1 (continued) Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 1

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 59.50 C (mg L^{-1}) = 232.5	T (°C) = 61.88 C (mg L^{-1}) = 265.1	T (°C) = 57.12 C (mg L^{-1}) = 200.0
2600	-6.9867	-7.0480	-7.2488	-6.7128
2700	-7.0625	-7.1148	-7.2904	-6.8148
2800	-7.1274	-7.1720	-7.3251	-6.9042
2900	-7.1828	-7.2209	-7.3542	-6.9824
3000	-7.2302	-7.2626	-7.3784	-7.0506

Table B.3.2 Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 2

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 43.65 C (mg L^{-1}) = 257.0	T (°C) = 45.40 C (mg L^{-1}) = 293.0	T (°C) = 41.90 C (mg L^{-1}) = 221.0
0	-0.0322	-0.0385	-0.0331	-0.0490
100	-0.0452	-0.0575	-0.0537	-0.0671
200	-0.0622	-0.0833	-0.0836	-0.0900
300	-0.0839	-0.1172	-0.1251	-0.1187
400	-0.1111	-0.1608	-0.1805	-0.1538
500	-0.1445	-0.2153	-0.2521	-0.1960
600	-0.1850	-0.2820	-0.3416	-0.2462
700	-0.2331	-0.3619	-0.4505	-0.3047
800	-0.2895	-0.4557	-0.5796	-0.3722
900	-0.3547	-0.5638	-0.7290	-0.4490
1000	-0.4292	-0.6863	-0.8983	-0.5354
1100	-0.5131	-0.8231	-1.0863	-0.6314
1200	-0.6067	-0.9736	-1.2916	-0.7369
1300	-0.7098	-1.1371	-1.5120	-0.8519
1400	-0.8224	-1.3124	-1.7452	-0.9758
1500	-0.9441	-1.4983	-1.9887	-1.1084
1600	-1.0745	-1.6934	-2.2398	-1.2490
1700	-1.2131	-1.8962	-2.4959	-1.3970
1800	-1.3593	-2.1051	-2.7544	-1.5517
1900	-1.5123	-2.3185	-3.0130	-1.7122
2000	-1.6713	-2.5349	-3.2695	-1.8777
2100	-1.8356	-2.7527	-3.5219	-2.0473
2200	-2.0042	-2.9706	-3.7686	-2.2203
2300	-2.1763	-3.1873	-4.0083	-2.3957
2400	-2.3512	-3.4015	-4.2397	-2.5728
2500	-2.5278	-3.6121	-4.4619	-2.7506

Table B.3.2 (continued) Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 2

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 43.65 C (mg L^{-1}) = 257.0	T (°C) = 45.40 C (mg L^{-1}) = 293.0	T (°C) = 41.90 C (mg L^{-1}) = 221.0
2600	-2.7054	-3.8184	-4.6744	-2.9284
2700	-2.8833	-4.0194	-4.8766	-3.1056
2800	-3.0606	-4.2146	-5.0683	-3.2815
2900	-3.2368	-4.4033	-5.2494	-3.4554
3000	-3.4112	-4.5852	-5.4199	-3.6268
3100	-3.5832	-4.7599	-5.5799	-3.7952
3200	-3.7523	-4.9273	-5.7297	-3.9602
3300	-3.9181	-5.0872	-5.8696	-4.1213
3400	-4.0803	-5.2395	-5.9999	-4.2784
3500	-4.2383	-5.3843	-6.1210	-4.4311
3600	-4.3921	-5.5216	-6.2334	-4.5792
3700	-4.5413	-5.6517	-6.3376	-4.7225
3800	-4.6859	-5.7745	-6.4339	-4.8609
3900	-4.8255	-5.8904	-6.5229	-4.9944
4000	-4.9602	-5.9996	-6.6049	-5.1229
4100	-5.0900	-6.1022	-6.6806	-5.2464
4200	-5.2147	-6.1986	-6.7502	-5.3648
4300	-5.3344	-6.2891	-6.8142	-5.4783
4400	-5.4491	-6.3738	-6.8729	-5.5868
4500	-5.5589	-6.4531	-6.9269	-5.6905
4600	-5.6638	-6.5273	-6.9764	-5.7895
4700	-5.7640	-6.5966	-7.0218	-5.8839
4800	-5.8595	-6.6612	-7.0633	-5.9738
4900	-5.9505	-6.7215	-7.1014	-6.0593
5000	-6.0372	-6.7778	-7.1362	-6.1406
5100	-6.1195	-6.8301	-7.1681	-6.2178

Table B.3.2 (continued) Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 2

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 43.65 C (mg L^{-1}) = 257.0	T (°C) = 45.40 C (mg L^{-1}) = 293.0	T (°C) = 41.90 C (mg L^{-1}) = 221.0
5200	-6.1977	-6.8789	-7.1972	-6.2910
5300	-6.2720	-6.9242	-7.2238	-6.3605
5400	-6.3424	-6.9664	-7.2481	-6.4263
5500	-6.4092	-7.0056	-7.2703	-6.4886
5600	-6.4724	-7.0420	-7.2906	-6.5476
5700	-6.5322	-7.0758	-7.3091	-6.6034
5800	-6.5888	-7.1072	-7.3260	-6.6561
5900	-6.6423	-7.1363	-7.3415	-6.7059
6000	-6.6929	-7.1633	-7.3555	-6.7530
6100	-6.7406	-7.1884	-7.3683	-6.7974
6200	-6.7857	-7.2116	-7.3800	-6.8393
6300	-6.8282	-7.2331	-7.3907	-6.8788
6400	-6.8684	-7.2531	-7.4004	-6.9161
6500	-6.9062	-7.2715	-7.4093	-6.9512
6600	-6.9419	-7.2887	-7.4174	-6.9842
6700	-6.9755	-7.3045	-7.4247	-7.0154
6800	-7.0071	-7.3192	-7.4315	-7.0447
6900	-7.0369	-7.3328	-7.4376	-7.0723
7000	-7.0650	-7.3453	-7.4431	-7.0983

Table B.3.3 Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 3

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 34.30 C (mg L^{-1}) = 221.5	T (°C) =35.67 C (mg L^{-1}) = 252.5	T (°C) = 32.93 C (mg L^{-1}) =190.5
0	-0.1152	-0.2120	-0.1449	-0.3202
100	-0.1335	-0.2291	-0.1649	-0.3313
200	-0.1539	-0.2472	-0.1869	-0.3427
300	-0.1766	-0.2663	-0.2110	-0.3544
400	-0.2016	-0.2865	-0.2372	-0.3664
500	-0.2291	-0.3076	-0.2656	-0.3786
600	-0.2591	-0.3298	-0.2964	-0.3911
700	-0.2919	-0.3530	-0.3295	-0.4038
800	-0.3274	-0.3774	-0.3651	-0.4169
900	-0.3657	-0.4028	-0.4031	-0.4301
1000	-0.4069	-0.4293	-0.4437	-0.4437
1100	-0.4511	-0.4570	-0.4868	-0.4576
1200	-0.4982	-0.4857	-0.5325	-0.4717
1300	-0.5483	-0.5156	-0.5808	-0.4861
1400	-0.6014	-0.5466	-0.6316	-0.5007
1500	-0.6575	-0.5787	-0.6850	-0.5157
1600	-0.7166	-0.6120	-0.7409	-0.5309
1700	-0.7787	-0.6463	-0.7993	-0.5464
1800	-0.8436	-0.6818	-0.8603	-0.5622
1900	-0.9113	-0.7184	-0.9236	-0.5782
2000	-0.9818	-0.7561	-0.9892	-0.5945
2100	-1.0550	-0.7949	-1.0572	-0.6111
2200	-1.1307	-0.8348	-1.1274	-0.6280
2300	-1.2089	-0.8758	-1.1997	-0.6452
2400	-1.2895	-0.9178	-1.2740	-0.6626
2500	-1.3723	-0.9608	-1.3502	-0.6803

Table B.3.3 (continued) Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 3

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 34.30 C (mg L^{-1}) = 221.5	T (°C) =35.67 C (mg L^{-1}) = 252.5	T (°C) = 32.93 C (mg L^{-1}) =190.5
2600	-1.4572	-1.0048	-1.4283	-0.6982
2700	-1.5441	-1.0498	-1.5082	-0.7165
2800	-1.6328	-1.0958	-1.5897	-0.7350
2900	-1.7232	-1.1428	-1.6726	-0.7538
3000	-1.8152	-1.1906	-1.7570	-0.7728
3100	-1.9086	-1.2394	-1.8427	-0.7922
3200	-2.0032	-1.2890	-1.9295	-0.8117
3300	-2.0989	-1.3395	-2.0173	-0.8316
3400	-2.1955	-1.3908	-2.1061	-0.8517
3500	-2.2930	-1.4428	-2.1957	-0.8721
3600	-2.3911	-1.4957	-2.2860	-0.8927
3700	-2.4897	-1.5492	-2.3768	-0.9136
3800	-2.5886	-1.6034	-2.4681	-0.9347
3900	-2.6878	-1.6583	-2.5597	-0.9561
4000	-2.7871	-1.7137	-2.6516	-0.9777
4100	-2.8864	-1.7698	-2.7435	-0.9996
4200	-2.9855	-1.8264	-2.8355	-1.0217
4300	-3.0843	-1.8836	-2.9275	-1.0441
4400	-3.1827	-1.9412	-3.0192	-1.0667
4500	-3.2806	-1.9993	-3.1106	-1.0896
4600	-3.3779	-2.0577	-3.2017	-1.1126
4700	-3.4745	-2.1166	-3.2924	-1.1359
4800	-3.5703	-2.1758	-3.3825	-1.1595
4900	-3.6653	-2.2353	-3.4720	-1.1832
5000	-3.7592	-2.2951	-3.5608	-1.2072
5100	-3.8521	-2.3552	-3.6489	-1.2314

Table B.3.3 (continued) Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 3

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 34.30 C (mg L^{-1}) = 221.5	T (°C) =35.67 C (mg L^{-1}) = 252.5	T (°C) = 32.93 C (mg L^{-1}) =190.5
5200	-3.9439	-2.4154	-3.7361	-1.2558
5300	-4.0346	-2.4759	-3.8225	-1.2804
5400	-4.1240	-2.5364	-3.9079	-1.3053
5500	-4.2121	-2.5971	-3.9924	-1.3303
5600	-4.2989	-2.6579	-4.0758	-1.3555
5700	-4.3843	-2.7187	-4.1582	-1.3809
5800	-4.4683	-2.7795	-4.2394	-1.4066
5900	-4.5508	-2.8404	-4.3194	-1.4324
6000	-4.6319	-2.9011	-4.3983	-1.4584
6100	-4.7115	-2.9619	-4.4760	-1.4845
6200	-4.7896	-3.0225	-4.5524	-1.5109
6300	-4.8661	-3.0830	-4.6276	-1.5374
6400	-4.9411	-3.1434	-4.7014	-1.5641
6500	-5.0145	-3.2035	-4.7740	-1.5910
6600	-5.0864	-3.2635	-4.8453	-1.6180
6700	-5.1567	-3.3233	-4.9152	-1.6452
6800	-5.2255	-3.3828	-4.9838	-1.6725
6900	-5.2926	-3.4420	-5.0510	-1.7000
7000	-5.3583	-3.5010	-5.1169	-1.7277
7100	-5.4223	-3.5597	-5.1815	-1.7554
7200	-5.4849	-3.6180	-5.2447	-1.7834
7300	-5.5459	-3.6760	-5.3066	-1.8114
7400	-5.6054	-3.7336	-5.3672	-1.8396
7500	-5.6634	-3.7908	-5.4264	-1.8679
7600	-5.7199	-3.8476	-5.4843	-1.8963
7700	-5.7749	-3.9041	-5.5409	-1.9248

Table B.3.3 (continued) Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 3

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 34.30 C (mg L^{-1}) = 221.5	T (°C) =35.67 C (mg L^{-1}) = 252.5	T (°C) = 32.93 C (mg L^{-1}) =190.5
7800	-5.8285	-3.9600	-5.5962	-1.9535
7900	-5.8807	-4.0156	-5.6502	-1.9823
8000	-5.9315	-4.0707	-5.7029	-2.0111
8100	-5.9809	-4.1253	-5.7544	-2.0401
8200	-6.0289	-4.1794	-5.8046	-2.0691
8300	-6.0757	-4.2331	-5.8536	-2.0983
8400	-6.1211	-4.2862	-5.9014	-2.1275
8500	-6.1652	-4.3388	-5.9479	-2.1569
8600	-6.2080	-4.3909	-5.9934	-2.1863
8700	-6.2497	-4.4425	-6.0376	-2.2157
8800	-6.2901	-4.4935	-6.0807	-2.2453
8900	-6.3293	-4.5440	-6.1227	-2.2749
9000	-6.3674	-4.5939	-6.1636	-2.3046
9100	-6.4044	-4.6433	-6.2034	-2.3343
9200	-6.4402	-4.6921	-6.2421	-2.3641
9300	-6.4750	-4.7403	-6.2798	-2.3939
9400	-6.5087	-4.7880	-6.3165	-2.4238
9500	-6.5414	-4.8351	-6.3522	-2.4537
9600	-6.5731	-4.8816	-6.3869	-2.4837
9700	-6.6038	-4.9275	-6.4206	-2.5137
9800	-6.6336	-4.9729	-6.4534	-2.5437
9900	-6.6625	-5.0176	-6.4853	-2.5738
10000	-6.6904	-5.0618	-6.5163	-2.6039
10100	-6.7175	-5.1054	-6.5464	-2.6340
10200	-6.7437	-5.1484	-6.5757	-2.6641
10300	-6.7691	-5.1908	-6.6041	-2.6942

Table B.3.3 (continued) Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 3

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 34.30 C (mg L^{-1}) = 221.5	T (°C) =35.67 C (mg L^{-1}) = 252.5	T (°C) = 32.93 C (mg L^{-1}) =190.5
10400	-6.7937	-5.2327	-6.6317	-2.7243
10500	-6.8175	-5.2739	-6.6585	-2.7545
10600	-6.8405	-5.3146	-6.6846	-2.7846
10700	-6.8628	-5.3546	-6.7098	-2.8147
10800	-6.8844	-5.3941	-6.7344	-2.8449
10900	-6.9052	-5.4330	-6.7582	-2.8750
11000	-6.9254	-5.4714	-6.7813	-2.9051
11100	-6.9450	-5.5091	-6.8038	-2.9352
11200	-6.9639	-5.5463	-6.8255	-2.9653
11300	-6.9822	-5.5829	-6.8467	-2.9953
11400	-6.9998	-5.6190	-6.8672	-3.0253
11500	-7.0169	-5.6545	-6.8871	-3.0553
11600	-7.0335	-5.6894	-6.9063	-3.0853
11700	-7.0495	-5.7238	-6.9250	-3.1152
11800	-7.0649	-5.7577	-6.9432	-3.1450
11900	-7.0799	-5.7909	-6.9608	-3.1749
12000	-7.0943	-5.8237	-6.9778	-3.2047
12100	-7.1083	-5.8559	-6.9944	-3.2344
12200	-7.1218	-5.8876	-7.0104	-3.2641
12300	-7.1348	-5.9188	-7.0259	-3.2937
12400	-7.1474	-5.9494	-7.0410	-3.3233
12500	-7.1596	-5.9795	-7.0556	-3.3528
12600	-7.1713	-6.0091	-7.0697	-3.3823
12700	-7.1827	-6.0383	-7.0834	-3.4117
12800	-7.1937	-6.0669	-7.0967	-3.4410
12900	-7.2043	-6.0950	-7.1096	-3.4702

Table B.3.3 (continued) Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 3

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 34.30 C (mg L^{-1}) = 221.5	T (°C) =35.67 C (mg L^{-1}) = 252.5	T (°C) = 32.93 C (mg L^{-1}) =190.5
13000	-7.2146	-6.1226	-7.1221	-3.4994
13100	-7.2245	-6.1498	-7.1342	-3.5285
13200	-7.2340	-6.1765	-7.1459	-3.5575
13300	-7.2433	-6.2027	-7.1572	-3.5865
13400	-7.2522	-6.2284	-7.1682	-3.6153
13500	-7.2608	-6.2537	-7.1789	-3.6441
13600	-7.2691	-6.2785	-7.1892	-3.6728
13700	-7.2772	-6.3029	-7.1992	-3.7014
13800	-7.2849	-6.3269	-7.2088	-3.7299
13900	-7.2924	-6.3504	-7.2182	-3.7583
14000	-7.2997	-6.3735	-7.2273	-3.7866

Table B.3.4 Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 4

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 40.30 C (mg L^{-1}) = 980.0	T (°C) = 41.91 C (mg L^{-1}) = 1117.2	T (°C) = 38.69 C (mg L^{-1}) = 842.8
0	-0.0744	-0.0479	-0.0492	-0.0508
100	-0.1288	-0.0974	-0.1129	-0.0906
200	-0.2088	-0.1792	-0.2258	-0.1511
300	-0.3197	-0.3028	-0.4027	-0.2374
400	-0.4653	-0.4753	-0.6529	-0.3540
500	-0.6476	-0.7002	-0.9772	-0.5040
600	-0.8667	-0.9769	-1.3683	-0.6889
700	-1.1203	-1.3007	-1.8124	-0.9082
800	-1.4046	-1.6635	-2.2917	-1.1596
900	-1.7143	-2.0553	-2.7875	-1.4392
1000	-2.0433	-2.4651	-3.2827	-1.7422
1100	-2.3851	-2.8820	-3.7628	-2.0629
1200	-2.7333	-3.2964	-4.2170	-2.3952
1300	-3.0819	-3.6998	-4.6378	-2.7335
1400	-3.4258	-4.0858	-5.0211	-3.0722
1500	-3.7605	-4.4496	-5.3652	-3.4065
1600	-4.0823	-4.7881	-5.6705	-3.7323
1700	-4.3886	-5.0996	-5.9386	-4.0463
1800	-4.6774	-5.3835	-6.1721	-4.3458
1900	-4.9476	-5.6401	-6.3740	-4.6291
2000	-5.1986	-5.8705	-6.5476	-4.8950
2100	-5.4302	-6.0759	-6.6962	-5.1428
2200	-5.6429	-6.2583	-6.8228	-5.3723
2300	-5.8371	-6.4194	-6.9303	-5.5838
2400	-6.0138	-6.5612	-7.0213	-5.7778
2500	-6.1738	-6.6856	-7.0982	-5.9549

Table B.3.4 (continued) Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 4

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 40.30 C (mg L^{-1}) = 980.0	T (°C) = 41.91 C (mg L^{-1}) = 1117.2	T (°C) = 38.69 C (mg L^{-1}) = 842.8
2600	-6.3184	-6.7944	-7.1631	-6.1160
2700	-6.4486	-6.8894	-7.2177	-6.2621
2800	-6.5655	-6.9720	-7.2636	-6.3942
2900	-6.6702	-7.0439	-7.3021	-6.5134
3000	-6.7639	-7.1062	-7.3345	-6.6206
3100	-6.8475	-7.1602	-7.3615	-6.7168
3200	-6.9221	-7.2070	-7.3842	-6.8031
3300	-6.9884	-7.2475	-7.4032	-6.8803
3400	-7.0474	-7.2824	-7.4191	-6.9493
3500	-7.0997	-7.3126	-7.4324	-7.0109

Table B.3.5 Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 5

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 58.70 C (mg L^{-1}) = 265.5	T (°C) = 61.05 C (mg L^{-1}) = 302.7	T (°C) = 56.35 C (mg L^{-1}) = 228.3
0	-0.0610	-0.0730	-0.1129	-0.0484
100	-0.1251	-0.1481	-0.2296	-0.0962
200	-0.2306	-0.2696	-0.4140	-0.1742
300	-0.3877	-0.4479	-0.6756	-0.2908
400	-0.6034	-0.6887	-1.0150	-0.4527
500	-0.8790	-0.9917	-1.4234	-0.6636
600	-1.2106	-1.3506	-1.8853	-0.9233
700	-1.5894	-1.7546	-2.3811	-1.2282
800	-2.0037	-2.1902	-2.8909	-1.5715
900	-2.4401	-2.6430	-3.3966	-1.9443
1000	-2.8854	-3.0992	-3.8834	-2.3368
1100	-3.3277	-3.5469	-4.3406	-2.7391
1200	-3.7569	-3.9764	-4.7611	-3.1420
1300	-4.1654	-4.3809	-5.1414	-3.5373
1400	-4.5476	-4.7557	-5.4803	-3.9186
1500	-4.9003	-5.0982	-5.7789	-4.2809
1600	-5.2217	-5.4077	-6.0393	-4.6207
1700	-5.5118	-5.6845	-6.2646	-4.9358
1800	-5.7711	-5.9302	-6.4582	-5.2253
1900	-6.0014	-6.1467	-6.6236	-5.4890
2000	-6.2044	-6.3363	-6.7643	-5.7274
2100	-6.3826	-6.5015	-6.8834	-5.9417
2200	-6.5382	-6.6449	-6.9840	-6.1332
2300	-6.6735	-6.7688	-7.0687	-6.3036
2400	-6.7909	-6.8756	-7.1398	-6.4546
2500	-6.8923	-6.9675	-7.1995	-6.5879

Table B.3.5 (continued) Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 5

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 58.70 C (mg L^{-1}) = 265.5	T (°C) = 61.05 C (mg L^{-1}) = 302.7	T (°C) = 56.35 C (mg L^{-1}) = 228.3
2600	-6.9798	-7.0463	-7.2494	-6.7053
2700	-7.0551	-7.1137	-7.2912	-6.8084
2800	-7.1198	-7.1714	-7.3261	-6.8987
2900	-7.1753	-7.2206	-7.3552	-6.9777
3000	-7.2229	-7.2626	-7.3795	-7.0467

Table B.3.6 Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 6

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 33.35 C (mg L^{-1}) = 940.0	T (°C) = 34.68 C (mg L^{-1}) = 1071.6	T (°C) = 32.02 C (mg L^{-1}) = 808.4
0	-0.0950	-0.0838	-0.0744	-0.1045
100	-0.1321	-0.1272	-0.1263	-0.1415
200	-0.1792	-0.1857	-0.2019	-0.1875
300	-0.2374	-0.2617	-0.3057	-0.2436
400	-0.3080	-0.3574	-0.4413	-0.3107
500	-0.3919	-0.4740	-0.6109	-0.3894
600	-0.4895	-0.6125	-0.8146	-0.4803
700	-0.6014	-0.7728	-1.0510	-0.5838
800	-0.7274	-0.9543	-1.3169	-0.6997
900	-0.8673	-1.1555	-1.6080	-0.8279
1000	-1.0205	-1.3746	-1.9188	-0.9681
1100	-1.1862	-1.6090	-2.2438	-1.1194
1200	-1.3631	-1.8561	-2.5771	-1.2812
1300	-1.5501	-2.1129	-2.9133	-1.4523
1400	-1.7458	-2.3765	-3.2473	-1.6318
1500	-1.9486	-2.6440	-3.5747	-1.8183
1600	-2.1571	-2.9127	-3.8921	-2.0106
1700	-2.3696	-3.1799	-4.1964	-2.2074
1800	-2.5847	-3.4435	-4.4856	-2.4076
1900	-2.8008	-3.7015	-4.7582	-2.6097
2000	-3.0168	-3.9522	-5.0133	-2.8127
2100	-3.2312	-4.1943	-5.2505	-3.0154
2200	-3.4430	-4.4268	-5.4699	-3.2168
2300	-3.6512	-4.6487	-5.6717	-3.4159
2400	-3.8548	-4.8598	-5.8565	-3.6120
2500	-4.0532	-5.0595	-6.0252	-3.8042

Table B.3.6 (continued) Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 6

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 33.35 C (mg L^{-1}) = 940.0	T (°C) = 34.68 C (mg L^{-1}) = 1071.6	T (°C) = 32.02 C (mg L^{-1}) = 808.4
2600	-4.2457	-5.2477	-6.1785	-3.9919
2700	-4.4318	-5.4246	-6.3175	-4.1745
2800	-4.6112	-5.5901	-6.4431	-4.3517
2900	-4.7834	-5.7447	-6.5564	-4.5231
3000	-4.9484	-5.8886	-6.6584	-4.6884
3100	-5.1060	-6.0223	-6.7500	-4.8473
3200	-5.2562	-6.1462	-6.8321	-4.9997
3300	-5.3990	-6.2608	-6.9056	-5.1457
3400	-5.5345	-6.3667	-6.9714	-5.2851
3500	-5.6628	-6.4642	-7.0301	-5.4180
3600	-5.7840	-6.5540	-7.0825	-5.5445
3700	-5.8985	-6.6365	-7.1292	-5.6646
3800	-6.0063	-6.7123	-7.1708	-5.7785
3900	-6.1077	-6.7818	-7.2079	-5.8864
4000	-6.2030	-6.8454	-7.2408	-5.9885
4100	-6.2925	-6.9037	-7.2701	-6.0849
4200	-6.3763	-6.9570	-7.2961	-6.1758
4300	-6.4548	-7.0057	-7.3192	-6.2616
4400	-6.5283	-7.0501	-7.3398	-6.3423
4500	-6.5969	-7.0907	-7.3580	-6.4182
4600	-6.6611	-7.1278	-7.3741	-6.4895
4700	-6.7209	-7.1615	-7.3885	-6.5565
4800	-6.7767	-7.1923	-7.4012	-6.6193
4900	-6.8287	-7.2203	-7.4125	-6.6782
5000	-6.8772	-7.2458	-7.4225	-6.7335
5100	-6.9223	-7.2690	-7.4313	-6.7852

Table B.3.6 (continued) Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 6

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 33.35 C (mg L^{-1}) = 940.0	T (°C) = 34.68 C (mg L^{-1}) = 1071.6	T (°C) = 32.02 C (mg L^{-1}) = 808.4
5200	-6.9643	-7.2902	-7.4392	-6.8336
5300	-7.0033	-7.3094	-7.4461	-6.8788
5400	-7.0396	-7.3269	-7.4523	-6.9212
5500	-7.0733	-7.3428	-7.4578	-6.9607
5600	-7.1046	-7.3572	-7.4626	-6.9977
5700	-7.1337	-7.3704	-7.4669	-7.0322
5800	-7.1606	-7.3823	-7.4707	-7.0644
5900	-7.1857	-7.3931	-7.4740	-7.0944
6000	-7.2089	-7.4030	-7.4770	-7.1225

Table B.3.7 Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 7

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 59.45 C (mg L^{-1}) = 1004.0	T (°C) = 61.83 C (mg L^{-1}) = 1144.6	T (°C) = 57.07 C (mg L^{-1}) = 863.4
0	-0.0256	-0.0822	-0.1004	-0.0646
100	-0.1012	-0.2573	-0.3400	-0.1864
200	-0.2870	-0.6037	-0.8156	-0.4245
300	-0.6323	-1.1416	-1.5274	-0.8048
400	-1.1505	-1.8377	-2.3955	-1.3233
500	-1.8111	-2.6226	-3.3080	-1.9476
600	-2.5545	-3.4208	-4.1696	-2.6299
700	-3.3153	-4.1720	-4.9226	-3.3215
800	-4.0396	-4.8390	-5.5450	-3.9823
900	-4.6922	-5.4060	-6.0394	-4.5854
1000	-5.2563	-5.8727	-6.4209	-5.1166
1100	-5.7285	-6.2474	-6.7092	-5.5716
1200	-6.1146	-6.5428	-6.9240	-5.953
1300	-6.4244	-6.7727	-7.0822	-6.2674
1400	-6.6697	-6.9497	-7.1980	-6.5231
1500	-6.8618	-7.0849	-7.2821	-6.7291
1600	-7.0111	-7.1876	-7.3431	-6.8937
1700	-7.1264	-7.2654	-7.3871	-7.0244
1800	-7.2151	-7.3240	-7.4189	-7.1276

Table B.3.8 Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 9

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 37.00 C (mg L^{-1}) = 674.0	T (°C) = 38.48 C (mg L^{-1}) = 701.0	T (°C) = 35.52 C (mg L^{-1}) = 647.0
0	-0.0338	-0.0620	-0.0525	-0.0758
100	-0.0518	-0.0943	-0.0857	-0.1072
200	-0.0769	-0.1381	-0.1334	-0.1477
300	-0.1106	-0.1956	-0.1988	-0.1987
400	-0.1545	-0.2689	-0.2847	-0.2614
500	-0.2103	-0.3595	-0.3935	-0.3368
600	-0.2792	-0.4685	-0.5268	-0.4257
700	-0.3624	-0.5967	-0.6851	-0.5287
800	-0.4609	-0.7442	-0.8682	-0.6459
900	-0.5750	-0.9103	-1.0746	-0.7772
1000	-0.7049	-1.0942	-1.3024	-0.9223
1100	-0.8503	-1.2942	-1.5487	-1.0804
1200	-1.0106	-1.5085	-1.8104	-1.2506
1300	-1.1847	-1.7350	-2.0837	-1.4317
1400	-1.3715	-1.9713	-2.3653	-1.6224
1500	-1.5693	-2.2150	-2.6513	-1.8212
1600	-1.7766	-2.4636	-2.9387	-2.0266
1700	-1.9916	-2.7148	-3.2241	-2.2370
1800	-2.2124	-2.9665	-3.5050	-2.4510
1900	-2.4374	-3.2164	-3.7790	-2.6669
2000	-2.6646	-3.4629	-4.0442	-2.8834
2100	-2.8926	-3.7044	-4.2990	-3.0992
2200	-3.1196	-3.9395	-4.5424	-3.3131
2300	-3.3444	-4.1670	-4.7735	-3.5239
2400	-3.5656	-4.3862	-4.9917	-3.7307
2500	-3.7822	-4.5963	-5.1969	-3.9326

Table B.3.8 (continued) Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 9

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 37.00 C (mg L^{-1}) = 674.0	T (°C) = 38.48 C (mg L^{-1}) = 701.0	T (°C) = 35.52 C (mg L^{-1}) = 647.0
2600	-3.9933	-4.7969	-5.3890	-4.1291
2700	-4.1980	-4.9876	-5.5682	-4.3194
2800	-4.3957	-5.1682	-5.7347	-4.5031
2900	-4.5860	-5.3389	-5.8890	-4.6799
3000	-4.7684	-5.4995	-6.0316	-4.8496
3100	-4.9428	-5.6504	-6.1631	-5.0119
3200	-5.1090	-5.7917	-6.2839	-5.1667
3300	-5.2670	-5.9237	-6.3949	-5.3142
3400	-5.4167	-6.0469	-6.4966	-5.4542
3500	-5.5583	-6.1616	-6.5896	-5.5870
3600	-5.6920	-6.2681	-6.6745	-5.7126
3700	-5.8179	-6.3670	-6.7519	-5.8312
3800	-5.9363	-6.4586	-6.8225	-5.9430
3900	-6.0474	-6.5434	-6.8867	-6.0484
4000	-6.1515	-6.6217	-6.9451	-6.1474
4100	-6.2490	-6.6940	-6.9981	-6.2404
4200	-6.3401	-6.7607	-7.0462	-6.3276
4300	-6.4252	-6.8222	-7.0899	-6.4093
4400	-6.5045	-6.8788	-7.1294	-6.4858
4500	-6.5784	-6.9309	-7.1653	-6.5574
4600	-6.6471	-6.9787	-7.1977	-6.6242
4700	-6.7111	-7.0227	-7.2271	-6.6866
4800	-6.7705	-7.0631	-7.2536	-6.7448
4900	-6.8257	-7.1002	-7.2776	-6.7991
5000	-6.8769	-7.1342	-7.2993	-6.8496
5100	-6.9243	-7.1654	-7.3190	-6.8967

Table B.3.8 (continued) Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 9

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 37.00 C (mg L^{-1}) = 674.0	T (°C) = 38.48 C (mg L^{-1}) = 701.0	T (°C) = 35.52 C (mg L^{-1}) = 647.0
5200	-6.9683	-7.1940	-7.3367	-6.9405
5300	-7.0091	-7.2202	-7.3527	-6.9812
5400	-7.0468	-7.2441	-7.3671	-7.0191
5500	-7.0817	-7.2661	-7.3802	-7.0543
5600	-7.1140	-7.2862	-7.3919	-7.0870
5700	-7.1439	-7.3046	-7.4026	-7.1174
5800	-7.1715	-7.3215	-7.4121	-7.1456
5900	-7.1971	-7.3369	-7.4208	-7.1717
6000	-7.2206	-7.3509	-7.4286	-7.1960

Table B.3.9 Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 10

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 37.00 C (mg L^{-1}) = 456.0	T (°C) = 38.48 C (mg L^{-1}) = 474.2	T (°C) = 35.52 C (mg L^{-1}) = 437.8
0	-0.0691	-0.0767	-0.0610	-0.0995
100	-0.0933	-0.1024	-0.0869	-0.1249
200	-0.1237	-0.1343	-0.1206	-0.1550
300	-0.1610	-0.1731	-0.1634	-0.1901
400	-0.2060	-0.2196	-0.2165	-0.2307
500	-0.2594	-0.2744	-0.2810	-0.2771
600	-0.3219	-0.3381	-0.3578	-0.3297
700	-0.3940	-0.4112	-0.4475	-0.3886
800	-0.4760	-0.4760	-0.5506	-0.4542
900	-0.5681	-0.5681	-0.6672	-0.5265
1000	-0.6705	-0.6705	-0.7972	-0.6055
1100	-0.7828	-0.7828	-0.9401	-0.6913
1200	-0.9050	-0.9050	-1.0952	-0.7838
1300	-1.0366	-1.0366	-1.2617	-0.8827
1400	-1.1769	-1.1769	-1.4385	-0.9880
1500	-1.3255	-1.3255	-1.6243	-1.0993
1600	-1.4814	-1.4814	-1.8177	-1.2163
1700	-1.6439	-1.6439	-2.0174	-1.3385
1800	-1.8121	-1.8121	-2.2220	-1.4657
1900	-1.9850	-1.9850	-2.4300	-1.5972
2000	-2.1618	-2.1618	-2.6400	-1.7328
2100	-2.3414	-2.3414	-2.8508	-1.8717
2200	-2.5231	-2.5231	-3.0610	-2.0136
2300	-2.7058	-2.7058	-3.2695	-2.1580
2400	-2.8887	-2.8887	-3.4754	-2.3043
2500	-3.0711	-3.0711	-3.6777	-2.4520

Table B.3.9 (continued) Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 10

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 37.00 C (mg L^{-1}) = 456.0	T (°C) = 38.48 C (mg L^{-1}) = 474.2	T (°C) = 35.52 C (mg L^{-1}) = 437.8
2600	-3.2522	-3.2522	-3.8756	-2.6007
2700	-3.4314	-3.4314	-4.0685	-2.7499
2800	-3.6080	-3.6080	-4.2557	-2.8991
2900	-3.7814	-3.7814	-4.4368	-3.0479
3000	-3.9513	-3.9513	-4.6115	-3.1959
3100	-4.1172	-4.1172	-4.7794	-3.3427
3200	-4.2788	-4.2788	-4.9405	-3.4880
3300	-4.4357	-4.4357	-5.0945	-3.6315
3400	-4.5877	-4.5877	-5.2415	-3.7728
3500	-4.7347	-4.7347	-5.3815	-3.9118
3600	-4.8766	-4.8766	-5.5145	-4.0482
3700	-5.0132	-5.0132	-5.6407	-4.1818
3800	-5.1445	-5.1445	-5.7601	-4.3125
3900	-5.2704	-5.2704	-5.8731	-4.4400
4000	-5.3911	-5.3911	-5.9796	-4.5642
4100	-5.5066	-5.5066	-6.0801	-4.6852
4200	-5.6168	-5.6168	-6.1747	-4.8027
4300	-5.7220	-5.7220	-6.2636	-4.9167
4400	-5.8223	-5.8223	-6.3472	-5.0273
4500	-5.9176	-5.9176	-6.4256	-5.1343
4600	-6.0083	-6.0083	-6.4991	-5.2378
4700	-6.0944	-6.0944	-6.5679	-5.3377
4800	-6.1761	-6.1761	-6.6323	-5.4342
4900	-6.2536	-6.2536	-6.6926	-5.5272
5000	-6.3270	-6.3270	-6.7489	-5.6167
5100	-6.3964	-6.3964	-6.8015	-5.7029

Table B.3.9 (continued) Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 10

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 37.00 C (mg L^{-1}) = 456.0	T (°C) = 38.48 C (mg L^{-1}) = 474.2	T (°C) = 35.52 C (mg L^{-1}) = 437.8
5200	-6.4621	-6.4621	-6.8506	-5.7857
5300	-6.5241	-6.5241	-6.8964	-5.8653
5400	-6.5828	-6.5828	-6.9391	-5.9418
5500	-6.6381	-6.6381	-6.9788	-6.0151
5600	-6.6903	-6.6903	-7.0159	-6.0854
5700	-6.7395	-6.7395	-7.0504	-6.1527
5800	-6.7859	-6.7859	-7.0826	-6.2172
5900	-6.8296	-6.8296	-7.1125	-6.2789
6000	-6.8708	-6.8708	-7.1403	-6.3379
6100	-6.9096	-6.9096	-7.1661	-6.3944
6200	-6.9460	-6.9460	-7.1902	-6.4483
6300	-6.9803	-6.9803	-7.2125	-6.4998
6400	-7.0125	-7.0125	-7.2333	-6.5490
6500	-7.0428	-7.0428	-7.2526	-6.5959
6600	-7.0713	-7.0713	-7.2705	-6.6407
6700	-7.0981	-7.0981	-7.2871	-6.6834
6800	-7.1232	-7.1232	-7.3026	-6.7240
6900	-7.1468	-7.1468	-7.3169	-6.7628
7000	-7.1690	-7.1690	-7.3302	-6.7998
7100	-7.1898	-7.1898	-7.3426	-6.8350
7200	-7.2093	-7.2093	-7.3541	-6.8685
7300	-7.2276	-7.2276	-7.3647	-6.9003
7400	-7.2448	-7.2448	-7.3746	-6.9307
7500	-7.2609	-7.2609	-7.3837	-6.9596
7600	-7.2760	-7.2760	-7.3922	-6.9870
7700	-7.2902	-7.2902	-7.4001	-7.0131

Table B.3.9 (continued) Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 10

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 37.00 C (mg L^{-1}) = 456.0	T (°C) = 38.48 C (mg L^{-1}) = 474.2	T (°C) = 35.52 C (mg L^{-1}) = 437.8
7800	-7.3035	-7.3035	-7.4074	-7.0380
7900	-7.3159	-7.3159	-7.4142	-7.0616
8000	-7.3276	-7.3276	-7.4204	-7.0840

Table B.3.10 Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 11

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 51.00 C (mg L^{-1}) = 247.0	T (°C) = 53.04 C (mg L^{-1}) = 256.9	T (°C) = 48.96 C (mg L^{-1}) = 237.1
0	-0.0634	-0.0296	-0.0341	-0.0281
100	-0.1074	-0.0551	-0.0666	-0.0493
200	-0.1715	-0.0957	-0.1195	-0.0818
300	-0.2602	-0.1563	-0.1996	-0.1290
400	-0.3770	-0.2414	-0.3127	-0.1943
500	-0.5244	-0.3552	-0.4634	-0.2808
600	-0.7032	-0.5004	-0.6542	-0.3911
700	-0.9130	-0.6783	-0.8849	-0.5267
800	-1.1518	-0.8885	-1.1530	-0.6884
900	-1.4162	-1.1292	-1.4539	-0.8758
1000	-1.7021	-1.3969	-1.7815	-1.0875
1100	-2.0047	-1.6872	-2.1286	-1.3212
1200	-2.3188	-1.9951	-2.4879	-1.5740
1300	-2.6393	-2.3152	-2.8522	-1.8423
1400	-2.9616	-2.6421	-3.2149	-2.1224
1500	-3.2813	-2.9707	-3.5705	-2.4104
1600	-3.5946	-3.2965	-3.9142	-2.7026
1700	-3.8984	-3.6155	-4.2425	-2.9955
1800	-4.1902	-3.9244	-4.5526	-3.2859
1900	-4.4681	-4.2206	-4.8429	-3.5710
2000	-4.7308	-4.5023	-5.1125	-3.8484
2100	-4.9775	-4.7680	-5.3610	-4.1161
2200	-5.2078	-5.0170	-5.5886	-4.3728
2300	-5.4216	-5.2488	-5.7959	-4.6172
2400	-5.6192	-5.4636	-5.9839	-4.8486
2500	-5.8011	-5.6616	-6.1536	-5.0666

Table B.3.10 (continued) Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 11

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 51.00 C (mg L^{-1}) = 247.0	T (°C) = 53.04 C (mg L^{-1}) = 256.9	T (°C) = 48.96 C (mg L^{-1}) = 237.1
2600	-5.9678	-5.8433	-6.3062	-5.2709
2700	-6.1201	-6.0095	-6.4431	-5.4617
2800	-6.2590	-6.1610	-6.5654	-5.6392
2900	-6.3851	-6.2987	-6.6745	-5.8036
3000	-6.4995	-6.4234	-6.7716	-5.9556
3100	-6.6030	-6.5362	-6.8578	-6.0957
3200	-6.6964	-6.6380	-6.9343	-6.2244
3300	-6.7806	-6.7297	-7.0019	-6.3425
3400	-6.8565	-6.8122	-7.0618	-6.4506
3500	-6.9247	-6.8862	-7.1146	-6.5494
3600	-6.9859	-6.9526	-7.1613	-6.6395
3700	-7.0408	-7.0120	-7.2024	-6.7215
3800	-7.0901	-7.0653	-7.2386	-6.7962
3900	-7.1342	-7.1128	-7.2704	-6.8641
4000	-7.1736	-7.1553	-7.2985	-6.9256
4100	-7.2089	-7.1932	-7.3231	-6.9815
4200	-7.2405	-7.2271	-7.3448	-7.0321
4300	-7.2687	-7.2572	-7.3639	-7.0779
4400	-7.2938	-7.2841	-7.3806	-7.1194
4500	-7.3163	-7.3081	-7.3953	-7.1568
4600	-7.3363	-7.3294	-7.4082	-7.1907
4700	-7.3542	-7.3484	-7.4195	-7.2213
4800	-7.3702	-7.3652	-7.4294	-7.2489
4900	-7.3844	-7.3803	-7.4381	-7.2738
5000	-7.3970	-7.3936	-7.4457	-7.2963

Table B.3.11 Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 12

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 50.72 C (mg L^{-1}) = 447.0	T (°C) = 52.75 C (mg L^{-1}) = 464.9	T (°C) = 48.69 C (mg L^{-1}) = 429.1
0	-0.1078	-0.0338	-0.0387	-0.0316
100	-0.1934	-0.0708	-0.0850	-0.0622
200	-0.3203	-0.1339	-0.1662	-0.1127
300	-0.4948	-0.2322	-0.2938	-0.1895
400	-0.7199	-0.3735	-0.4769	-0.2989
500	-0.9945	-0.5628	-0.7201	-0.4455
600	-1.3141	-0.8020	-1.0224	-0.6319
700	-1.6708	-1.0888	-1.3774	-0.8585
800	-2.0552	-1.4176	-1.7748	-1.1229
900	-2.4569	-1.7803	-2.2017	-1.4206
1000	-2.8656	-2.1671	-2.6447	-1.7457
1100	-3.2722	-2.5681	-3.0909	-2.0911
1200	-3.6687	-2.9735	-3.5291	-2.4495
1300	-4.0489	-3.3745	-3.9503	-2.8136
1400	-4.4081	-3.7639	-4.3478	-3.1769
1500	-4.7433	-4.1360	-4.7172	-3.5335
1600	-5.0527	-4.4867	-5.0560	-3.8787
1700	-5.3355	-4.8132	-5.3631	-4.2088
1800	-5.5920	-5.1142	-5.6390	-4.5210
1900	-5.8230	-5.3891	-5.8847	-4.8135
2000	-6.0299	-5.6382	-6.1021	-5.0853
2100	-6.2140	-5.8626	-6.2933	-5.3360
2200	-6.3773	-6.0634	-6.4606	-5.5658
2300	-6.5215	-6.2423	-6.6064	-5.7752
2400	-6.6485	-6.4009	-6.7329	-5.9652
2500	-6.7599	-6.5411	-6.8425	-6.1368

Table B.3.11 (continued) Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 12

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 50.72 C (mg L^{-1}) = 447.0	T (°C) = 52.75 C (mg L^{-1}) = 464.9	T (°C) = 48.69 C (mg L^{-1}) = 429.1
2600	-6.8574	-6.6646	-6.9370	-6.2911
2700	-6.9427	-6.7731	-7.0184	-6.4296
2800	-7.0170	-6.8682	-7.0885	-6.5534
2900	-7.0817	-6.9514	-7.1485	-6.6638
3000	-7.1380	-7.0239	-7.2000	-6.7621
3100	-7.1868	-7.0872	-7.2441	-6.8494
3200	-7.2292	-7.1423	-7.2818	-6.9268
3300	-7.2660	-7.1902	-7.3141	-6.9954
3400	-7.2978	-7.2318	-7.3416	-7.0560
3500	-7.3254	-7.2679	-7.3651	-7.1095
3600	-7.3492	-7.2992	-7.3851	-7.1567
3700	-7.3698	-7.3263	-7.4022	-7.1984
3800	-7.3876	-7.3498	-7.4167	-7.2351
3900	-7.4030	-7.3702	-7.4291	-7.2674
4000	-7.4163	-7.3878	-7.4397	-7.2958

Table B.3.12 Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 13

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 49.93 C (mg L^{-1}) = 674.5	T (°C) = 51.93 C (mg L^{-1}) = 701.5	T (°C) = 47.93 C (mg L^{-1}) = 674.5
0	-0.0972	-0.0360	-0.0403	-0.0339
100	-0.2009	-0.0850	-0.1005	-0.0748
200	-0.3677	-0.1748	-0.2138	-0.1470
300	-0.6086	-0.3199	-0.3985	-0.2616
400	-0.9259	-0.5314	-0.6660	-0.4279
500	-1.3133	-0.8135	-1.0175	-0.6512
600	-1.7571	-1.1629	-1.4433	-0.9319
700	-2.2392	-1.5695	-1.9259	-1.2653
800	-2.7403	-2.0186	-2.4433	-1.6426
900	-3.2423	-2.4931	-2.9732	-2.0523
1000	-3.7300	-2.9764	-3.4959	-2.4819
1100	-4.1917	-3.4534	-3.9955	-2.9188
1200	-4.6196	-3.9123	-4.4611	-3.3521
1300	-5.0092	-4.3441	-4.8857	-3.7722
1400	-5.3587	-4.7429	-5.2663	-4.1722
1500	-5.6683	-5.1058	-5.6025	-4.5469
1600	-5.9398	-5.4316	-5.8960	-4.8932
1700	-6.1758	-5.7209	-6.1496	-5.2094
1800	-6.3795	-5.9756	-6.3670	-5.4954
1900	-6.5543	-6.1981	-6.5522	-5.7518
2000	-6.7036	-6.3911	-6.7089	-5.9801
2100	-6.8305	-6.5578	-6.8411	-6.1820
2200	-6.9381	-6.7009	-6.9521	-6.3597
2300	-7.0289	-6.8235	-7.0450	-6.5154
2400	-7.1055	-6.9280	-7.1226	-6.6513
2500	-7.1700	-7.0170	-7.1873	-6.7694

Table B.3.12 (continued) Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 13

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 49.93 C (mg L^{-1}) = 674.5	T (°C) = 51.93 C (mg L^{-1}) = 701.5	T (°C) = 47.93 C (mg L^{-1}) = 674.5
2600	-7.2241	-7.0925	-7.2410	-6.8719
2700	-7.2695	-7.1566	-7.2857	-6.9606
2800	-7.3075	-7.2107	-7.3228	-7.0372
2900	-7.3393	-7.2565	-7.3535	-7.1033
3000	-7.3659	-7.2951	-7.3789	-7.1601
3100	-7.3881	-7.3277	-7.4000	-7.2090
3200	-7.4067	-7.3551	-7.4174	-7.2509
3300	-7.4222	-7.3783	-7.4318	-7.2869
3400	-7.4352	-7.3977	-7.4437	-7.3178
3500	-7.4460	-7.4141	-7.4535	-7.3442

Table B.3.13 Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 14

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 60.08 C (mg L^{-1}) = 737.5	T (°C) = 62.48 C (mg L^{-1}) = 767.0	T (°C) = 57.68 C (mg L^{-1}) = 708.0
0	-0.0357	-0.0915	-0.1257	-0.0680
100	-0.1244	-0.2441	-0.3337	-0.1794
200	-0.3236	-0.5232	-0.7015	-0.3877
300	-0.6737	-0.9465	-1.2351	-0.7145
400	-1.1819	-1.5005	-1.8999	-1.1607
500	-1.8188	-2.1468	-2.6369	-1.7059
600	-2.5312	-2.8362	-3.3844	-2.3156
700	-3.2611	-3.5217	-4.0925	-2.9512
800	-3.9604	-4.1671	-4.7293	-3.5776
900	-4.5966	-4.7496	-5.2797	-4.1680
1000	-5.1527	-5.2580	-5.7412	-4.7053
1100	-5.6243	-5.6906	-6.1194	-5.1805
1200	-6.0148	-6.0513	-6.4240	-5.5915
1300	-6.3326	-6.3475	-6.6659	-5.9409
1400	-6.5875	-6.5877	-6.8562	-6.2336
1500	-6.7899	-6.7807	-7.0047	-6.4761
1600	-6.9493	-6.9346	-7.1199	-6.6753
1700	-7.0740	-7.0566	-7.2089	-6.8377
1800	-7.1712	-7.1530	-7.2773	-6.9694
1900	-7.2466	-7.2288	-7.3299	-7.0757
2000	-7.3049	-7.2883	-7.3701	-7.1613
2100	-7.3500	-7.3349	-7.4009	-7.2299
2200	-7.3847	-7.3714	-7.4245	-7.2848
2300	-7.4114	-7.3998	-7.4424	-7.3287
2400	-7.4320	-7.4220	-7.4561	-7.3638
2500	-7.4478	-7.4393	-7.4666	-7.3917

Table B.3.14 Predicted results of *B.subtilis* inactivarion by the Gompertz model (eq. 2.1) and by the model that integrated process conditions (eq. 2.5) for cycles of RUN 15

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.1)	$\log\frac{N}{N_0}$ (eq. 2.5)		
		T (°C) = 61.98 C (mg L^{-1}) = 498.0	T (°C) = 64.46 C (mg L^{-1}) = 517.9	T (°C) = 59.50 C (mg L^{-1}) = 478.1
0	-0.0475	-0.1288	-0.1947	-0.0868
100	-0.1256	-0.2910	-0.4273	-0.1985
200	-0.2756	-0.5582	-0.7919	-0.3895
300	-0.5200	-0.9397	-1.2850	-0.6743
400	-0.8684	-1.4251	-1.8788	-1.0543
500	-1.3142	-1.9881	-2.5312	-1.5172
600	-1.8366	-2.5945	-3.1981	-2.0409
700	-2.4068	-3.2098	-3.8424	-2.5984
800	-2.9944	-3.8052	-4.4375	-3.1631
900	-3.5722	-4.3597	-4.9684	-3.7127
1000	-4.1194	-4.8606	-5.4290	-4.2301
1100	-4.6221	-5.3022	-5.8202	-4.7043
1200	-5.0727	-5.6840	-6.1468	-5.1295
1300	-5.4686	-6.0089	-6.4159	-5.5041
1400	-5.8108	-6.2820	-6.6352	-5.8294
1500	-6.1029	-6.5092	-6.8126	-6.1084
1600	-6.3495	-6.6967	-6.9551	-6.3455
1700	-6.5560	-6.8506	-7.0690	-6.5454
1800	-6.7277	-6.9761	-7.1596	-6.7128
1900	-6.8696	-7.0781	-7.2316	-6.8524
2000	-6.9865	-7.1608	-7.2886	-6.9682
2100	-7.0824	-7.2275	-7.3336	-7.0639
2200	-7.1608	-7.2813	-7.3691	-7.1429
2300	-7.2248	-7.3247	-7.3971	-7.2078
2400	-7.2769	-7.3595	-7.4191	-7.2612
2500	-7.3192	-7.3874	-7.4365	-7.3049

B.4 Analysis of variance from 2^3 factorial design

Table B.4.1 ANOVA table for k_{max}

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	Computed F	P-value
T	0.000041573521125	1	0.000041573521125	423916751565617.00000	0.0970195612728482
RH	0.000000013366125	1	0.000000013366125	0.013629166204093	0.92601336328851
EO	0.000016585920125	1	0.000016585920125	169123259008454.00000	0.151855464018003
T/RH	0.000002609470125	1	0.000002609470125	266082368960641.00000	0.350112766335637
T/EO	0.000004119885125	1	0.000004119885125	420096318943565.00000	0.288971950893239
RH/EO	0.000000369370125	1	0.000000369370125	0.376639214765059	0.649579661046028
Error	98070012.500001	1	98070012.500001		
Total	0.000066252232875	7			

Table B.4.2 Estimated effects for k_{max}

Source of Variation	Estimated Effect		Standard error †
Average	0.004385875	±	0.000350125000000002
T	0.00455925	±	0.000700250000000005
RH	-0.00008175	±	0.000700250000000005
EO	0.00287975	±	0.000700250000000005
T/RH	-0.00114225	±	0.000700250000000005
T/EO	0.00143525	±	0.000700250000000005
RH/EO	-0.00042975	±	0.000700250000000005

† Estimated from total error with 1 degree of freedom (t=12.52660)

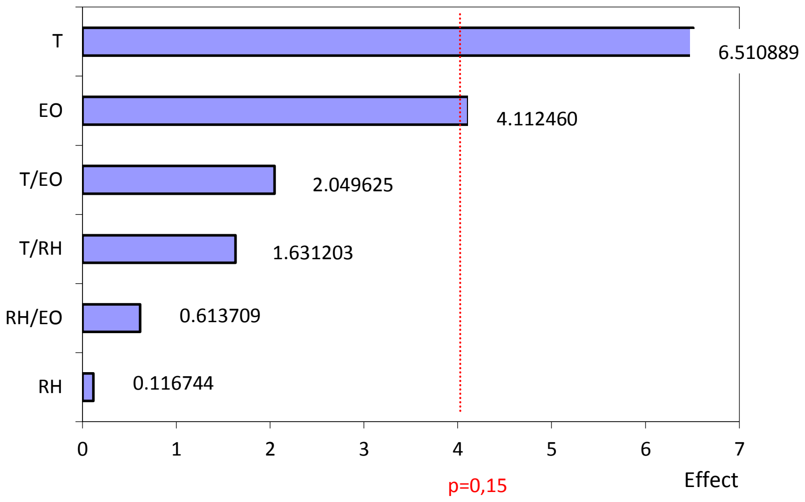


Figure B.4.1 Pareto chart for k_{max}

Table B.4.3 ANOVA table for λ

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	Computed F	P-value
T	644472.912903125	1	644472.912903125	33.5925821624598	0.108768618875058
RH	436.586475125002	1	436.586475125002	0.0227566849483089	0.904682576078751
EO	367112.670015125	1	367112.670015125	19.1354241325839	0.14307436499117
T/RH	33134.716306125	1	33134.716306125	1.72711786276519	0.41409149056106
T/EO	71591.955606125	1	71591.955606125	3.73166754214142	0.30410008233348
RH/EO	5841.12957012501	1	5841.12957012501	0.304463726989085	0.679009576770537
Error	19184.9769031252	1	19184.9769031252		
Total	1141774.94777888	7			

Table B.4.4 Estimated effects for λ

Source of Variation	Estimated Effect		Standard error †
Average	536.409125	±	48.9706250000002
T	-567.65875	±	97.9412500000004
RH	-14.77475	±	97.9412500000004
EO	-428.43475	±	97.9412500000004
T/RH	128.71425	±	97.9412500000004
T/EO	189.19825	±	97.9412500000004
RH/EO	54.04225	±	97.9412500000004

† Estimated from total error with 1 degree of freedom (t=10.95369)

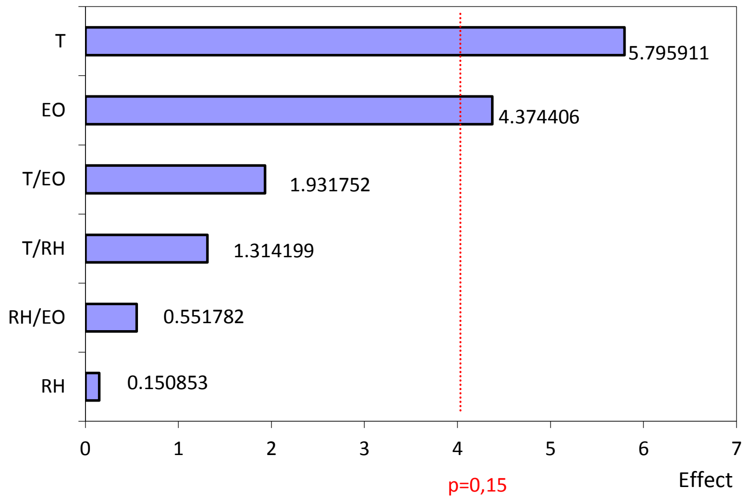


Figure B.4.2 Pareto chart for λ

B.5 Studies on the sensitivity of the predicted microbial response in relation to processing conditions

In order to consider the sensitivity of the model response to fluctuations on temperature and humidity, the propagation of measurement uncertainties method was applied.

If $\log\left(\frac{N}{N_0}\right)$ is function of variables T and C with uncertainties:

B.1 $$\log\left(\frac{N}{N_0}\right) = f(T, C)$$

as,

B.2 $$\log\left(\frac{N}{N_0}\right) = A \cdot \exp\left[-\exp\left\{\frac{-k_{max}e}{A}(\lambda - t) + 1\right\}\right]$$

being,

B.3 $$k_{max} = f(T, C)$$

B.4 $$\lambda = f(T, C)$$

Then, the uncertainty in $\log\left(\frac{N}{N_0}\right)$ due to T and C would be:

B.5 $$d\left(\log\frac{N}{N_0}\right) = \frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T} \cdot dT + \frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C} \cdot dC$$

Therefore, the net uncertainty is calculated considering the sum of the individual contributions.

Considering,

B.6 $$k_{max} = \left(1.42\times10^{-4}T - 4.96\times10^{-3}\right) + \left(5.54\times10^{-8}T + 1.25\times10^{-6}\right)C$$

B.7 $$\lambda = \left(1.63\times10^{1}T - 1.06\times10^{3}\right)\ln C + \left(-1.25\times10^{2}T + 8.23\times10^{3}\right)$$

we get,

B.8 $$\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T} = \left[e\left(1.42x10^{-4} + 5.54x10^{-8}C\right).(\lambda - t) + k_{max}e\left(-1.63x10^{+1} - 1.25x10^{+2}\ln C\right)\right].$$
$$.\exp\left[-\exp\left(-\frac{k_{max}e}{-7.5}(\lambda - t) + 1\right)\right].\exp\left[-\frac{k_{max}e}{-7.5}(\lambda - t) + 1\right]$$

B.9 $$\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C} = \left[e(5.54x10^{-8}T - 1.25x10^{-6})\cdot(\lambda - t) + \frac{k_{max}e\left(-1.25x10^{+2}T - 8.23x10^{+3}\right)}{C}\right].$$
$$.\exp\left[-\exp\left(-\frac{k_{max}e}{-7.5}(\lambda - t) + 1\right)\right].\exp\left[-\frac{k_{max}e}{-7.5}(\lambda - t) + 1\right]$$

In global,

B.10

$$
\begin{aligned}
d\left(\log\frac{N}{N_0}\right) = &\left\{\left[e\left(1.42x10^{-4} + 5.54x10^{-8}C\right).(\lambda - t) + k_{max}e\left(-1.63x10^{+1} - 1.25x10^{+2}\ln C\right)\right].\right.\\
&.\exp\left[-\exp\left(-\frac{k_{max}e}{-7.5}(\lambda - t) + 1\right)\right].\exp\left[-\frac{k_{max}e}{-7.5}(\lambda - t) + 1\right]\Bigg\}.dT +\\
&+\left\{\left[e(5.54x10^{-8}T - 1.25x10^{-6}).(\lambda - t) + \frac{k_{max}e\left(-1.25x10^{+2}T - 8.23x10^{+3}\right)}{C}\right].\right.\\
&.\exp\left[-\exp\left(-\frac{k_{max}e}{-7.5}(\lambda - t) + 1\right)\right].\exp\left[-\frac{k_{max}e}{-7.5}(\lambda - t) + 1\right]\Bigg\}.dC
\end{aligned}
$$

The bands of uncertainty for EO concentration can be calculated by the product,

$$\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\cdot dC$$

and for temperature,

$$\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\cdot dT$$

Errors due to propagation of measurement uncertainties are listed on attachment B.6. Tables B.6.1.1 to B.6.1.14 and Figure B.6.1 for temperature and Tables B.6.2.1 to B.6.2.14 and Figure B.6.2 for EO concentration, presents the results assuming that these variables fluctuates 1 %, in a random and independent way, using the propagation of measurement uncertainties methodology.

B.6 Predicted bands of *B. subtilis* inactivation by the model that integrates relevant process conditions

Table B.6.1.1 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 1 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 59.50; C (mg L^{-1}) = 232.5. Kinetic parameters: k_{max} (s^{-1}) = 4.5460x10^{-3} (eq. 2.3); λ (s) = 3.0705x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
0	-0.0826	0.2504	-0.3330	0.1677
100	-0.1639	0.4233	-0.5872	0.2594
200	-0.2930	0.6448	-0.9378	0.3519
300	-0.4794	0.8994	-1.3788	0.4199
400	-0.7280	1.1639	-1.8920	0.4359
500	-1.0376	1.4137	-2.4513	0.3761
600	-1.4013	1.6270	-3.0283	0.2257
700	-1.8080	1.7889	-3.5969	-0.0190
800	-2.2441	1.8922	-4.1364	-0.3519
900	-2.6956	1.9368	-4.6324	-0.7587
1000	-3.1489	1.9280	-5.0769	-1.2209
1100	-3.5926	1.8743	-5.4670	-1.7183
1200	-4.0176	1.7860	-5.8037	-2.2316
1300	-4.4172	1.6732	-6.0904	-2.7440
1400	-4.7871	1.5450	-6.3322	-3.2421
1500	-5.1250	1.4093	-6.5344	-3.7157
1600	-5.4302	1.2723	-6.7025	-4.1579
1700	-5.7032	1.1385	-6.8417	-4.5647

Table B.6.1.1 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 1 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 59.50; C (mg L^{-1}) = 232.5. Kinetic parameters: k_{max} (s^{-1}) = 4.5460x10^{-3} (eq. 2.3); λ (s) = 3.0705x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
1800	-5.9455	1.0112	-6.9567	-4.9343
1900	-6.1590	0.8924	-7.0514	-5.2666
2000	-6.3461	0.7834	-7.1295	-5.5627
2100	-6.5092	0.6845	-7.1937	-5.8247
2200	-6.6508	0.5959	-7.2467	-6.0550
2300	-6.7733	0.5170	-7.2903	-6.2564
2400	-6.8790	0.4473	-7.3263	-6.4318
2500	-6.9699	0.3860	-7.3559	-6.5839
2600	-7.0480	0.3325	-7.3805	-6.7154
2700	-7.1148	0.2859	-7.4008	-6.8289
2800	-7.1720	0.2455	-7.4176	-6.9265
2900	-7.2209	0.2106	-7.4315	-7.0104
3000	-7.2626	0.1804	-7.4430	-7.0823

Table B.6.1.2 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 2 condition

Time (s)	$\log \frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 43.65; C (mg L^{-1}) = 257.0. Kinetic parameters: k_{max} (s^{-1}) = 2.1810x10^{-3} (eq. 2.3); λ (s) = 8.3787x10^{+2} (eq. 2.4). Predicted bands		
		$\left[\frac{\partial\left(\log \frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
0	-0.0385	0.0454	-0.0840	0.0069
100	-0.0575	0.0634	-0.1209	0.0059
200	-0.0833	0.0857	-0.1690	0.0024
300	-0.1172	0.1127	-0.2299	-0.0045
400	-0.1608	0.1444	-0.3052	-0.0164
500	-0.2153	0.1805	-0.3959	-0.0348
600	-0.2820	0.2208	-0.5028	-0.0613
700	-0.3619	0.2645	-0.6264	-0.0974
800	-0.4557	0.3108	-0.7665	-0.1448
900	-0.5638	0.3589	-0.9227	-0.2048
1000	-0.6863	0.4078	-1.0941	-0.2785
1100	-0.8231	0.4564	-1.2795	-0.3667
1200	-0.9736	0.5038	-1.4774	-0.4699
1300	-1.1371	0.5489	-1.6860	-0.5882
1400	-1.3124	0.5910	-1.9034	-0.7213
1500	-1.4983	0.6294	-2.1277	-0.8688
1600	-1.6934	0.6636	-2.3570	-1.0298
1700	-1.8962	0.6930	-2.5892	-1.2032
1800	-2.1051	0.7175	-2.8226	-1.3876
1900	-2.3185	0.7369	-3.0554	-1.5816
2000	-2.5349	0.7512	-3.2861	-1.7837

Table B.6.1.2 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 2 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 43.65; C (mg L^{-1}) = 257.0; Kinetic parameters: k_{max} (s^{-1}) = 2.1810x10^{-3} (eq. 2.3); λ (s) = 8.3787x10^{+2} (eq. 2.4); Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
2100	-2.7527	0.7606	-3.5133	-1.9921
2200	-2.9706	0.7652	-3.7359	-2.2054
2300	-3.1873	0.7654	-3.9526	-2.4219
2400	-3.4015	0.7614	-4.1628	-2.6401
2500	-3.6121	0.7536	-4.3658	-2.8585
2600	-3.8184	0.7425	-4.5609	-3.0759
2700	-4.0194	0.7283	-4.7478	-3.2911
2800	-4.2146	0.7117	-4.9262	-3.5029
2900	-4.4033	0.6928	-5.0961	-3.7105
3000	-4.5852	0.6722	-5.2574	-3.9130
3100	-4.7599	0.6501	-5.4100	-4.1098
3200	-4.9273	0.6269	-5.5542	-4.3004
3300	-5.0872	0.6030	-5.6901	-4.4842
3400	-5.2395	0.5785	-5.8179	-4.6610
3500	-5.3843	0.5537	-5.9380	-4.8306
3600	-5.5216	0.5288	-6.0505	-4.9928
3700	-5.6517	0.5041	-6.1558	-5.1476
3800	-5.7745	0.4796	-6.2542	-5.2949
3900	-5.8904	0.4556	-6.3460	-5.4348
4000	-5.9996	0.4321	-6.4316	-5.5675
4100	-6.1022	0.4092	-6.5114	-5.6930

Table B.6.1.2 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 2 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables		
		T (°C) = 43.65 C (mg L^{-1}) = 257.0		
		Kinetic parameters		
		k_{max} (s^{-1}) = 2.1810x10^{-3} (eq. 2.3) λ (s) = 8.3787x10^{+2} (eq. 2.4)		
		Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
4200	-6.1986	0.3870	-6.5856	-5.8117
4300	-6.2891	0.3655	-6.6546	-5.9236
4400	-6.3738	0.3448	-6.7187	-6.0290
4500	-6.4531	0.3250	-6.7781	-6.1281
4600	-6.5273	0.3060	-6.8333	-6.2213
4700	-6.5966	0.2878	-6.8844	-6.3087
4800	-6.6612	0.2705	-6.9317	-6.3907
4900	-6.7215	0.2540	-6.9756	-6.4675
5000	-6.7778	0.2384	-7.0161	-6.5394
5100	-6.8301	0.2235	-7.0537	-6.6066
5200	-6.8789	0.2095	-7.0884	-6.6694
5300	-6.9242	0.1962	-7.1204	-6.7280
5400	-6.9664	0.1837	-7.1501	-6.7827
5500	-7.0056	0.1719	-7.1774	-6.8337
5600	-7.0420	0.1607	-7.2027	-6.8813
5700	-7.0758	0.1502	-7.2260	-6.9256
5800	-7.1072	0.1404	-7.2475	-6.9668
5900	-7.1363	0.1311	-7.2674	-7.0052
6000	-7.1633	0.1224	-7.2857	-7.0409
6100	-7.1884	0.1143	-7.3026	-7.0741
6200	-7.2116	0.1066	-7.3182	-7.1050

Table B.6.1.2 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 2 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables		
		T (°C) = 43.65 C (mg L^{-1}) = 257.0		
		Kinetic parameters		
		k_{max} (s^{-1}) = 2.1810x10^{-3} (eq. 2.3) λ (s) = 8.3787x10^{+2} (eq. 2.4)		
		Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
6300	-7.2331	0.0995	-7.3326	-7.1336
6400	-7.2531	0.0928	-7.3458	-7.1603
6500	-7.2715	0.0865	-7.3580	-7.1851
6600	-7.2887	0.0806	-7.3693	-7.2080
6700	-7.3045	0.0751	-7.3796	-7.2294
6800	-7.3192	0.0700	-7.3892	-7.2492
6900	-7.3328	0.0652	-7.3980	-7.2676
7000	-7.3453	0.0607	-7.4061	-7.2846

Table B.6.1.3 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 3 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables		
		T (°C) = 34.30		
		C (mg L^{-1}) = 221.5		
		Kinetic parameters		
		k_{max} (s^{-1}) = 6.0837x10^{-4} (eq. 2.3)		
		λ (s) = 1.2312x10^{+3} (eq. 2.4)		
		Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
0	-0.2120	0.0216	-0.2336	-0.1904
100	-0.2291	0.0244	-0.2535	-0.2048
200	-0.2472	0.0273	-0.2746	-0.2199
300	-0.2663	0.0305	-0.2969	-0.2358
400	-0.2865	0.0339	-0.3204	-0.2526
500	-0.3076	0.0375	-0.3451	-0.2701
600	-0.3298	0.0413	-0.3711	-0.2885
700	-0.3530	0.0453	-0.3984	-0.3077
800	-0.3774	0.0495	-0.4269	-0.3278
900	-0.4028	0.0540	-0.4568	-0.3488
1000	-0.4293	0.0586	-0.4880	-0.3707
1100	-0.4570	0.0635	-0.5205	-0.3935
1200	-0.4857	0.0686	-0.5543	-0.4171
1300	-0.5156	0.0739	-0.5894	-0.4417
1400	-0.5466	0.0793	-0.6259	-0.4672
1500	-0.5787	0.0850	-0.6637	-0.4937
1600	-0.6120	0.0909	-0.7028	-0.5211
1700	-0.6463	0.0969	-0.7433	-0.5494
1800	-0.6818	0.1032	-0.7850	-0.5787
1900	-0.7184	0.1096	-0.8280	-0.6089
2000	-0.7561	0.1161	-0.8723	-0.6400

Table B.6.1.3 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 3 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 34.30; C (mg L^{-1}) = 221.5. Kinetic parameters: k_{max} (s^{-1}) = 6.0837×10^{-4} (eq. 2.3); λ (s) = $1.2312\times10^{+3}$ (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
2100	-0.7949	0.1228	-0.9178	-0.6721
2200	-0.8348	0.1297	-0.9645	-0.7051
2300	-0.8758	0.1367	-1.0125	-0.7391
2400	-0.9178	0.1438	-1.0616	-0.7739
2500	-0.9608	0.1511	-1.1118	-0.8097
2600	-1.0048	0.1584	-1.1632	-0.8464
2700	-1.0498	0.1659	-1.2157	-0.8840
2800	-1.0958	0.1734	-1.2692	-0.9224
2900	-1.1428	0.1810	-1.3238	-0.9618
3000	-1.1906	0.1887	-1.3793	-1.0020
3100	-1.2394	0.1964	-1.4358	-1.0430
3200	-1.2890	0.2042	-1.4932	-1.0849
3300	-1.3395	0.2120	-1.5515	-1.1275
3400	-1.3908	0.2198	-1.6106	-1.1710
3500	-1.4428	0.2276	-1.6704	-1.2153
3600	-1.4957	0.2354	-1.7310	-1.2603
3700	-1.5492	0.2432	-1.7924	-1.3060
3800	-1.6034	0.2510	-1.8543	-1.3524
3900	-1.6583	0.2587	-1.9169	-1.3996
4000	-1.7137	0.2664	-1.9801	-1.4474
4100	-1.7698	0.2740	-2.0438	-1.4958

Table B.6.1.3 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 3 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 34.30; C (mg L^{-1}) = 221.5. Kinetic parameters: k_{max} (s^{-1}) = 6.0837x10^{-4} (eq. 2.3); λ (s) = 1.2312x10^{+3} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
4200	-1.8264	0.2815	-2.1080	-1.5449
4300	-1.8836	0.2890	-2.1726	-1.5946
4400	-1.9412	0.2964	-2.2376	-1.6448
4500	-1.9993	0.3036	-2.3029	-1.6956
4600	-2.0577	0.3108	-2.3686	-1.7469
4700	-2.1166	0.3179	-2.4345	-1.7987
4800	-2.1758	0.3248	-2.5006	-1.8510
4900	-2.2353	0.3316	-2.5669	-1.9037
5000	-2.2951	0.3383	-2.6334	-1.9569
5100	-2.3552	0.3448	-2.6999	-2.0104
5200	-2.4154	0.3511	-2.7666	-2.0643
5300	-2.4759	0.3573	-2.8332	-2.1185
5400	-2.5364	0.3634	-2.8998	-2.1731
5500	-2.5971	0.3692	-2.9663	-2.2279
5600	-2.6579	0.3749	-3.0328	-2.2830
5700	-2.7187	0.3804	-3.0991	-2.3383
5800	-2.7795	0.3857	-3.1653	-2.3938
5900	-2.8404	0.3909	-3.2312	-2.4495
6000	-2.9011	0.3958	-3.2970	-2.5053
6100	-2.9619	0.4006	-3.3624	-2.5613
6200	-3.0225	0.4051	-3.4276	-2.6174

Table B.6.1.3 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 3 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 34.30; C (mg L^{-1}) = 221.5. Kinetic parameters: k_{max} (s^{-1}) = 6.0837x10^{-4} (eq. 2.3); λ (s) = 1.2312x10^{+3} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
6300	-3.0830	0.4095	-3.4925	-2.6735
6400	-3.1434	0.4136	-3.5570	-2.7297
6500	-3.2035	0.4176	-3.6211	-2.7860
6600	-3.2635	0.4213	-3.6848	-2.8422
6700	-3.3233	0.4249	-3.7481	-2.8984
6800	-3.3828	0.4282	-3.8110	-2.9546
6900	-3.4420	0.4313	-3.8734	-3.0107
7000	-3.5010	0.4343	-3.9353	-3.0667
7100	-3.5597	0.4370	-3.9967	-3.1227
7200	-3.6180	0.4395	-4.0575	-3.1784
7300	-3.6760	0.4419	-4.1179	-3.2341
7400	-3.7336	0.4440	-4.1776	-3.2896
7500	-3.7908	0.4459	-4.2368	-3.3449
7600	-3.8476	0.4477	-4.2953	-3.4000
7700	-3.9041	0.4492	-4.3533	-3.4548
7800	-3.9600	0.4506	-4.4106	-3.5095
7900	-4.0156	0.4518	-4.4673	-3.5638
8000	-4.0707	0.4527	-4.5234	-3.6179
8100	-4.1253	0.4535	-4.5788	-3.6718
8200	-4.1794	0.4541	-4.6336	-3.7253
8300	-4.2331	0.4546	-4.6876	-3.7785

Table B.6.1.3 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 3 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables T (°C) = 34.30 C (mg L^{-1}) = 221.5 Kinetic parameters k_{max} (s^{-1}) = 6.0837x10^{-4} (eq. 2.3) λ (s) = 1.2312x10^{+3} (eq. 2.4) Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
8400	-4.2862	0.4549	-4.7410	-3.8313
8500	-4.3388	0.4550	-4.7938	-3.8839
8600	-4.3909	0.4549	-4.8458	-3.9360
8700	-4.4425	0.4547	-4.8971	-3.9878
8800	-4.4935	0.4543	-4.9478	-4.0392
8900	-4.5440	0.4537	-4.9977	-4.0903
9000	-4.5939	0.4530	-5.0469	-4.1409
9100	-4.6433	0.4522	-5.0954	-4.1911
9200	-4.6921	0.4512	-5.1433	-4.2409
9300	-4.7403	0.4500	-5.1904	-4.2903
9400	-4.7880	0.4488	-5.2368	-4.3392
9500	-4.8351	0.4474	-5.2825	-4.3877
9600	-4.8816	0.4459	-5.3275	-4.4358
9700	-4.9275	0.4442	-5.3717	-4.4833
9800	-4.9729	0.4424	-5.4153	-4.5305
9900	-5.0176	0.4405	-5.4582	-4.5771
10000	-5.0618	0.4385	-5.5004	-4.6233
10100	-5.1054	0.4364	-5.5419	-4.6690
10200	-5.1484	0.4342	-5.5827	-4.7142
10300	-5.1908	0.4319	-5.6228	-4.7589
10400	-5.2327	0.4295	-5.6622	-4.8031

Table B.6.1.3 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 3 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 34.30; C (mg L^{-1}) = 221.5. Kinetic parameters: k_{max} (s^{-1}) = 6.0837x10^{-4} (eq. 2.3); λ (s) = 1.2312x10^{+3} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
10500	-5.2739	0.4270	-5.7009	-4.8469
10600	-5.3146	0.4245	-5.7390	-4.8901
10700	-5.3546	0.4218	-5.7764	-4.9328
10800	-5.3941	0.4190	-5.8132	-4.9751
10900	-5.4330	0.4162	-5.8493	-5.0168
11000	-5.4714	0.4133	-5.8847	-5.0580
11100	-5.5091	0.4104	-5.9195	-5.0988
11200	-5.5463	0.4073	-5.9536	-5.1390
11300	-5.5829	0.4042	-5.9872	-5.1787
11400	-5.6190	0.4011	-6.0201	-5.2179
11500	-5.6545	0.3979	-6.0524	-5.2566
11600	-5.6894	0.3946	-6.0841	-5.2948
11700	-5.7238	0.3913	-6.1151	-5.3325
11800	-5.7577	0.3880	-6.1456	-5.3697
11900	-5.7909	0.3846	-6.1755	-5.4064
12000	-5.8237	0.3811	-6.2048	-5.4426
12100	-5.8559	0.3777	-6.2336	-5.4782
12200	-5.8876	0.3742	-6.2618	-5.5134
12300	-5.9188	0.3706	-6.2894	-5.5481
12400	-5.9494	0.3671	-6.3165	-5.5823
12500	-5.9795	0.3635	-6.3430	-5.6161

Table B.6.1.3 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 3 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 34.30; C (mg L^{-1}) = 221.5. Kinetic parameters: k_{max} (s^{-1}) = 6.0837x10^{-4} (eq. 2.3); λ (s) = 1.2312x10^{+3} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
12600	-6.0091	0.3599	-6.3690	-5.6493
12700	-6.0383	0.3562	-6.3945	-5.6820
12800	-6.0669	0.3526	-6.4195	-5.7143
12900	-6.0950	0.3489	-6.4439	-5.7461
13000	-6.1226	0.3452	-6.4679	-5.7774
13100	-6.1498	0.3415	-6.4913	-5.8082
13200	-6.1765	0.3378	-6.5143	-5.8386
13300	-6.2027	0.3341	-6.5368	-5.8685
13400	-6.2284	0.3304	-6.5588	-5.8980
13500	-6.2537	0.3267	-6.5804	-5.9270
13600	-6.2785	0.3230	-6.6015	-5.9555
13700	-6.3029	0.3193	-6.6222	-5.9836
13800	-6.3269	0.3156	-6.6424	-6.0113
13900	-6.3504	0.3119	-6.6623	-6.0385
14000	-6.3735	0.3082	-6.6816	-6.0653

Table B.6.1.4 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 4 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables		
		T (°C) = 40.30 C (mg L^{-1}) = 980.0		
		Kinetic parameters		
		k_{max} (s^{-1}) = = 4.1756x10^{-3} (eq. 2.3) λ (s) = 4.0978x10^{+2} (eq. 2.4)		
		Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
0	-0.0479	0.1264	-0.1743	0.0785
100	-0.0974	0.2221	-0.3195	0.1247
200	-0.1792	0.3533	-0.5326	0.1741
300	-0.3028	0.5159	-0.8187	0.2131
400	-0.4753	0.6997	-1.1750	0.2245
500	-0.7002	0.8908	-1.5910	0.1907
600	-0.9769	1.0741	-2.0509	0.0972
700	-1.3007	1.2357	-2.5364	-0.0649
800	-1.6635	1.3657	-3.0292	-0.2978
900	-2.0553	1.4580	-3.5133	-0.5973
1000	-2.4651	1.5110	-3.9761	-0.9541
1100	-2.8820	1.5263	-4.4084	-1.3557
1200	-3.2964	1.5084	-4.8047	-1.7880
1300	-3.6998	1.4627	-5.1625	-2.2371
1400	-4.0858	1.3956	-5.4813	-2.6902
1500	-4.4496	1.3130	-5.7627	-3.1366
1600	-4.7881	1.2207	-6.0088	-3.5675
1700	-5.0996	1.1231	-6.2227	-3.9765
1800	-5.3835	1.0242	-6.4078	-4.3593
1900	-5.6401	0.9270	-6.5671	-4.7132
2000	-5.8705	0.8334	-6.7039	-5.0370

Table B.6.1.4 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 4 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 40.30; C (mg L^{-1}) = 980.0. Kinetic parameters: k_{max} (s^{-1}) = = 4.1756x10^{-3} (eq. 2.3); λ (s) = 4.0978x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
2100	-6.0759	0.7451	-6.8211	-5.3308
2200	-6.2583	0.6630	-6.9213	-5.5953
2300	-6.4194	0.5874	-7.0068	-5.8320
2400	-6.5612	0.5186	-7.0798	-6.0427
2500	-6.6856	0.4564	-7.1420	-6.2292
2600	-6.7944	0.4006	-7.1950	-6.3938
2700	-6.8894	0.3508	-7.2402	-6.5385
2800	-6.9720	0.3066	-7.2787	-6.6654
2900	-7.0439	0.2676	-7.3114	-6.7763
3000	-7.1062	0.2331	-7.3393	-6.8731
3100	-7.1602	0.2028	-7.3631	-6.9574
3200	-7.2070	0.1763	-7.3833	-7.0307
3300	-7.2475	0.1531	-7.4006	-7.0943
3400	-7.2824	0.1329	-7.4153	-7.1495
3500	-7.3126	0.1152	-7.4278	-7.1974

Table B.6.1.5 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 5 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 58.70; C (mg L^{-1}) = 265.5. Kinetic parameters: k_{max} (s^{-1}) = = 4.5707×10^{-3} (eq. 2.3); λ (s) = $3.2175\times10^{+2}$ (eq. 2.4). Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
0	-0.0730	0.2307	-0.3037	0.1577
100	-0.1481	0.3984	-0.5465	0.2504
200	-0.2696	0.6176	-0.8872	0.3481
300	-0.4479	0.8738	-1.3217	0.4258
400	-0.6887	1.1439	-1.8326	0.4551
500	-0.9917	1.4022	-2.3939	0.4106
600	-1.3506	1.6259	-2.9764	0.2753
700	-1.7546	1.7983	-3.5529	0.0437
800	-2.1902	1.9111	-4.1013	-0.2791
900	-2.6430	1.9633	-4.6063	-0.6797
1000	-3.0992	1.9598	-5.0591	-1.1394
1100	-3.5469	1.9094	-5.4562	-1.6375
1200	-3.9764	1.8222	-5.7987	-2.1542
1300	-4.3809	1.7089	-6.0899	-2.6720
1400	-4.7557	1.5791	-6.3348	-3.1765
1500	-5.0982	1.4410	-6.5392	-3.6572
1600	-5.4077	1.3010	-6.7087	-4.1066
1700	-5.6845	1.1641	-6.8486	-4.5204
1800	-5.9302	1.0337	-6.9639	-4.8966
1900	-6.1467	0.9119	-7.0586	-5.2348
2000	-6.3363	0.8001	-7.1364	-5.5362

Table B.6.1.5 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 5 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 58.70; C (mg L^{-1}) = 265.5. Kinetic parameters: k_{max} (s^{-1}) = = 4.5707×10^{-3} (eq. 2.3); λ (s) = $3.2175\times10^{+2}$ (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
2100	-6.5015	0.6987	-7.2002	-5.8028
2200	-6.6449	0.6078	-7.2526	-6.0371
2300	-6.7688	0.5269	-7.2957	-6.2419
2400	-6.8756	0.4555	-7.3312	-6.4201
2500	-6.9675	0.3928	-7.3603	-6.5746
2600	-7.0463	0.3381	-7.3844	-6.7082
2700	-7.1137	0.2905	-7.4042	-6.8232
2800	-7.1714	0.2492	-7.4206	-6.9222
2900	-7.2206	0.2135	-7.4341	-7.0071
3000	-7.2626	0.1828	-7.4453	-7.0798

Table B.6.1.6 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 6 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 33.35; C (mg L^{-1}) = 940.0. Kinetic parameters: k_{max} (s^{-1}) = = 2.6874x10^{-3} (eq. 2.3); λ (s) = 5.1616x10^{+2} (eq. 2.4). Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
0	-0.0838	0.1019	-0.1857	0.0181
100	-0.1272	0.1415	-0.2687	0.0143
200	-0.1857	0.1891	-0.3748	0.0034
300	-0.2617	0.2438	-0.5056	-0.0179
400	-0.3574	0.3046	-0.6619	-0.0528
500	-0.4740	0.3696	-0.8436	-0.1045
600	-0.6125	0.4368	-1.0493	-0.1757
700	-0.7728	0.5041	-1.2769	-0.2687
800	-0.9543	0.5693	-1.5236	-0.3850
900	-1.1555	0.6304	-1.7860	-0.5251
1000	-1.3746	0.6858	-2.0604	-0.6887
1100	-1.6090	0.7341	-2.3431	-0.8749
1200	-1.8561	0.7743	-2.6304	-1.0818
1300	-2.1129	0.8059	-2.9189	-1.3070
1400	-2.3765	0.8288	-3.2053	-1.5478
1500	-2.6440	0.8429	-3.4870	-1.8011
1600	-2.9127	0.8489	-3.7615	-2.0638
1700	-3.1799	0.8471	-4.0270	-2.3328
1800	-3.4435	0.8385	-4.2820	-2.6050
1900	-3.7015	0.8238	-4.5253	-2.8777
2000	-3.9522	0.8039	-4.7561	-3.1483

Table B.6.1.6 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 6 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 33.35; C (mg L^{-1}) = 940.0. Kinetic parameters: k_{max} (s^{-1}) = = 2.6874x10^{-3} (eq. 2.3); λ (s) = 5.1616x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
2100	-4.1943	0.7797	-4.9740	-3.4146
2200	-4.4268	0.7520	-5.1788	-3.6747
2300	-4.6487	0.7216	-5.3704	-3.9271
2400	-4.8598	0.6893	-5.5491	-4.1704
2500	-5.0595	0.6557	-5.7152	-4.4037
2600	-5.2477	0.6214	-5.8691	-4.6263
2700	-5.4246	0.5868	-6.0114	-4.8377
2800	-5.5901	0.5525	-6.1426	-5.0377
2900	-5.7447	0.5187	-6.2634	-5.2261
3000	-5.8886	0.4857	-6.3743	-5.4030
3100	-6.0223	0.4537	-6.4760	-5.5686
3200	-6.1462	0.4229	-6.5692	-5.7233
3300	-6.2608	0.3935	-6.6543	-5.8674
3400	-6.3667	0.3654	-6.7321	-6.0012
3500	-6.4642	0.3389	-6.8031	-6.1254
3600	-6.5540	0.3137	-6.8677	-6.2402
3700	-6.6365	0.2901	-6.9266	-6.3464
3800	-6.7123	0.2679	-6.9802	-6.4443
3900	-6.7818	0.2472	-7.0290	-6.5346
4000	-6.8454	0.2278	-7.0732	-6.6176
4100	-6.9037	0.2098	-7.1135	-6.6939

Table B.6.1.6 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 6 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 33.35; C (mg L^{-1}) = 940.0. Kinetic parameters: k_{max} (s^{-1}) = = 2.6874x10^{-3} (eq. 2.3); λ (s) = 5.1616x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
4200	-6.9570	0.1930	-7.1500	-6.7640
4300	-7.0057	0.1774	-7.1831	-6.8282
4400	-7.0501	0.1630	-7.2132	-6.8871
4500	-7.0907	0.1497	-7.2404	-6.9411
4600	-7.1278	0.1373	-7.2651	-6.9904
4700	-7.1615	0.1260	-7.2875	-7.0356
4800	-7.1923	0.1155	-7.3077	-7.0768
4900	-7.2203	0.1058	-7.3261	-7.1145
5000	-7.2458	0.0969	-7.3427	-7.1489
5100	-7.2690	0.0887	-7.3578	-7.1803
5200	-7.2902	0.0812	-7.3714	-7.2090
5300	-7.3094	0.0743	-7.3837	-7.2351
5400	-7.3269	0.0680	-7.3949	-7.2589
5500	-7.3428	0.0622	-7.4049	-7.2806
5600	-7.3572	0.0568	-7.4141	-7.3004
5700	-7.3704	0.0520	-7.4223	-7.3184
5800	-7.3823	0.0475	-7.4298	-7.3348
5900	-7.3931	0.0434	-7.4365	-7.3498
6000	-7.4030	0.0396	-7.4426	-7.3634

Table B.6.1.7 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 7 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 59.45; C (mg L^{-1}) = 1004.0. Kinetic parameters: k_{max} (s^{-1}) = = 8.0436x10^{-3} (eq. 2.3); λ (s) = 1.7396x10^{+2} (eq. 2.4). Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
0	-0.0822	0.5620	-0.6441	0.4798
100	-0.2573	1.3185	-1.5758	1.0612
200	-0.6037	2.3176	-2.9213	1.7139
300	-1.1416	3.2837	-4.4253	2.1420
400	-1.8377	3.9600	-5.7977	2.1224
500	-2.6226	4.2340	-6.8566	1.6114
600	-3.4208	4.1375	-7.5583	0.7168
700	-4.1720	3.7805	-7.9524	-0.3915
800	-4.8390	3.2851	-8.1241	-1.5539
900	-5.4060	2.7495	-8.1555	-2.6565
1000	-5.8727	2.2376	-8.1103	-3.6350
1100	-6.2474	1.7833	-8.0307	-4.4641
1200	-6.5428	1.3992	-7.9420	-5.1437
1300	-6.7727	1.0850	-7.8577	-5.6877
1400	-6.9497	0.8341	-7.7837	-6.1156
1500	-7.0849	0.6370	-7.7219	-6.4479
1600	-7.1876	0.4841	-7.6718	-6.7035
1700	-7.2654	0.3666	-7.6320	-6.8988
1800	-7.3240	0.2768	-7.6008	-7.0472

Table B.6.1.8 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 9 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 37.00; C (mg L^{-1}) = 674.0. Kinetic parameters: k_{max} (s^{-1}) = = 2.5181x10^{-3} (eq. 2.3); λ (s) = 6.2185x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
0	-0.0620	0.0788	-0.1409	0.0168
100	-0.0943	0.1103	-0.2045	0.0160
200	-0.1381	0.1488	-0.2869	0.0107
300	-0.1956	0.1941	-0.3898	-0.0015
400	-0.2689	0.2457	-0.5146	-0.0232
500	-0.3595	0.3024	-0.6619	-0.0570
600	-0.4685	0.3629	-0.8315	-0.1056
700	-0.5967	0.4256	-1.0223	-0.1712
800	-0.7442	0.4885	-1.2327	-0.2556
900	-0.9103	0.5501	-1.4604	-0.3602
1000	-1.0942	0.6086	-1.7027	-0.4856
1100	-1.2942	0.6625	-1.9567	-0.6316
1200	-1.5085	0.7107	-2.2193	-0.7978
1300	-1.7350	0.7522	-2.4873	-0.9828
1400	-1.9713	0.7865	-2.7578	-1.1848
1500	-2.2150	0.8131	-3.0281	-1.4019
1600	-2.4636	0.8321	-3.2957	-1.6315
1700	-2.7148	0.8436	-3.5585	-1.8712
1800	-2.9665	0.8480	-3.8145	-2.1184
1900	-3.2164	0.8458	-4.0623	-2.3706
2000	-3.4629	0.8377	-4.3006	-2.6253

Table B.6.1.8 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 9 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 37.00; C (mg L^{-1}) = 674.0. Kinetic parameters: k_{max} (s^{-1}) = = 2.5181×10^{-3} (eq. 2.3); λ (s) = $6.2185\times10^{+2}$ (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
2100	-3.7044	0.8242	-4.5286	-2.8802
2200	-3.9395	0.8061	-4.7456	-3.1333
2300	-4.1670	0.7842	-4.9513	-3.3828
2400	-4.3862	0.7591	-5.1454	-3.6271
2500	-4.5963	0.7315	-5.3278	-3.8648
2600	-4.7969	0.7020	-5.4989	-4.0949
2700	-4.9876	0.6711	-5.6587	-4.3164
2800	-5.1682	0.6394	-5.8077	-4.5288
2900	-5.3389	0.6073	-5.9461	-4.7316
3000	-5.4995	0.5751	-6.0746	-4.9244
3100	-5.6504	0.5432	-6.1935	-5.1072
3200	-5.7917	0.5118	-6.3035	-5.2799
3300	-5.9237	0.4812	-6.4049	-5.4426
3400	-6.0469	0.4515	-6.4984	-5.5954
3500	-6.1616	0.4228	-6.5844	-5.7387
3600	-6.2681	0.3953	-6.6634	-5.8728
3700	-6.3670	0.3690	-6.7360	-5.9979
3800	-6.4586	0.3440	-6.8026	-6.1146
3900	-6.5434	0.3203	-6.8636	-6.2231
4000	-6.6217	0.2978	-6.9195	-6.3239
4100	-6.6940	0.2766	-6.9707	-6.4174

Table B.6.1.8 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 9 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 37.00; C (mg L^{-1}) = 674.0. Kinetic parameters: k_{max} (s^{-1}) = = 2.5181x10^{-3} (eq. 2.3); λ (s) = 6.2185x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
4200	-6.7607	0.2567	-7.0175	-6.5040
4300	-6.8222	0.2380	-7.0602	-6.5842
4400	-6.8788	0.2205	-7.0993	-6.6583
4500	-6.9309	0.2041	-7.1350	-6.7268
4600	-6.9787	0.1888	-7.1675	-6.7900
4700	-7.0227	0.1745	-7.1972	-6.8482
4800	-7.0631	0.1612	-7.2244	-6.9019
4900	-7.1002	0.1489	-7.2491	-6.9513
5000	-7.1342	0.1374	-7.2716	-6.9968
5100	-7.1654	0.1267	-7.2921	-7.0386
5200	-7.1940	0.1169	-7.3108	-7.0771
5300	-7.2202	0.1077	-7.3279	-7.1124
5400	-7.2441	0.0993	-7.3434	-7.1449
5500	-7.2661	0.0914	-7.3575	-7.1747
5600	-7.2862	0.0842	-7.3704	-7.2020
5700	-7.3046	0.0775	-7.3821	-7.2271
5800	-7.3215	0.0713	-7.3928	-7.2501
5900	-7.3369	0.0656	-7.4025	-7.2712
6000	-7.3509	0.0604	-7.4113	-7.2906

Table B.6.1.9 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 10 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 37.00; C (mg L^{-1}) = 456.0. Kinetic parameters: k_{max} (s^{-1}) = 1.7987x10^{-3} (eq. 2.3); λ (s) = 8.0121x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
0	-0.0767	0.0598	-0.1365	-0.0169
100	-0.1024	0.0758	-0.1782	-0.0266
200	-0.1343	0.0944	-0.2286	-0.0399
300	-0.1731	0.1154	-0.2885	-0.0577
400	-0.2196	0.1389	-0.3585	-0.0807
500	-0.2744	0.1647	-0.4391	-0.1097
600	-0.3381	0.1924	-0.5305	-0.1457
700	-0.4112	0.2219	-0.6331	-0.1892
800	-0.4938	0.2528	-0.7466	-0.2411
900	-0.5864	0.2845	-0.8709	-0.3018
1000	-0.6887	0.3168	-1.0054	-0.3719
1100	-0.8007	0.3491	-1.1498	-0.4516
1200	-0.9221	0.3810	-1.3031	-0.5412
1300	-1.0525	0.4120	-1.4646	-0.6405
1400	-1.1914	0.4419	-1.6333	-0.7495
1500	-1.3381	0.4701	-1.8082	-0.8680
1600	-1.4919	0.4965	-1.9883	-0.9954
1700	-1.6519	0.5207	-2.1726	-1.1313
1800	-1.8175	0.5424	-2.3599	-1.2750
1900	-1.9875	0.5617	-2.5492	-1.4258
2000	-2.1613	0.5783	-2.7396	-1.5830

Table B.6.1.9 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 10 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 37.00; C (mg L^{-1}) = 456.0. Kinetic parameters: k_{max} (s^{-1}) = 1.7987x10^{-3} (eq. 2.3); λ (s) = 8.0121x10^{+2} (eq. 2.4). Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
2100	-2.3379	0.5922	-2.9300	-1.7457
2200	-2.5163	0.6033	-3.1196	-1.9130
2300	-2.6959	0.6117	-3.3076	-2.0841
2400	-2.8757	0.6175	-3.4933	-2.2582
2500	-3.0551	0.6208	-3.6759	-2.4343
2600	-3.2332	0.6217	-3.8549	-2.6116
2700	-3.4096	0.6202	-4.0298	-2.7894
2800	-3.5835	0.6166	-4.2001	-2.9669
2900	-3.7545	0.6111	-4.3656	-3.1434
3000	-3.9221	0.6038	-4.5259	-3.3183
3100	-4.0859	0.5949	-4.6808	-3.4910
3200	-4.2455	0.5845	-4.8301	-3.6610
3300	-4.4008	0.5729	-4.9737	-3.8278
3400	-4.5514	0.5603	-5.1116	-3.9911
3500	-4.6971	0.5466	-5.2438	-4.1505
3600	-4.8379	0.5322	-5.3702	-4.3057
3700	-4.9737	0.5172	-5.4909	-4.4564
3800	-5.1043	0.5017	-5.6060	-4.6026
3900	-5.2298	0.4858	-5.7156	-4.7439
4000	-5.3501	0.4697	-5.8198	-4.8804
4100	-5.4654	0.4534	-5.9188	-5.0120

Table B.6.1.9 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 10 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 37.00; C (mg L^{-1}) = 456.0; Kinetic parameters: k_{max} (s^{-1}) = 1.7987x10^{-3} (eq. 2.3); λ (s) = 8.0121x10^{+2} (eq. 2.4); Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
4200	-5.5757	0.4371	-6.0127	-5.1386
4300	-5.6810	0.4208	-6.1017	-5.2602
4400	-5.7815	0.4046	-6.1860	-5.3769
4500	-5.8772	0.3885	-6.2657	-5.4887
4600	-5.9683	0.3727	-6.3410	-5.5956
4700	-6.0550	0.3572	-6.4122	-5.6978
4800	-6.1373	0.3419	-6.4793	-5.7954
4900	-6.2155	0.3270	-6.5426	-5.8885
5000	-6.2896	0.3125	-6.6022	-5.9771
5100	-6.3599	0.2984	-6.6583	-6.0615
5200	-6.4264	0.2848	-6.7112	-6.1417
5300	-6.4894	0.2715	-6.7609	-6.2179
5400	-6.5489	0.2587	-6.8076	-6.2902
5500	-6.6052	0.2463	-6.8516	-6.3589
5600	-6.6584	0.2344	-6.8928	-6.4240
5700	-6.7086	0.2230	-6.9316	-6.4856
5800	-6.7560	0.2119	-6.9679	-6.5440
5900	-6.8007	0.2014	-7.0021	-6.5993
6000	-6.8428	0.1912	-7.0341	-6.6516
6100	-6.8825	0.1815	-7.0641	-6.7010
6200	-6.9200	0.1723	-7.0922	-6.7477

Table B.6.1.9 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 10 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 37.00; C (mg L^{-1}) = 456.0. Kinetic parameters: k_{max} (s^{-1}) = 1.7987x10^{-3} (eq. 2.3); λ (s) = 8.0121x10^{+2} (eq. 2.4). Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
6300	-6.9552	0.1634	-7.1186	-6.7918
6400	-6.9884	0.1549	-7.1433	-6.8335
6500	-7.0196	0.1468	-7.1664	-6.8728
6600	-7.0490	0.1391	-7.1881	-6.9099
6700	-7.0766	0.1318	-7.2084	-6.9449
6800	-7.1026	0.1248	-7.2274	-6.9779
6900	-7.1271	0.1181	-7.2452	-7.0090
7000	-7.1501	0.1118	-7.2618	-7.0383
7100	-7.1717	0.1058	-7.2774	-7.0659
7200	-7.1919	0.1000	-7.2920	-7.0919
7300	-7.2110	0.0946	-7.3056	-7.1164
7400	-7.2289	0.0895	-7.3184	-7.1395
7500	-7.2457	0.0846	-7.3303	-7.1612
7600	-7.2615	0.0799	-7.3415	-7.1816
7700	-7.2763	0.0755	-7.3519	-7.2008
7800	-7.2903	0.0714	-7.3616	-7.2189
7900	-7.3033	0.0674	-7.3707	-7.2359
8000	-7.3156	0.0637	-7.3793	-7.2519

Table B.6.1.10 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 11 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 51.00; C (mg L^{-1}) = 247.0. Kinetic parameters: k_{max} (s^{-1}) = 3.2886x10^{-3} (eq. 2.3); λ (s) = 5.9661x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
0	-0.0296	0.0672	-0.0968	0.0377
100	-0.0551	0.1120	-0.1671	0.0568
200	-0.0957	0.1738	-0.2695	0.0781
300	-0.1563	0.2536	-0.4098	0.0973
400	-0.2414	0.3501	-0.5915	0.1087
500	-0.3552	0.4603	-0.8155	0.1051
600	-0.5004	0.5795	-1.0799	0.0791
700	-0.6783	0.7020	-1.3802	0.0237
800	-0.8885	0.8217	-1.7102	-0.0668
900	-1.1292	0.9331	-2.0622	-0.1961
1000	-1.3969	1.0313	-2.4282	-0.3655
1100	-1.6872	1.1130	-2.8002	-0.5742
1200	-1.9951	1.1758	-3.1709	-0.8193
1300	-2.3152	1.2190	-3.5342	-1.0962
1400	-2.6421	1.2427	-3.8848	-1.3994
1500	-2.9707	1.2482	-4.2189	-1.7225
1600	-3.2965	1.2372	-4.5337	-2.0592
1700	-3.6155	1.2121	-4.8276	-2.4034
1800	-3.9244	1.1751	-5.0995	-2.7493
1900	-4.2206	1.1288	-5.3495	-3.0918
2000	-4.5023	1.0755	-5.5777	-3.4268

Table B.6.1.10 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 11 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 51.00; C (mg L^{-1}) = 247.0. Kinetic parameters: k_{max} (s^{-1}) = 3.2886x10^{-3} (eq. 2.3); λ (s) = 5.9661x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
2100	-4.7680	1.0172	-5.7852	-3.7508
2200	-5.0170	0.9558	-5.9728	-4.0611
2300	-5.2488	0.8930	-6.1418	-4.3558
2400	-5.4636	0.8301	-6.2937	-4.6335
2500	-5.6616	0.7681	-6.4297	-4.8935
2600	-5.8433	0.7079	-6.5512	-5.1354
2700	-6.0095	0.6500	-6.6596	-5.3595
2800	-6.1610	0.5950	-6.7560	-5.5660
2900	-6.2987	0.5431	-6.8418	-5.7555
3000	-6.4234	0.4945	-6.9180	-5.9289
3100	-6.5362	0.4493	-6.9855	-6.0870
3200	-6.6380	0.4073	-7.0454	-6.2307
3300	-6.7297	0.3686	-7.0984	-6.3611
3400	-6.8122	0.3331	-7.1453	-6.4791
3500	-6.8862	0.3006	-7.1868	-6.5856
3600	-6.9526	0.2709	-7.2235	-6.6817
3700	-7.0120	0.2439	-7.2559	-6.7682
3800	-7.0653	0.2193	-7.2846	-6.8459
3900	-7.1128	0.1971	-7.3099	-6.9157
4000	-7.1553	0.1770	-7.3323	-6.9784
4100	-7.1932	0.1588	-7.3520	-7.0345

Table B.6.1.10 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 11 condition

Time (s)	$\log \frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 51.00; C (mg L^{-1}) = 247.0. Kinetic parameters: k_{max} (s^{-1}) = 3.2886x10^{-3} (eq. 2.3); λ (s) = 5.9661x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log \frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
4200	-7.2271	0.1424	-7.3694	-7.0847
4300	-7.2572	0.1276	-7.3848	-7.1297
4400	-7.2841	0.1143	-7.3984	-7.1698
4500	-7.3081	0.1023	-7.4104	-7.2057
4600	-7.3294	0.0916	-7.4209	-7.2378
4700	-7.3484	0.0819	-7.4303	-7.2664
4800	-7.3652	0.0733	-7.4385	-7.2920
4900	-7.3803	0.0655	-7.4458	-7.3147
5000	-7.3936	0.0586	-7.4522	-7.3351

Table B.6.1.11 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 12 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 50.72; C (mg L^{-1}) = 447.0. Kinetic parameters: k_{max} (s^{-1}) = 4.0570x10^{-3} (eq. 2.3); λ (s) = 4.6703x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
0	-0.0338	0.1033	-0.1371	0.0695
100	-0.0708	0.1877	-0.2585	0.1169
200	-0.1339	0.3082	-0.4421	0.1743
300	-0.2322	0.4638	-0.6960	0.2316
400	-0.3735	0.6474	-1.0208	0.2739
500	-0.5628	0.8467	-1.4096	0.2839
600	-0.8020	1.0470	-1.8491	0.2450
700	-1.0888	1.2335	-2.3223	0.1447
800	-1.4176	1.3936	-2.8112	-0.0239
900	-1.7803	1.5187	-3.2990	-0.2615
1000	-2.1671	1.6042	-3.7713	-0.5629
1100	-2.5681	1.6495	-4.2176	-0.9186
1200	-2.9735	1.6571	-4.6306	-1.3163
1300	-3.3745	1.6317	-5.0062	-1.7427
1400	-3.7639	1.5791	-5.3430	-2.1848
1500	-4.1360	1.5055	-5.6415	-2.6305
1600	-4.4867	1.4169	-5.9035	-3.0698
1700	-4.8132	1.3187	-6.1319	-3.4945
1800	-5.1142	1.2156	-6.3297	-3.8986
1900	-5.3891	1.1112	-6.5003	-4.2779
2000	-5.6382	1.0085	-6.6468	-4.6297

Table B.6.1.11 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 12 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 50.72; C (mg L^{-1}) = 447.0; Kinetic parameters: k_{max} (s^{-1}) = 4.0570x10^{-3} (eq. 2.3); λ (s) = 4.6703x10^{+2} (eq. 2.4); Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
2100	-5.8626	0.9097	-6.7723	-4.9529
2200	-6.0634	0.8162	-6.8795	-5.2472
2300	-6.2423	0.7289	-6.9711	-5.5134
2400	-6.4009	0.6483	-7.0492	-5.7526
2500	-6.5411	0.5746	-7.1158	-5.9665
2600	-6.6646	0.5078	-7.1725	-6.1568
2700	-6.7731	0.4477	-7.2208	-6.3255
2800	-6.8682	0.3937	-7.2619	-6.4745
2900	-6.9514	0.3456	-7.2970	-6.6057
3000	-7.0239	0.3029	-7.3268	-6.7211
3100	-7.0872	0.2651	-7.3523	-6.8222
3200	-7.1423	0.2317	-7.3739	-6.9106
3300	-7.1902	0.2023	-7.3924	-6.9879
3400	-7.2318	0.1764	-7.4082	-7.0554
3500	-7.2679	0.1537	-7.4216	-7.1141
3600	-7.2992	0.1339	-7.4331	-7.1653
3700	-7.3263	0.1166	-7.4429	-7.2098
3800	-7.3498	0.1014	-7.4512	-7.2484
3900	-7.3702	0.0882	-7.4584	-7.2820
4000	-7.3878	0.0766	-7.4644	-7.3112

Table B.6.1.12 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 13 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables T (°C) = 49.93 C (mg L^{-1}) = 674.5 Kinetic parameters k_{max} (s^{-1}) = 4.8389x10^{-3} (eq. 2.3) λ (s) = 3.8487x10^{+2} (eq. 2.4) Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
0	-0.0360	0.1372	-0.1732	0.1011
100	-0.0850	0.2729	-0.3579	0.1879
200	-0.1748	0.4729	-0.6477	0.2981
300	-0.3199	0.7298	-1.0497	0.4098
400	-0.5314	1.0218	-1.5532	0.4903
500	-0.8135	1.3184	-2.1319	0.5049
600	-1.1629	1.5885	-2.7514	0.4256
700	-1.5695	1.8070	-3.3766	0.2375
800	-2.0186	1.9588	-3.9773	-0.0598
900	-2.4931	2.0390	-4.5321	-0.4541
1000	-2.9764	2.0515	-5.0279	-0.9248
1100	-3.4534	2.0062	-5.4596	-1.4473
1200	-3.9123	1.9154	-5.8277	-1.9969
1300	-4.3441	1.7924	-6.1364	-2.5517
1400	-4.7429	1.6492	-6.3921	-3.0937
1500	-5.1058	1.4961	-6.6019	-3.6096
1600	-5.4316	1.3413	-6.7728	-4.0903
1700	-5.7209	1.1905	-6.9114	-4.5304
1800	-5.9756	1.0479	-7.0235	-4.9278
1900	-6.1981	0.9159	-7.1140	-5.2822
2000	-6.3911	0.7958	-7.1869	-5.5953

Table B.6.1.12 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 13 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 49.93; C (mg L^{-1}) = 674.5. Kinetic parameters: k_{max} (s^{-1}) = 4.8389x10^{-3} (eq. 2.3); λ (s) = 3.8487x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
2100	-6.5578	0.6881	-7.2458	-5.8697
2200	-6.7009	0.5924	-7.2933	-6.1085
2300	-6.8235	0.5083	-7.3318	-6.3152
2400	-6.9280	0.4349	-7.3629	-6.4932
2500	-7.0170	0.3711	-7.3881	-6.6459
2600	-7.0925	0.3161	-7.4086	-6.7765
2700	-7.1566	0.2687	-7.4253	-6.8879
2800	-7.2107	0.2281	-7.4388	-6.9826
2900	-7.2565	0.1934	-7.4499	-7.0631
3000	-7.2951	0.1638	-7.4589	-7.1313
3100	-7.3277	0.1386	-7.4663	-7.1891
3200	-7.3551	0.1172	-7.4724	-7.2379
3300	-7.3783	0.0991	-7.4773	-7.2792
3400	-7.3977	0.0837	-7.4814	-7.3140
3500	-7.4141	0.0707	-7.4847	-7.3434

Table B.6.1.13 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 14 condition

Time (s)	$\log \frac{N}{N_0}$ (eq. 2.5)	Process variables T (°C) = 60.08 C (mg L^{-1}) = 737.5 Kinetic parameters k_{max} (s^{-1}) = 6.9480x10^{-3} (eq. 2.3) λ (s) = 1.9179x10^{+2} (eq. 2.4) Predicted bands		
		$\left[\frac{\partial\left(\log \frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
0	-0.0915	0.5094	-0.6010	0.4179
100	-0.2441	1.0594	-1.3035	0.8153
200	-0.5232	1.7710	-2.2942	1.2478
300	-0.9465	2.4983	-3.4447	1.5518
400	-1.5005	3.0885	-4.5890	1.5881
500	-2.1468	3.4460	-5.5928	1.2992
600	-2.8362	3.5500	-6.3862	0.7139
700	-3.5217	3.4374	-6.9591	-0.0843
800	-4.1671	3.1717	-7.3388	-0.9955
900	-4.7496	2.8189	-7.5684	-1.9307
1000	-5.2580	2.4334	-7.6914	-2.8247
1100	-5.6906	2.0535	-7.7441	-3.6371
1200	-6.0513	1.7028	-7.7541	-4.3486
1300	-6.3475	1.3927	-7.7402	-4.9548
1400	-6.5877	1.1270	-7.7147	-5.4606
1500	-6.7807	0.9045	-7.6852	-5.8761
1600	-6.9346	0.7213	-7.6559	-6.2133
1700	-7.0566	0.5723	-7.6289	-6.4843
1800	-7.1530	0.4523	-7.6053	-6.7007
1900	-7.2288	0.3564	-7.5853	-6.8724
2000	-7.2883	0.2802	-7.5685	-7.0082

Table B.6.1.13 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 14 condition

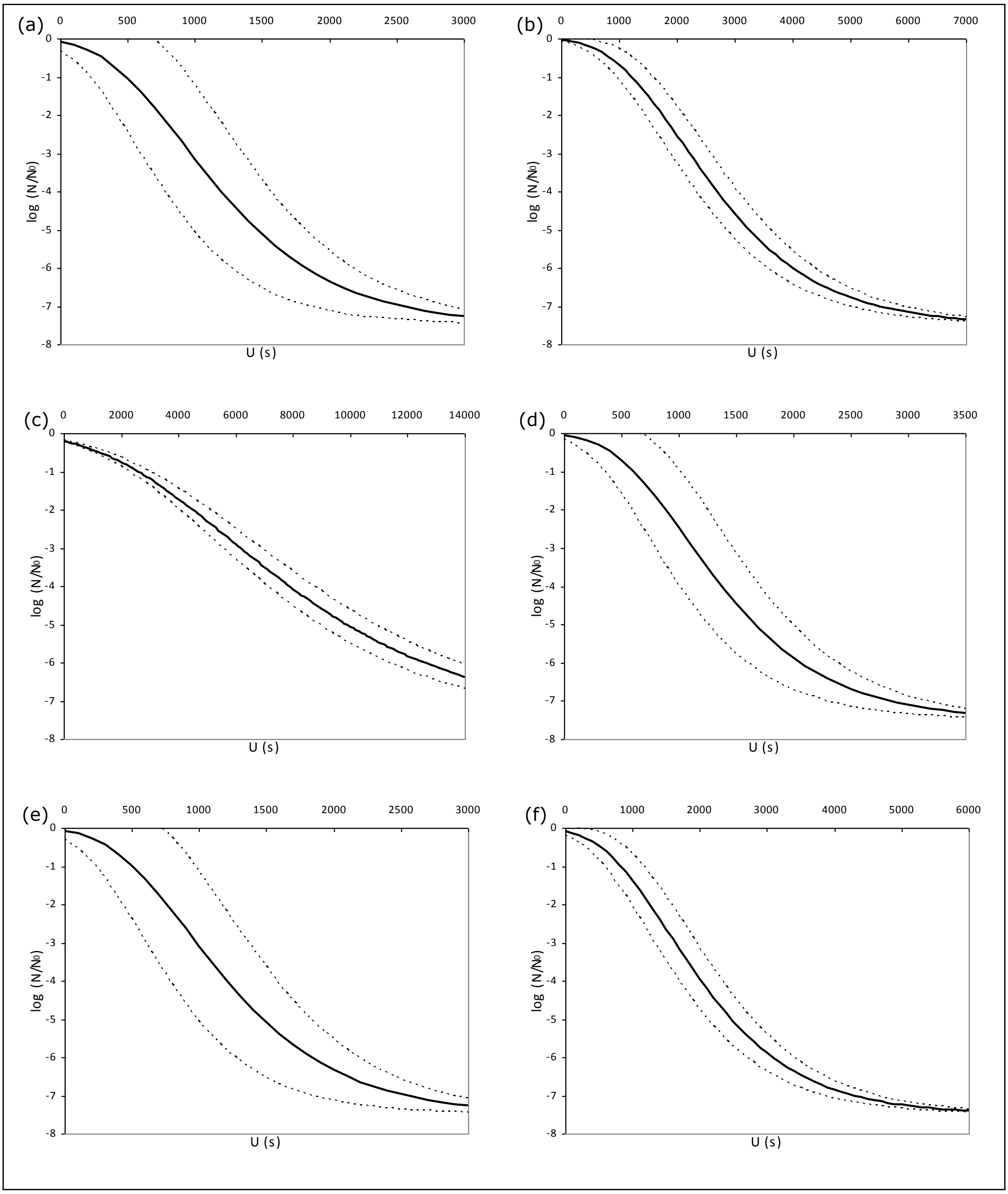
Time (s)	$\log \frac{N}{N_0}$ (eq. 2.5)	Process variables		
		T (°C) = 60.08 C (mg L^{-1}) = 737.5		
		Kinetic parameters		
		k_{max} (s^{-1}) = 6.9480x10^{-3} (eq. 2.3) λ (s) = 1.9179x10^{+2} (eq. 2.4)		
		Predicted bands		
		$\left[\frac{\partial\left(\log \frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
2100	-7.3349	0.2199	-7.5548	-7.1151
2200	-7.3714	0.1723	-7.5436	-7.1991
2300	-7.3998	0.1348	-7.5346	-7.2650
2400	-7.4220	0.1054	-7.5274	-7.3166
2500	-7.4393	0.0824	-7.5217	-7.3569

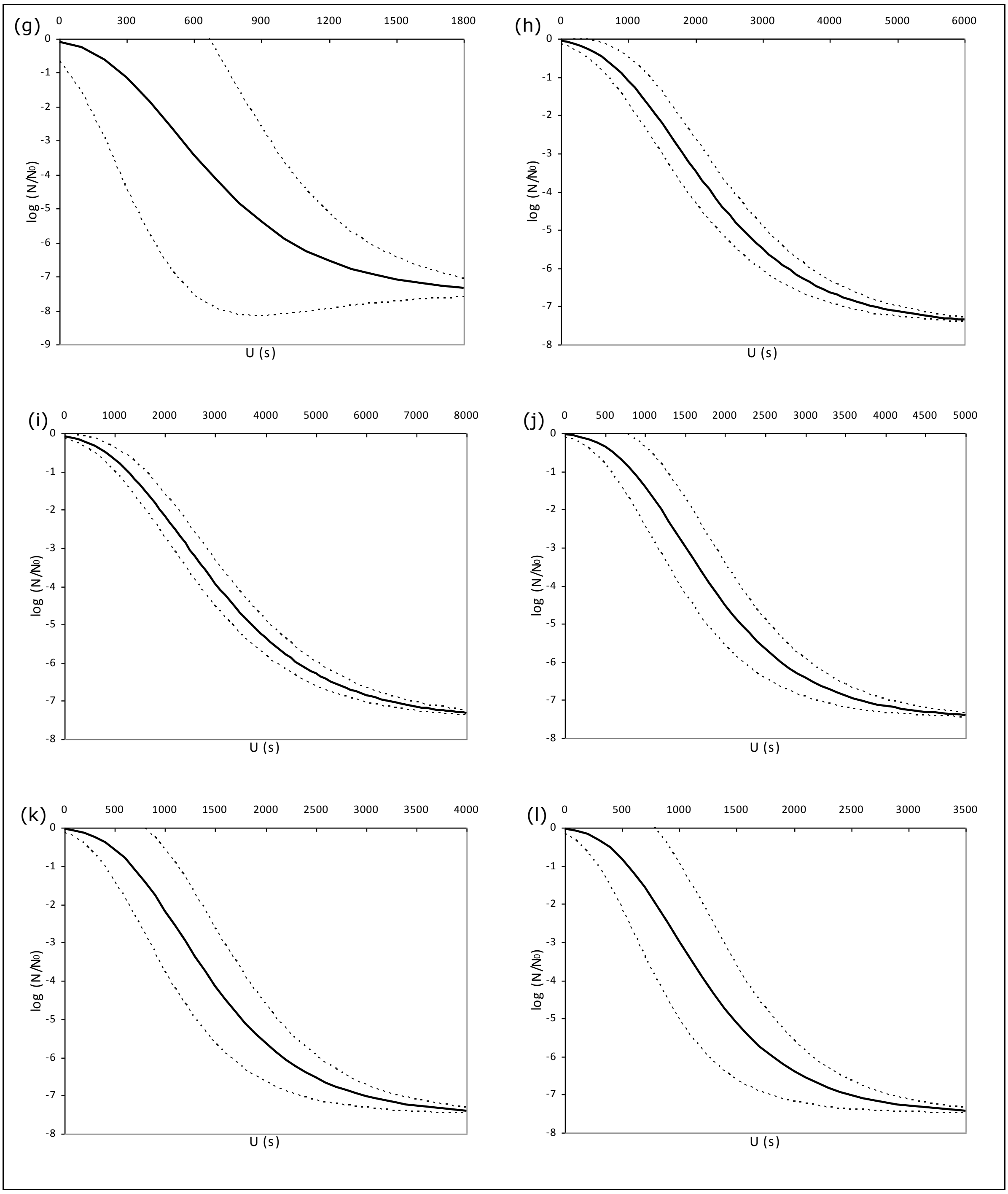
Table B.6.1.14 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 15 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables		
		T (°C) = 61.98 C (mg L^{-1}) = 498.0		
		Kinetic parameters		
		k_{max} (s^{-1}) = 6.1736x10^{-3} (eq. 2.3) λ (s) = 1.7976x10^{+2} (eq. 2.4)		
		Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
0	-0.1288	0.5708	-0.6996	0.4420
100	-0.2910	1.0344	-1.3254	0.7434
200	-0.5582	1.5920	-2.1502	1.0338
300	-0.9397	2.1503	-3.0900	1.2105
400	-1.4251	2.6162	-4.0413	1.1911
500	-1.9881	2.9281	-4.9162	0.9399
600	-2.5945	3.0655	-5.6600	0.4710
700	-3.2098	3.0425	-6.2523	-0.1673
800	-3.8052	2.8936	-6.6988	-0.9116
900	-4.3597	2.6596	-7.0193	-1.7001
1000	-4.8606	2.3787	-7.2394	-2.4819
1100	-5.3022	2.0816	-7.3838	-3.2206
1200	-5.6840	1.7901	-7.4741	-3.8939
1300	-6.0089	1.5181	-7.5270	-4.4908
1400	-6.2820	1.2731	-7.5551	-5.0088
1500	-6.5092	1.0582	-7.5674	-5.4510
1600	-6.6967	0.8733	-7.5700	-5.8234
1700	-6.8506	0.7166	-7.5672	-6.1339
1800	-6.9761	0.5854	-7.5615	-6.3907
1900	-7.0781	0.4764	-7.5545	-6.6017
2000	-7.1608	0.3866	-7.5474	-6.7741

Table B.6.1.14 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of temperature) for cycles of RUN 15 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 61.98; C (mg L^{-1}) = 498.0. Kinetic parameters: k_{max} (s^{-1}) = 6.1736x10^{-3} (eq. 2.3); λ (s) = 1.7976x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial T}\right]$ (eq. B.8)	Upper band	Lower band
2100	-7.2275	0.3130	-7.5405	-6.9145
2200	-7.2813	0.2529	-7.5343	-7.0284
2300	-7.3247	0.2041	-7.5287	-7.1206
2400	-7.3595	0.1645	-7.5240	-7.1950
2500	-7.3874	0.1324	-7.5199	-7.2550


(a)
(b)
(c)
(d)
(e)
(f)
log (N/N0)
U (s)



(g)
(h)
(i)
(j)
(k)
(l)
log (N/N0)
U (s)

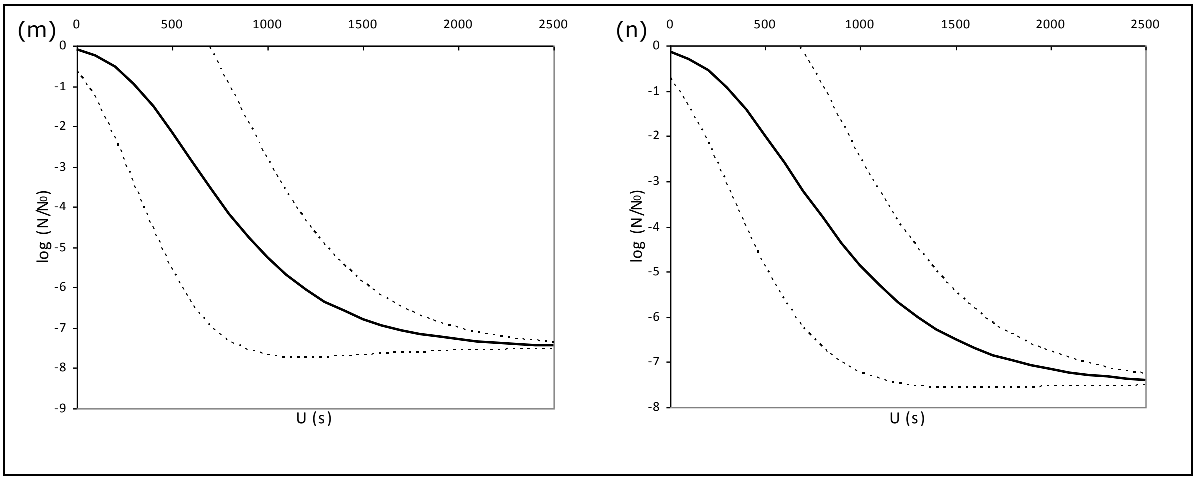


Figure B.6.1 Inactivation of *B. subtilis* spores by EO sterilisation.

—— Predicted data by eq. 2.5 ------- Upper and lower limits of predicted data, considering that T fluctuates in a random and independent way of 1 %

a) Run1 T=60 °C; C=233 mg L^{-1}; RH=63 %

b) Run2 T=44 °C; C=257 mg L^{-1}; RH=86 %

c) Run3 T=34 °C; C=222 mg L^{-1}; RH=60 %

d) Run4 T=40 °C; C=980 mg L^{-1}; RH=90 %

e) Run5 T=59 °C; C=266 mg L^{-1}; RH=83 %

f) Run6 T=33 °C; C=940 mg L^{-1}; RH=61 %

g) Run7 T=59 °C; C=1004 mg L^{-1}; RH=98 %

h) Run9 T=37 °C; C=674 mg L^{-1}; RH=73%

i) Run10 T=37 °C; C=456 mg L^{-1}; RH=80%

j) Run11 T=51 °C; C=247 mg L^{-1}; RH=80%

k) Run12 T=51 °C; C=447 mg L^{-1}; RH=67%

l) Run13 T=50 °C; C=675 mg L^{-1}; RH=72%

m) Run14 T=60 °C; C=738 mg L^{-1}; RH=71%

n) Run15 T=62 °C; C=498 mg L^{-1}; RH=77%

Table B.6.2.1 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 1 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables T (°C) = 59.50 C (mg L^{-1}) = 232.5 Kinetic parameters k_{max} (s^{-1}) = 4.5460x10^{-3} (eq. 2.3) λ (s) = 3.0705x10^{+2} (eq. 2.4) Predicted bands $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
0	-0.0826	0.0959	-0.1785	0.0132
100	-0.1639	0.1614	-0.3252	-0.0025
200	-0.2930	0.2448	-0.5377	-0.0482
300	-0.4794	0.3399	-0.8194	-0.1395
400	-0.7280	0.4381	-1.1661	-0.2900
500	-1.0376	0.5299	-1.5675	-0.5077
600	-1.4013	0.6073	-2.0085	-0.7940
700	-1.8080	0.6650	-2.4729	-1.1430
800	-2.2441	0.7005	-2.9446	-1.5437
900	-2.6956	0.7140	-3.4096	-1.9815
1000	-3.1489	0.7079	-3.8568	-2.4410
1100	-3.5926	0.6854	-4.2780	-2.9072
1200	-4.0176	0.6505	-4.6681	-3.3671
1300	-4.4172	0.6069	-5.0242	-3.8103
1400	-4.7871	0.5582	-5.3454	-4.2289
1500	-5.1250	0.5072	-5.6322	-4.6178
1600	-5.4302	0.4560	-5.8862	-4.9741
1700	-5.7032	0.4065	-6.1097	-5.2967
1800	-5.9455	0.3596	-6.3051	-5.5859
1900	-6.1590	0.3162	-6.4752	-5.8429
2000	-6.3461	0.2765	-6.6226	-6.0696

Table B.6.2.1 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 1 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 59.50; C (mg L^{-1}) = 232.5. Kinetic parameters: k_{max} (s^{-1}) = 4.5460x10^{-3} (eq. 2.3); λ (s) = 3.0705x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
2100	-6.5092	0.2406	-6.7499	-6.2686
2200	-6.6508	0.2087	-6.8595	-6.4422
2300	-6.7733	0.1804	-6.9537	-6.5930
2400	-6.8790	0.1554	-7.0345	-6.7236
2500	-6.9699	0.1337	-7.1036	-6.8363
2600	-7.0480	0.1147	-7.1627	-6.9333
2700	-7.1148	0.0983	-7.2131	-7.0166
2800	-7.1720	0.0841	-7.2561	-7.0880
2900	-7.2209	0.0718	-7.2927	-7.1491
3000	-7.2626	0.0613	-7.3239	-7.2013

Table B.6.2.2 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 2 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables T (°C) = 43.65 C (mg L^{-1}) = 257.0 Kinetic parameters k_{max} (s^{-1}) = 2.1810x10^{-3} (eq. 2.3) λ (s) = 8.3787x10^{+2} (eq. 2.4) Predicted bands $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
0	-0.0385	0.0218	-0.0603	-0.0168
100	-0.0575	0.0300	-0.0875	-0.0275
200	-0.0833	0.0402	-0.1235	-0.0430
300	-0.1172	0.0524	-0.1696	-0.0648
400	-0.1608	0.0665	-0.2273	-0.0943
500	-0.2153	0.0823	-0.2977	-0.1330
600	-0.2820	0.0998	-0.3818	-0.1823
700	-0.3619	0.1184	-0.4803	-0.2435
800	-0.4557	0.1379	-0.5935	-0.3178
900	-0.5638	0.1578	-0.7216	-0.4060
1000	-0.6863	0.1777	-0.8640	-0.5087
1100	-0.8231	0.1971	-1.0202	-0.6260
1200	-0.9736	0.2156	-1.1892	-0.7580
1300	-1.1371	0.2329	-1.3700	-0.9042
1400	-1.3124	0.2486	-1.5610	-1.0637
1500	-1.4983	0.2625	-1.7608	-1.2357
1600	-1.6934	0.2744	-1.9678	-1.4189
1700	-1.8962	0.2842	-2.1804	-1.6119
1800	-2.1051	0.2919	-2.3969	-1.8132
1900	-2.3185	0.2973	-2.6158	-2.0212
2000	-2.5349	0.3007	-2.8355	-2.2342

Table B.6.2.2 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 2 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 43.65; C (mg L^{-1}) = 257.0; Kinetic parameters: k_{max} (s^{-1}) = 2.1810x10^{-3} (eq. 2.3); λ (s) = 8.3787x10^{+2} (eq. 2.4); Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
2100	-2.7527	0.3020	-3.0547	-2.4508
2200	-2.9706	0.3014	-3.2720	-2.6692
2300	-3.1873	0.2991	-3.4864	-2.8882
2400	-3.4015	0.2952	-3.6967	-3.1062
2500	-3.6121	0.2900	-3.9021	-3.3222
2600	-3.8184	0.2835	-4.1019	-3.5349
2700	-4.0194	0.2760	-4.2955	-3.7434
2800	-4.2146	0.2677	-4.4823	-3.9469
2900	-4.4033	0.2587	-4.6620	-4.1446
3000	-4.5852	0.2492	-4.8343	-4.3360
3100	-4.7599	0.2392	-4.9991	-4.5207
3200	-4.9273	0.2290	-5.1563	-4.6983
3300	-5.0872	0.2187	-5.3059	-4.8685
3400	-5.2395	0.2083	-5.4478	-5.0311
3500	-5.3843	0.1980	-5.5823	-5.1863
3600	-5.5216	0.1878	-5.7095	-5.3338
3700	-5.6517	0.1778	-5.8295	-5.4739
3800	-5.7745	0.1680	-5.9426	-5.6065
3900	-5.8904	0.1585	-6.0489	-5.7319
4000	-5.9996	0.1493	-6.1489	-5.8502
4100	-6.1022	0.1405	-6.2427	-5.9617

Table B.6.2.2 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 2 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 43.65; C (mg L^{-1}) = 257.0; Kinetic parameters: k_{max} (s^{-1}) = 2.1810x10^{-3} (eq. 2.3); λ (s) = 8.3787x10^{+2} (eq. 2.4); Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
4200	-6.1986	0.1320	-6.3306	-6.0666
4300	-6.2891	0.1239	-6.4129	-6.1652
4400	-6.3738	0.1161	-6.4899	-6.2577
4500	-6.4531	0.1087	-6.5618	-6.3444
4600	-6.5273	0.1017	-6.6290	-6.4256
4700	-6.5966	0.0951	-6.6916	-6.5015
4800	-6.6612	0.0888	-6.7500	-6.5724
4900	-6.7215	0.0829	-6.8044	-6.6387
5000	-6.7778	0.0773	-6.8550	-6.7005
5100	-6.8301	0.0720	-6.9022	-6.7581
5200	-6.8789	0.0671	-6.9460	-6.8118
5300	-6.9242	0.0625	-6.9867	-6.8618
5400	-6.9664	0.0581	-7.0245	-6.9083
5500	-7.0056	0.0541	-7.0596	-6.9515
5600	-7.0420	0.0503	-7.0922	-6.9917
5700	-7.0758	0.0467	-7.1225	-7.0291
5800	-7.1072	0.0434	-7.1506	-7.0638
5900	-7.1363	0.0403	-7.1766	-7.0960
6000	-7.1633	0.0374	-7.2007	-7.1259
6100	-7.1884	0.0347	-7.2231	-7.1536
6200	-7.2116	0.0322	-7.2438	-7.1794

Table B.6.2.2 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 2 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 43.65; C (mg L^{-1}) = 257.0. Kinetic parameters: k_{max} (s^{-1}) = 2.1810×10^{-3} (eq. 2.3); λ (s) = $8.3787\times10^{+2}$ (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
6300	-7.2331	0.0299	-7.2630	-7.2032
6400	-7.2531	0.0277	-7.2808	-7.2253
6500	-7.2715	0.0257	-7.2972	-7.2458
6600	-7.2887	0.0238	-7.3125	-7.2648
6700	-7.3045	0.0221	-7.3266	-7.2824
6800	-7.3192	0.0205	-7.3396	-7.2987
6900	-7.3328	0.0190	-7.3517	-7.3138
7000	-7.3453	0.0176	-7.3629	-7.3278

Table B.6.2.3 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 3 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 34.30; C (mg L^{-1}) = 221.5. Kinetic parameters: k_{max} (s^{-1}) = 6.0837x10^{-4} (eq. 2.3); λ (s) = 1.2312x10^{+3} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
0	-0.2120	0.0204	-0.2324	-0.1916
100	-0.2291	0.0216	-0.2507	-0.2076
200	-0.2472	0.0228	-0.2701	-0.2244
300	-0.2663	0.0241	-0.2904	-0.2423
400	-0.2865	0.0254	-0.3118	-0.2611
500	-0.3076	0.0267	-0.3343	-0.2809
600	-0.3298	0.0281	-0.3579	-0.3017
700	-0.3530	0.0295	-0.3825	-0.3236
800	-0.3774	0.0309	-0.4082	-0.3465
900	-0.4028	0.0323	-0.4351	-0.3705
1000	-0.4293	0.0337	-0.4630	-0.3956
1100	-0.4570	0.0352	-0.4921	-0.4218
1200	-0.4857	0.0366	-0.5223	-0.4491
1300	-0.5156	0.0381	-0.5537	-0.4775
1400	-0.5466	0.0396	-0.5862	-0.5070
1500	-0.5787	0.0411	-0.6198	-0.5376
1600	-0.6120	0.0426	-0.6545	-0.5694
1700	-0.6463	0.0441	-0.6904	-0.6023
1800	-0.6818	0.0456	-0.7274	-0.6363
1900	-0.7184	0.0471	-0.7655	-0.6714
2000	-0.7561	0.0485	-0.8047	-0.7076

Table B.6.2.3 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 3 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables		
		T (°C) = 34.30 C (mg L^{-1}) = 221.5		
		Kinetic parameters		
		k_{max} (s^{-1}) = 6.0837x10^{-4} (eq. 2.3) λ (s) = 1.2312x10^{+3} (eq. 2.4)		
		Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
2100	-0.7949	0.0500	-0.8449	-0.7449
2200	-0.8348	0.0515	-0.8863	-0.7834
2300	-0.8758	0.0529	-0.9287	-0.8229
2400	-0.9178	0.0543	-0.9721	-0.8634
2500	-0.9608	0.0557	-1.0165	-0.9050
2600	-1.0048	0.0571	-1.0620	-0.9477
2700	-1.0498	0.0585	-1.1083	-0.9913
2800	-1.0958	0.0598	-1.1557	-1.0360
2900	-1.1428	0.0612	-1.2039	-1.0816
3000	-1.1906	0.0624	-1.2531	-1.1282
3100	-1.2394	0.0637	-1.3031	-1.1757
3200	-1.2890	0.0649	-1.3540	-1.2241
3300	-1.3395	0.0661	-1.4056	-1.2734
3400	-1.3908	0.0673	-1.4581	-1.3235
3500	-1.4428	0.0684	-1.5112	-1.3744
3600	-1.4957	0.0695	-1.5651	-1.4262
3700	-1.5492	0.0705	-1.6197	-1.4787
3800	-1.6034	0.0715	-1.6749	-1.5319
3900	-1.6583	0.0725	-1.7307	-1.5858
4000	-1.7137	0.0734	-1.7872	-1.6403
4100	-1.7698	0.0743	-1.8441	-1.6955

Table B.6.2.3 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 3 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 34.30; C (mg L^{-1}) = 221.5; Kinetic parameters: k_{max} (s^{-1}) = 6.0837x10^{-4} (eq. 2.3); λ (s) = 1.2312x10^{+3} (eq. 2.4); Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
4200	-1.8264	0.0751	-1.9016	-1.7513
4300	-1.8836	0.0759	-1.9595	-1.8076
4400	-1.9412	0.0767	-2.0179	-1.8645
4500	-1.9993	0.0774	-2.0767	-1.9219
4600	-2.0577	0.0781	-2.1358	-1.9797
4700	-2.1166	0.0787	-2.1953	-2.0379
4800	-2.1758	0.0793	-2.2551	-2.0966
4900	-2.2353	0.0798	-2.3151	-2.1555
5000	-2.2951	0.0803	-2.3754	-2.2149
5100	-2.3552	0.0807	-2.4359	-2.2744
5200	-2.4154	0.0811	-2.4966	-2.3343
5300	-2.4759	0.0815	-2.5574	-2.3944
5400	-2.5364	0.0818	-2.6182	-2.4546
5500	-2.5971	0.0821	-2.6792	-2.5150
5600	-2.6579	0.0823	-2.7402	-2.5756
5700	-2.7187	0.0825	-2.8012	-2.6362
5800	-2.7795	0.0827	-2.8622	-2.6969
5900	-2.8404	0.0828	-2.9231	-2.7576
6000	-2.9011	0.0828	-2.9840	-2.8183
6100	-2.9619	0.0829	-3.0447	-2.8790
6200	-3.0225	0.0829	-3.1054	-2.9396

Table B.6.2.3 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 3 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 34.30; C (mg L^{-1}) = 221.5. Kinetic parameters: k_{max} (s^{-1}) = 6.0837x10^{-4} (eq. 2.3); λ (s) = 1.2312x10^{+3} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
6300	-3.0830	0.0828	-3.1658	-3.0002
6400	-3.1434	0.0828	-3.2261	-3.0606
6500	-3.2035	0.0826	-3.2862	-3.1209
6600	-3.2635	0.0825	-3.3460	-3.1810
6700	-3.3233	0.0823	-3.4056	-3.2410
6800	-3.3828	0.0821	-3.4649	-3.3007
6900	-3.4420	0.0819	-3.5239	-3.3602
7000	-3.5010	0.0816	-3.5826	-3.4194
7100	-3.5597	0.0813	-3.6409	-3.4784
7200	-3.6180	0.0809	-3.6989	-3.5370
7300	-3.6760	0.0806	-3.7566	-3.5954
7400	-3.7336	0.0802	-3.8138	-3.6534
7500	-3.7908	0.0798	-3.8706	-3.7110
7600	-3.8476	0.0794	-3.9270	-3.7683
7700	-3.9041	0.0789	-3.9830	-3.8252
7800	-3.9600	0.0784	-4.0385	-3.8816
7900	-4.0156	0.0779	-4.0935	-3.9377
8000	-4.0707	0.0774	-4.1481	-3.9933
8100	-4.1253	0.0768	-4.2021	-4.0484
8200	-4.1794	0.0763	-4.2557	-4.1031
8300	-4.2331	0.0757	-4.3087	-4.1574

Table B.6.2.3 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 3 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables		
		T (°C) = 34.30 C (mg L^{-1}) = 221.5		
		Kinetic parameters		
		k_{max} (s^{-1}) = 6.0837x10^{-4} (eq. 2.3) λ (s) = 1.2312x10^{+3} (eq. 2.4)		
		Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
8400	-4.2862	0.0751	-4.3613	-4.2111
8500	-4.3388	0.0745	-4.4133	-4.2643
8600	-4.3909	0.0739	-4.4648	-4.3170
8700	-4.4425	0.0732	-4.5157	-4.3692
8800	-4.4935	0.0726	-4.5661	-4.4209
8900	-4.5440	0.0719	-4.6159	-4.4721
9000	-4.5939	0.0712	-4.6651	-4.5227
9100	-4.6433	0.0705	-4.7138	-4.5727
9200	-4.6921	0.0698	-4.7619	-4.6223
9300	-4.7403	0.0691	-4.8095	-4.6712
9400	-4.7880	0.0684	-4.8564	-4.7196
9500	-4.8351	0.0677	-4.9028	-4.7674
9600	-4.8816	0.0670	-4.9486	-4.8146
9700	-4.9275	0.0662	-4.9938	-4.8613
9800	-4.9729	0.0655	-5.0384	-4.9074
9900	-5.0176	0.0647	-5.0824	-4.9529
10000	-5.0618	0.0640	-5.1258	-4.9978
10100	-5.1054	0.0632	-5.1686	-5.0422
10200	-5.1484	0.0625	-5.2109	-5.0859
10300	-5.1908	0.0617	-5.2525	-5.1291
10400	-5.2327	0.0610	-5.2936	-5.1717

Table B.6.2.3 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 3 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables		
		T (°C) = 34.30		
		C (mg L^{-1}) = 221.5		
		Kinetic parameters		
		k_{max} (s^{-1}) = 6.0837x10^{-4} (eq. 2.3)		
		λ (s) = 1.2312x10^{+3} (eq. 2.4)		
		Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
10500	-5.2739	0.0602	-5.3341	-5.2137
10600	-5.3146	0.0594	-5.3740	-5.2551
10700	-5.3546	0.0587	-5.4133	-5.2960
10800	-5.3941	0.0579	-5.4520	-5.3362
10900	-5.4330	0.0571	-5.4902	-5.3759
11000	-5.4714	0.0564	-5.5277	-5.4150
11100	-5.5091	0.0556	-5.5647	-5.4535
11200	-5.5463	0.0549	-5.6012	-5.4915
11300	-5.5829	0.0541	-5.6370	-5.5288
11400	-5.6190	0.0534	-5.6723	-5.5656
11500	-5.6545	0.0526	-5.7071	-5.6019
11600	-5.6894	0.0519	-5.7413	-5.6376
11700	-5.7238	0.0511	-5.7749	-5.6727
11800	-5.7577	0.0504	-5.8080	-5.7073
11900	-5.7909	0.0496	-5.8406	-5.7413
12000	-5.8237	0.0489	-5.8726	-5.7748
12100	-5.8559	0.0482	-5.9041	-5.8077
12200	-5.8876	0.0475	-5.9351	-5.8401
12300	-5.9188	0.0467	-5.9655	-5.8720
12400	-5.9494	0.0460	-5.9954	-5.9034
12500	-5.9795	0.0453	-6.0249	-5.9342

Table B.6.2.3 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 3 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 34.30; C (mg L^{-1}) = 221.5. Kinetic parameters: k_{max} (s^{-1}) = 6.0837x10^{-4} (eq. 2.3); λ (s) = 1.2312x10^{+3} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
12600	-6.0091	0.0446	-6.0538	-5.9645
12700	-6.0383	0.0439	-6.0822	-5.9943
12800	-6.0669	0.0432	-6.1101	-6.0236
12900	-6.0950	0.0426	-6.1376	-6.0524
13000	-6.1226	0.0419	-6.1645	-6.0807
13100	-6.1498	0.0412	-6.1910	-6.1086
13200	-6.1765	0.0406	-6.2170	-6.1359
13300	-6.2027	0.0399	-6.2426	-6.1628
13400	-6.2284	0.0393	-6.2677	-6.1892
13500	-6.2537	0.0386	-6.2923	-6.2151
13600	-6.2785	0.0380	-6.3165	-6.2406
13700	-6.3029	0.0374	-6.3403	-6.2656
13800	-6.3269	0.0367	-6.3636	-6.2901
13900	-6.3504	0.0361	-6.3865	-6.3143
14000	-6.3735	0.0355	-6.4090	-6.3380

Table B.6.2.4 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 4 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 40.30; C (mg L^{-1}) = 980.0. Kinetic parameters: k_{max} (s^{-1}) = 4.1756x10^{-3} (eq. 2.3); λ (s) = 4.0978x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
0	-0.0479	0.0482	-0.0961	0.0003
100	-0.0974	0.0844	-0.1818	-0.0130
200	-0.1792	0.1338	-0.3130	-0.0455
300	-0.3028	0.1946	-0.4974	-0.1082
400	-0.4753	0.2630	-0.7382	-0.2123
500	-0.7002	0.3336	-1.0337	-0.3666
600	-0.9769	0.4007	-1.3776	-0.5762
700	-1.3007	0.4594	-1.7601	-0.8413
800	-1.6635	0.5059	-2.1694	-1.1576
900	-2.0553	0.5382	-2.5935	-1.5171
1000	-2.4651	0.5558	-3.0209	-1.9093
1100	-2.8820	0.5595	-3.4416	-2.3225
1200	-3.2964	0.5510	-3.8474	-2.7453
1300	-3.6998	0.5325	-4.2323	-3.1673
1400	-4.0858	0.5064	-4.5922	-3.5794
1500	-4.4496	0.4748	-4.9244	-3.9748
1600	-4.7881	0.4399	-5.2281	-4.3482
1700	-5.0996	0.4034	-5.5031	-4.6962
1800	-5.3835	0.3667	-5.7502	-5.0168
1900	-5.6401	0.3308	-5.9709	-5.3093
2000	-5.8705	0.2964	-6.1669	-5.5740

Table B.6.2.4 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 4 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 40.30; C (mg L^{-1}) = 980.0. Kinetic parameters: k_{max} (s^{-1}) = 4.1756×10^{-3} (eq. 2.3); λ (s) = $4.0978\times10^{+2}$ (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
2100	-6.0759	0.2642	-6.3401	-5.8118
2200	-6.2583	0.2343	-6.4926	-6.0240
2300	-6.4194	0.2069	-6.6263	-6.2125
2400	-6.5612	0.1821	-6.7433	-6.3791
2500	-6.6856	0.1597	-6.8454	-6.5259
2600	-6.7944	0.1398	-6.9342	-6.6546
2700	-6.8894	0.1220	-7.0114	-6.7673
2800	-6.9720	0.1063	-7.0784	-6.8657
2900	-7.0439	0.0925	-7.1364	-6.9514
3000	-7.1062	0.0803	-7.1866	-7.0259
3100	-7.1602	0.0697	-7.2299	-7.0905
3200	-7.2070	0.0604	-7.2674	-7.1466
3300	-7.2475	0.0523	-7.2998	-7.1952
3400	-7.2824	0.0452	-7.3277	-7.2372
3500	-7.3126	0.0391	-7.3517	-7.2735

Table B.6.2.5 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 5 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 58.70; C (mg L^{-1}) = 265.5. Kinetic parameters: k_{max} (s^{-1}) = 4.5707x10^{-3} (eq. 2.3); λ (s) = 3.2175x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
0	-0.0730	0.0869	-0.1599	0.0139
100	-0.1481	0.1495	-0.2975	0.0014
200	-0.2696	0.2307	-0.5003	-0.0389
300	-0.4479	0.3251	-0.7730	-0.1228
400	-0.6887	0.4239	-1.1126	-0.2649
500	-0.9917	0.5175	-1.5092	-0.4742
600	-1.3506	0.5976	-1.9482	-0.7529
700	-1.7546	0.6584	-2.4130	-1.0962
800	-2.1902	0.6969	-2.8872	-1.4933
900	-2.6430	0.7131	-3.3562	-1.9299
1000	-3.0992	0.7091	-3.8083	-2.3901
1100	-3.5469	0.6881	-4.2350	-2.8587
1200	-3.9764	0.6542	-4.6306	-3.3223
1300	-4.3809	0.6112	-4.9921	-3.7698
1400	-4.7557	0.5626	-5.3182	-4.1931
1500	-5.0982	0.5114	-5.6096	-4.5868
1600	-5.4077	0.4600	-5.8676	-4.9477
1700	-5.6845	0.4100	-6.0945	-5.2745
1800	-5.9302	0.3627	-6.2929	-5.5675
1900	-6.1467	0.3188	-6.4655	-5.8279
2000	-6.3363	0.2787	-6.6149	-6.0576

Table B.6.2.5 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 5 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables T (°C) = 58.70 C (mg L^{-1}) = 265.5 Kinetic parameters k_{max} (s^{-1}) = 4.5707x10^{-3} (eq. 2.3) λ (s) = 3.2175x10^{+2} (eq. 2.4) Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
2100	-6.5015	0.2424	-6.7439	-6.2591
2200	-6.6449	0.2101	-6.8550	-6.4347
2300	-6.7688	0.1815	-6.9503	-6.5873
2400	-6.8756	0.1563	-7.0320	-6.7193
2500	-6.9675	0.1343	-7.1018	-6.8332
2600	-7.0463	0.1152	-7.1615	-6.9311
2700	-7.1137	0.0986	-7.2123	-7.0151
2800	-7.1714	0.0843	-7.2557	-7.0871
2900	-7.2206	0.0720	-7.2926	-7.1486
3000	-7.2626	0.0614	-7.3240	-7.2012

Table B.6.2.6 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 6 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 33.35; C (mg L^{-1}) = 940.0. Kinetic parameters: k_{max} (s^{-1}) = 2.6874x10^{-3} (eq. 2.3); λ (s) = 5.1616x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
0	-0.0838	0.0451	-0.1289	-0.0388
100	-0.1272	0.0621	-0.1893	-0.0651
200	-0.1857	0.0824	-0.2681	-0.1033
300	-0.2617	0.1056	-0.3673	-0.1562
400	-0.3574	0.1310	-0.4883	-0.2264
500	-0.4740	0.1579	-0.6319	-0.3161
600	-0.6125	0.1854	-0.7979	-0.4271
700	-0.7728	0.2126	-0.9854	-0.5602
800	-0.9543	0.2385	-1.1928	-0.7158
900	-1.1555	0.2624	-1.4180	-0.8931
1000	-1.3746	0.2837	-1.6583	-1.0909
1100	-1.6090	0.3018	-1.9108	-1.3072
1200	-1.8561	0.3163	-2.1724	-1.5398
1300	-2.1129	0.3272	-2.4401	-1.7857
1400	-2.3765	0.3345	-2.7110	-2.0421
1500	-2.6440	0.3381	-2.9822	-2.3059
1600	-2.9127	0.3385	-3.2511	-2.5742
1700	-3.1799	0.3358	-3.5157	-2.8441
1800	-3.4435	0.3304	-3.7739	-3.1131
1900	-3.7015	0.3227	-4.0242	-3.3787
2000	-3.9522	0.3131	-4.2653	-3.6391

Table B.6.2.6 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 6 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 33.35; C (mg L^{-1}) = 940.0. Kinetic parameters: k_{max} (s^{-1}) = 2.6874x10^{-3} (eq. 2.3); λ (s) = 5.1616x10^{+2} (eq. 2.4). Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
2100	-4.1943	0.3020	-4.4963	-3.8923
2200	-4.4268	0.2896	-4.7164	-4.1371
2300	-4.6487	0.2764	-4.9251	-4.3724
2400	-4.8598	0.2625	-5.1223	-4.5973
2500	-5.0595	0.2483	-5.3078	-4.8111
2600	-5.2477	0.2341	-5.4818	-5.0137
2700	-5.4246	0.2198	-5.6444	-5.2047
2800	-5.5901	0.2059	-5.7960	-5.3843
2900	-5.7447	0.1922	-5.9370	-5.5525
3000	-5.8886	0.1791	-6.0677	-5.7096
3100	-6.0223	0.1664	-6.1887	-5.8559
3200	-6.1462	0.1543	-6.3005	-5.9919
3300	-6.2608	0.1428	-6.4037	-6.1180
3400	-6.3667	0.1320	-6.4986	-6.2347
3500	-6.4642	0.1218	-6.5860	-6.3425
3600	-6.5540	0.1122	-6.6662	-6.4418
3700	-6.6365	0.1032	-6.7397	-6.5333
3800	-6.7123	0.0948	-6.8071	-6.6174
3900	-6.7818	0.0871	-6.8688	-6.6947
4000	-6.8454	0.0799	-6.9253	-6.7656
4100	-6.9037	0.0732	-6.9769	-6.8305

Table B.6.2.6 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 6 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables T (°C) = 33.35 C (mg L^{-1}) = 940.0 Kinetic parameters k_{max} (s^{-1}) = 2.6874x10^{-3} (eq. 2.3) λ (s) = 5.1616x10^{+2} (eq. 2.4) Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
4200	-6.9570	0.0670	-7.0240	-6.8900
4300	-7.0057	0.0613	-7.0670	-6.9444
4400	-7.0501	0.0561	-7.1062	-6.9941
4500	-7.0907	0.0512	-7.1420	-7.0395
4600	-7.1278	0.0468	-7.1746	-7.0810
4700	-7.1615	0.0427	-7.2042	-7.1188
4800	-7.1923	0.0390	-7.2313	-7.1533
4900	-7.2203	0.0356	-7.2559	-7.1847
5000	-7.2458	0.0324	-7.2782	-7.2134
5100	-7.2690	0.0296	-7.2986	-7.2395
5200	-7.2902	0.0269	-7.3171	-7.2632
5300	-7.3094	0.0245	-7.3339	-7.2849
5400	-7.3269	0.0223	-7.3492	-7.3045
5500	-7.3428	0.0203	-7.3631	-7.3224
5600	-7.3572	0.0185	-7.3758	-7.3387
5700	-7.3704	0.0169	-7.3872	-7.3535
5800	-7.3823	0.0153	-7.3976	-7.3670
5900	-7.3931	0.0140	-7.4071	-7.3792
6000	-7.4030	0.0127	-7.4157	-7.3903

Table B.6.2.7 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 7 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 59.45; C (mg L^{-1}) = 1004.0. Kinetic parameters: k_{max} (s^{-1}) = 8.0436x10^{-3} (eq. 2.3); λ (s) = 1.7396x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
0	-0.0822	0.1687	-0.2508	0.0865
100	-0.2573	0.3952	-0.6525	0.1379
200	-0.6037	0.6939	-1.2976	0.0903
300	-1.1416	0.9821	-2.1237	-0.1596
400	-1.8377	1.1830	-3.0206	-0.6547
500	-2.6226	1.2634	-3.8859	-1.3592
600	-3.4208	1.2332	-4.6539	-2.1876
700	-4.1720	1.1255	-5.2974	-3.0465
800	-4.8390	0.9769	-5.8158	-3.8621
900	-5.4060	0.8167	-6.2227	-4.5894
1000	-5.8727	0.6639	-6.5365	-5.2088
1100	-6.2474	0.5285	-6.7759	-5.7189
1200	-6.5428	0.4142	-6.9570	-6.1287
1300	-6.7727	0.3208	-7.0935	-6.4519
1400	-6.9497	0.2464	-7.1960	-6.7033
1500	-7.0849	0.1879	-7.2728	-6.8970
1600	-7.1876	0.1427	-7.3303	-7.0450
1700	-7.2654	0.1079	-7.3733	-7.1575
1800	-7.3240	0.0814	-7.4054	-7.2426

Table B.6.2.8 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 9 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 37.00; C (mg L^{-1}) = 674.0. Kinetic parameters: k_{max} (s^{-1}) = 2.5181x10^{-3} (eq. 2.3); λ (s) = 6.2185x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
0	-0.0620	0.0345	-0.0966	-0.0275
100	-0.0943	0.0479	-0.1422	-0.0463
200	-0.1381	0.0642	-0.2023	-0.0739
300	-0.1956	0.0832	-0.2788	-0.1125
400	-0.2689	0.1045	-0.3734	-0.1644
500	-0.3595	0.1277	-0.4872	-0.2317
600	-0.4685	0.1522	-0.6208	-0.3163
700	-0.5967	0.1773	-0.7740	-0.4195
800	-0.7442	0.2021	-0.9463	-0.5421
900	-0.9103	0.2260	-1.1364	-0.6843
1000	-1.0942	0.2484	-1.3426	-0.8457
1100	-1.2942	0.2686	-1.5628	-1.0255
1200	-1.5085	0.2863	-1.7948	-1.2222
1300	-1.7350	0.3011	-2.0361	-1.4340
1400	-1.9713	0.3127	-2.2841	-1.6586
1500	-2.2150	0.3213	-2.5363	-1.8937
1600	-2.4636	0.3267	-2.7903	-2.1369
1700	-2.7148	0.3291	-3.0440	-2.3857
1800	-2.9665	0.3288	-3.2953	-2.6376
1900	-3.2164	0.3260	-3.5424	-2.8905
2000	-3.4629	0.3209	-3.7838	-3.1421

Table B.6.2.8 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 9 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 37.00; C (mg L^{-1}) = 674.0; Kinetic parameters: k_{max} (s^{-1}) = 2.5181x10^{-3} (eq. 2.3); λ (s) = 6.2185x10^{+2} (eq. 2.4); Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
2100	-3.7044	0.3138	-4.0182	-3.3906
2200	-3.9395	0.3051	-4.2446	-3.6344
2300	-4.1670	0.2951	-4.4621	-3.8720
2400	-4.3862	0.2839	-4.6702	-4.1023
2500	-4.5963	0.2720	-4.8684	-4.3243
2600	-4.7969	0.2596	-5.0564	-4.5373
2700	-4.9876	0.2467	-5.2343	-4.7408
2800	-5.1682	0.2338	-5.4020	-4.9345
2900	-5.3389	0.2208	-5.5596	-5.1181
3000	-5.4995	0.2079	-5.7074	-5.2916
3100	-5.6504	0.1953	-5.8456	-5.4551
3200	-5.7917	0.1830	-5.9747	-5.6087
3300	-5.9237	0.1711	-6.0948	-5.7526
3400	-6.0469	0.1597	-6.2066	-5.8872
3500	-6.1616	0.1488	-6.3103	-6.0128
3600	-6.2681	0.1384	-6.4065	-6.1297
3700	-6.3670	0.1285	-6.4955	-6.2385
3800	-6.4586	0.1192	-6.5777	-6.3394
3900	-6.5434	0.1104	-6.6537	-6.4330
4000	-6.6217	0.1021	-6.7238	-6.5196
4100	-6.6940	0.0944	-6.7884	-6.5997

Table B.6.2.8 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 9 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables		
		T (°C) = 37.00 C (mg L^{-1}) = 674.0		
		Kinetic parameters		
		k_{max} (s^{-1}) = 2.5181x10^{-3} (eq. 2.3) λ (s) = 6.2185x10^{+2} (eq. 2.4)		
		Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
4200	-6.7607	0.0871	-6.8479	-6.6736
4300	-6.8222	0.0804	-6.9026	-6.7418
4400	-6.8788	0.0741	-6.9529	-6.8047
4500	-6.9309	0.0683	-6.9991	-6.8626
4600	-6.9787	0.0628	-7.0416	-6.9159
4700	-7.0227	0.0578	-7.0805	-6.9649
4800	-7.0631	0.0531	-7.1163	-7.0100
4900	-7.1002	0.0488	-7.1490	-7.0514
5000	-7.1342	0.0449	-7.1791	-7.0893
5100	-7.1654	0.0412	-7.2066	-7.1242
5200	-7.1940	0.0378	-7.2318	-7.1562
5300	-7.2202	0.0347	-7.2548	-7.1855
5400	-7.2441	0.0318	-7.2760	-7.2123
5500	-7.2661	0.0292	-7.2953	-7.2369
5600	-7.2862	0.0267	-7.3130	-7.2595
5700	-7.3046	0.0245	-7.3291	-7.2801
5800	-7.3215	0.0225	-7.3439	-7.2990
5900	-7.3369	0.0206	-7.3574	-7.3163
6000	-7.3509	0.0188	-7.3698	-7.3321

Table B.6.2.9 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 10 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 37.00; C (mg L^{-1}) = 456.0. Kinetic parameters: k_{max} (s^{-1}) = 1.7987x10^{-3} (eq. 2.3); λ (s) = 8.0121x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
0	-0.0767	0.0291	-0.1057	-0.0476
100	-0.1024	0.0364	-0.1388	-0.0660
200	-0.1343	0.0448	-0.1791	-0.0895
300	-0.1731	0.0542	-0.2273	-0.1189
400	-0.2196	0.0645	-0.2841	-0.1551
500	-0.2744	0.0756	-0.3500	-0.1988
600	-0.3381	0.0875	-0.4256	-0.2507
700	-0.4112	0.0998	-0.5109	-0.3114
800	-0.4938	0.1125	-0.6063	-0.3814
900	-0.5864	0.1253	-0.7117	-0.4610
1000	-0.6887	0.1381	-0.8268	-0.5506
1100	-0.8007	0.1507	-0.9514	-0.6500
1200	-0.9221	0.1628	-1.0850	-0.7593
1300	-1.0525	0.1744	-1.2269	-0.8781
1400	-1.1914	0.1852	-1.3767	-1.0062
1500	-1.3381	0.1952	-1.5333	-1.1429
1600	-1.4919	0.2042	-1.6961	-1.2876
1700	-1.6519	0.2122	-1.8642	-1.4397
1800	-1.8175	0.2191	-2.0365	-1.5984
1900	-1.9875	0.2248	-2.2124	-1.7627
2000	-2.1613	0.2294	-2.3907	-1.9319

Table B.6.2.9 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 10 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables		
		T (°C) = 37.00		
		C (mg L^{-1}) = 456.0		
		Kinetic parameters		
		k_{max} (s^{-1}) = 1.7987x10^{-3} (eq. 2.3)		
		λ (s) = 8.0121x10^{+2} (eq. 2.4)		
		Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
2100	-2.3379	0.2328	-2.5707	-2.1050
2200	-2.5163	0.2352	-2.7515	-2.2812
2300	-2.6959	0.2364	-2.9323	-2.4595
2400	-2.8757	0.2366	-3.1123	-2.6391
2500	-3.0551	0.2359	-3.2909	-2.8192
2600	-3.2332	0.2342	-3.4675	-2.9990
2700	-3.4096	0.2318	-3.6414	-3.1778
2800	-3.5835	0.2286	-3.8121	-3.3549
2900	-3.7545	0.2247	-3.9792	-3.5298
3000	-3.9221	0.2203	-4.1423	-3.7018
3100	-4.0859	0.2153	-4.3012	-3.8706
3200	-4.2455	0.2099	-4.4555	-4.0356
3300	-4.4008	0.2042	-4.6050	-4.1966
3400	-4.5514	0.1981	-4.7495	-4.3532
3500	-4.6971	0.1919	-4.8890	-4.5053
3600	-4.8379	0.1854	-5.0233	-4.6525
3700	-4.9737	0.1789	-5.1525	-4.7948
3800	-5.1043	0.1722	-5.2765	-4.9320
3900	-5.2298	0.1656	-5.3953	-5.0642
4000	-5.3501	0.1589	-5.5091	-5.1912
4100	-5.4654	0.1523	-5.6178	-5.3131

Table B.6.2.9 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 10 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 37.00; C (mg L^{-1}) = 456.0. Kinetic parameters: k_{max} (s^{-1}) = 1.7987x10^{-3} (eq. 2.3); λ (s) = 8.0121x10^{+2} (eq. 2.4). Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
4200	-5.5757	0.1458	-5.7215	-5.4298
4300	-5.6810	0.1394	-5.8204	-5.5416
4400	-5.7815	0.1331	-5.9146	-5.6483
4500	-5.8772	0.1270	-6.0042	-5.7502
4600	-5.9683	0.1210	-6.0893	-5.8473
4700	-6.0550	0.1152	-6.1702	-5.9398
4800	-6.1373	0.1095	-6.2469	-6.0278
4900	-6.2155	0.1041	-6.3196	-6.1114
5000	-6.2896	0.0988	-6.3885	-6.1908
5100	-6.3599	0.0938	-6.4536	-6.2661
5200	-6.4264	0.0889	-6.5153	-6.3375
5300	-6.4894	0.0842	-6.5736	-6.4052
5400	-6.5489	0.0797	-6.6287	-6.4692
5500	-6.6052	0.0755	-6.6807	-6.5298
5600	-6.6584	0.0714	-6.7298	-6.5870
5700	-6.7086	0.0675	-6.7761	-6.6411
5800	-6.7560	0.0638	-6.8197	-6.6922
5900	-6.8007	0.0602	-6.8609	-6.7405
6000	-6.8428	0.0568	-6.8997	-6.7860
6100	-6.8825	0.0536	-6.9362	-6.8289
6200	-6.9200	0.0506	-6.9706	-6.8693

Table B.6.2.9 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 10 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 37.00; C (mg L^{-1}) = 456.0. Kinetic parameters: k_{max} (s^{-1}) = 1.7987x10^{-3} (eq. 2.3); λ (s) = 8.0121x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
6300	-6.9552	0.0477	-7.0029	-6.9075
6400	-6.9884	0.0450	-7.0334	-6.9434
6500	-7.0196	0.0424	-7.0620	-6.9772
6600	-7.0490	0.0400	-7.0890	-7.0090
6700	-7.0766	0.0376	-7.1143	-7.0390
6800	-7.1026	0.0354	-7.1381	-7.0672
6900	-7.1271	0.0334	-7.1604	-7.0937
7000	-7.1501	0.0314	-7.1815	-7.1187
7100	-7.1717	0.0296	-7.2012	-7.1421
7200	-7.1919	0.0278	-7.2198	-7.1641
7300	-7.2110	0.0262	-7.2372	-7.1849
7400	-7.2289	0.0246	-7.2535	-7.2043
7500	-7.2457	0.0231	-7.2689	-7.2226
7600	-7.2615	0.0218	-7.2833	-7.2398
7700	-7.2763	0.0205	-7.2968	-7.2559
7800	-7.2903	0.0192	-7.3095	-7.2710
7900	-7.3033	0.0181	-7.3214	-7.2853
8000	-7.3156	0.0170	-7.3326	-7.2986

Table B.6.2.10 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 11 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 51.00; C (mg L^{-1}) = 247.0. Kinetic parameters: k_{max} (s^{-1}) = 3.2886x10^{-3} (eq. 2.3); λ (s) = 5.9661x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
0	-0.0296	0.0283	-0.0579	-0.0012
100	-0.0551	0.0469	-0.1020	-0.0082
200	-0.0957	0.0724	-0.1681	-0.0234
300	-0.1563	0.1049	-0.2612	-0.0513
400	-0.2414	0.1440	-0.3854	-0.0974
500	-0.3552	0.1882	-0.5434	-0.1670
600	-0.5004	0.2356	-0.7359	-0.2648
700	-0.6783	0.2837	-0.9619	-0.3946
800	-0.8885	0.3301	-1.2186	-0.5584
900	-1.1292	0.3727	-1.5018	-0.7565
1000	-1.3969	0.4096	-1.8064	-0.9873
1100	-1.6872	0.4395	-2.1267	-1.2477
1200	-1.9951	0.4616	-2.4568	-1.5335
1300	-2.3152	0.4759	-2.7911	-1.8393
1400	-2.6421	0.4825	-3.1245	-2.1596
1500	-2.9707	0.4819	-3.4526	-2.4888
1600	-3.2965	0.4750	-3.7715	-2.8214
1700	-3.6155	0.4628	-4.0783	-3.1526
1800	-3.9244	0.4463	-4.3707	-3.4781
1900	-4.2206	0.4264	-4.6470	-3.7943
2000	-4.5023	0.4041	-4.9064	-4.0982

Table B.6.2.10 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 11 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 51.00; C (mg L^{-1}) = 247.0; Kinetic parameters: k_{max} (s^{-1}) = 3.2886x10^{-3} (eq. 2.3); λ (s) = 5.9661x10^{+2} (eq. 2.4); Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
2100	-4.7680	0.3801	-5.1481	-4.3879
2200	-5.0170	0.3553	-5.3723	-4.6616
2300	-5.2488	0.3302	-5.5791	-4.9186
2400	-5.4636	0.3054	-5.7690	-5.1582
2500	-5.6616	0.2811	-5.9427	-5.3805
2600	-5.8433	0.2577	-6.1011	-5.5856
2700	-6.0095	0.2355	-6.2450	-5.7740
2800	-6.1610	0.2145	-6.3755	-5.9466
2900	-6.2987	0.1948	-6.4934	-6.1039
3000	-6.4234	0.1764	-6.5999	-6.2470
3100	-6.5362	0.1595	-6.6957	-6.3767
3200	-6.6380	0.1439	-6.7819	-6.4941
3300	-6.7297	0.1296	-6.8593	-6.6001
3400	-6.8122	0.1165	-6.9287	-6.6956
3500	-6.8862	0.1046	-6.9909	-6.7816
3600	-6.9526	0.0939	-7.0464	-6.8587
3700	-7.0120	0.0841	-7.0961	-6.9280
3800	-7.0653	0.0753	-7.1405	-6.9900
3900	-7.1128	0.0673	-7.1801	-7.0455
4000	-7.1553	0.0602	-7.2155	-7.0952
4100	-7.1932	0.0537	-7.2470	-7.1395

Table B.6.2.10 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 11 condition

Time (s)	$\log \frac{N}{N_0}$ (eq. 2.5)	Process variables		
		T (°C) = 51.00		
		C (mg L^{-1}) = 247.0		
		Kinetic parameters		
		k_{max} (s^{-1}) = 3.2886x10^{-3} (eq. 2.3)		
		λ (s) = 5.9661x10^{+2} (eq. 2.4)		
		Predicted bands		
		$\left[\frac{\partial\left(\log \frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
4200	-7.2271	0.0479	-7.2750	-7.1791
4300	-7.2572	0.0428	-7.3000	-7.2145
4400	-7.2841	0.0381	-7.3222	-7.2460
4500	-7.3081	0.0340	-7.3420	-7.2741
4600	-7.3294	0.0303	-7.3597	-7.2991
4700	-7.3484	0.0270	-7.3753	-7.3214
4800	-7.3652	0.0240	-7.3893	-7.3412
4900	-7.3803	0.0214	-7.4016	-7.3589
5000	-7.3936	0.0190	-7.4126	-7.3746

Table B.6.2.11 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 12 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 50.72; C (mg L^{-1}) = 447.0. Kinetic parameters: k_{max} (s^{-1}) = 4.0570x10^{-3} (eq. 2.3); λ (s) = 4.6703x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
0	-0.0338	0.0389	-0.0727	0.0051
100	-0.0708	0.0703	-0.1411	-0.0005
200	-0.1339	0.1150	-0.2489	-0.0189
300	-0.2322	0.1723	-0.4045	-0.0599
400	-0.3735	0.2396	-0.6130	-0.1339
500	-0.5628	0.3120	-0.8749	-0.2508
600	-0.8020	0.3843	-1.1863	-0.4177
700	-1.0888	0.4509	-1.5397	-0.6379
800	-1.4176	0.5074	-1.9250	-0.9102
900	-1.7803	0.5507	-2.3310	-1.2296
1000	-2.1671	0.5794	-2.7465	-1.5878
1100	-2.5681	0.5934	-3.1615	-1.9747
1200	-2.9735	0.5938	-3.5673	-2.3796
1300	-3.3745	0.5824	-3.9569	-2.7920
1400	-3.7639	0.5615	-4.3253	-3.2024
1500	-4.1360	0.5332	-4.6692	-3.6028
1600	-4.4867	0.4999	-4.9866	-3.9867
1700	-4.8132	0.4635	-5.2767	-4.3497
1800	-5.1142	0.4256	-5.5398	-4.6885
1900	-5.3891	0.3876	-5.7767	-5.0014
2000	-5.6382	0.3505	-5.9887	-5.2877

Table B.6.2.11 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 12 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 50.72; C (mg L^{-1}) = 447.0; Kinetic parameters: k_{max} (s^{-1}) = 4.0570x10^{-3} (eq. 2.3); λ (s) = 4.6703x10^{+2} (eq. 2.4); Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
2100	-5.8626	0.3150	-6.1775	-5.5476
2200	-6.0634	0.2816	-6.3449	-5.7818
2300	-6.2423	0.2505	-6.4928	-5.9918
2400	-6.4009	0.2220	-6.6230	-6.1789
2500	-6.5411	0.1961	-6.7372	-6.3451
2600	-6.6646	0.1727	-6.8373	-6.4920
2700	-6.7731	0.1517	-6.9248	-6.6215
2800	-6.8682	0.1329	-7.0011	-6.7353
2900	-6.9514	0.1163	-7.0676	-6.8351
3000	-7.0239	0.1015	-7.1255	-6.9224
3100	-7.0872	0.0885	-7.1757	-6.9987
3200	-7.1423	0.0771	-7.2194	-7.0652
3300	-7.1902	0.0671	-7.2573	-7.1231
3400	-7.2318	0.0583	-7.2901	-7.1735
3500	-7.2679	0.0506	-7.3185	-7.2172
3600	-7.2992	0.0440	-7.3432	-7.2552
3700	-7.3263	0.0381	-7.3645	-7.2882
3800	-7.3498	0.0331	-7.3829	-7.3168
3900	-7.3702	0.0287	-7.3988	-7.3415
4000	-7.3878	0.0248	-7.4126	-7.3630

Table B.6.2.12 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 13 condition

Time (s)	$\log \frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 49.93; C (mg L^{-1}) = 674.5. Kinetic parameters: k_{max} (s^{-1}) = 4.8389x10^{-3} (eq. 2.3); λ (s) = 3.8487x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log \frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
0	-0.0360	0.0485	-0.0845	0.0125
100	-0.0850	0.0961	-0.1811	0.0111
200	-0.1748	0.1661	-0.3409	-0.0087
300	-0.3199	0.2555	-0.5755	-0.0644
400	-0.5314	0.3567	-0.8881	-0.1747
500	-0.8135	0.4589	-1.2724	-0.3546
600	-1.1629	0.5513	-1.7142	-0.6117
700	-1.5695	0.6252	-2.1948	-0.9443
800	-2.0186	0.6757	-2.6943	-1.3428
900	-2.4931	0.7014	-3.1945	-1.7917
1000	-2.9764	0.7036	-3.6800	-2.2727
1100	-3.4534	0.6861	-4.1395	-2.7673
1200	-3.9123	0.6532	-4.5654	-3.2591
1300	-4.3441	0.6095	-4.9535	-3.7346
1400	-4.7429	0.5592	-5.3021	-4.1837
1500	-5.1058	0.5059	-5.6116	-4.5999
1600	-5.4316	0.4522	-5.8838	-4.9793
1700	-5.7209	0.4003	-6.1212	-5.3207
1800	-5.9756	0.3513	-6.3270	-5.6243
1900	-6.1981	0.3062	-6.5043	-5.8919
2000	-6.3911	0.2654	-6.6565	-6.1258

Table B.6.2.12 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 13 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 49.93; C (mg L^{-1}) = 674.5. Kinetic parameters: k_{max} (s^{-1}) = 4.8389x10^{-3} (eq. 2.3); λ (s) = 3.8487x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
2100	-6.5578	0.2288	-6.7865	-6.3290
2200	-6.7009	0.1965	-6.8974	-6.5045
2300	-6.8235	0.1681	-6.9916	-6.6553
2400	-6.9280	0.1434	-7.0715	-6.7846
2500	-7.0170	0.1221	-7.1391	-6.8949
2600	-7.0925	0.1037	-7.1962	-6.9888
2700	-7.1566	0.0879	-7.2445	-7.0686
2800	-7.2107	0.0744	-7.2852	-7.1363
2900	-7.2565	0.0630	-7.3194	-7.1935
3000	-7.2951	0.0532	-7.3483	-7.2419
3100	-7.3277	0.0449	-7.3726	-7.2828
3200	-7.3551	0.0379	-7.3930	-7.3173
3300	-7.3783	0.0319	-7.4102	-7.3463
3400	-7.3977	0.0269	-7.4246	-7.3708
3500	-7.4141	0.0226	-7.4367	-7.3914

Table B.6.2.13 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 14 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 60.08; C (mg L^{-1}) = 737.5. Kinetic parameters: k_{max} (s^{-1}) = 6.9480x10^{-3} (eq. 2.3); λ (s) = 1.9179x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
0	-0.0915	0.1592	-0.2507	0.0677
100	-0.2441	0.3305	-0.5746	0.0865
200	-0.5232	0.5516	-1.0748	0.0284
300	-0.9465	0.7768	-1.7232	-0.1697
400	-1.5005	0.9587	-2.4591	-0.5418
500	-2.1468	1.0678	-3.2146	-1.0790
600	-2.8362	1.0981	-3.9343	-1.7380
700	-3.5217	1.0615	-4.5832	-2.4602
800	-4.1671	0.9778	-5.1449	-3.1893
900	-4.7496	0.8676	-5.6171	-3.8820
1000	-5.2580	0.7477	-6.0057	-4.5104
1100	-5.6906	0.6299	-6.3205	-5.0607
1200	-6.0513	0.5215	-6.5728	-5.5299
1300	-6.3475	0.4258	-6.7733	-5.9217
1400	-6.5877	0.3440	-6.9317	-6.2437
1500	-6.7807	0.2756	-7.0563	-6.5050
1600	-6.9346	0.2194	-7.1540	-6.7151
1700	-7.0566	0.1738	-7.2305	-6.8828
1800	-7.1530	0.1372	-7.2902	-7.0158
1900	-7.2288	0.1079	-7.3368	-7.1209
2000	-7.2883	0.0847	-7.3730	-7.2036

Table B.6.2.13 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 14 condition

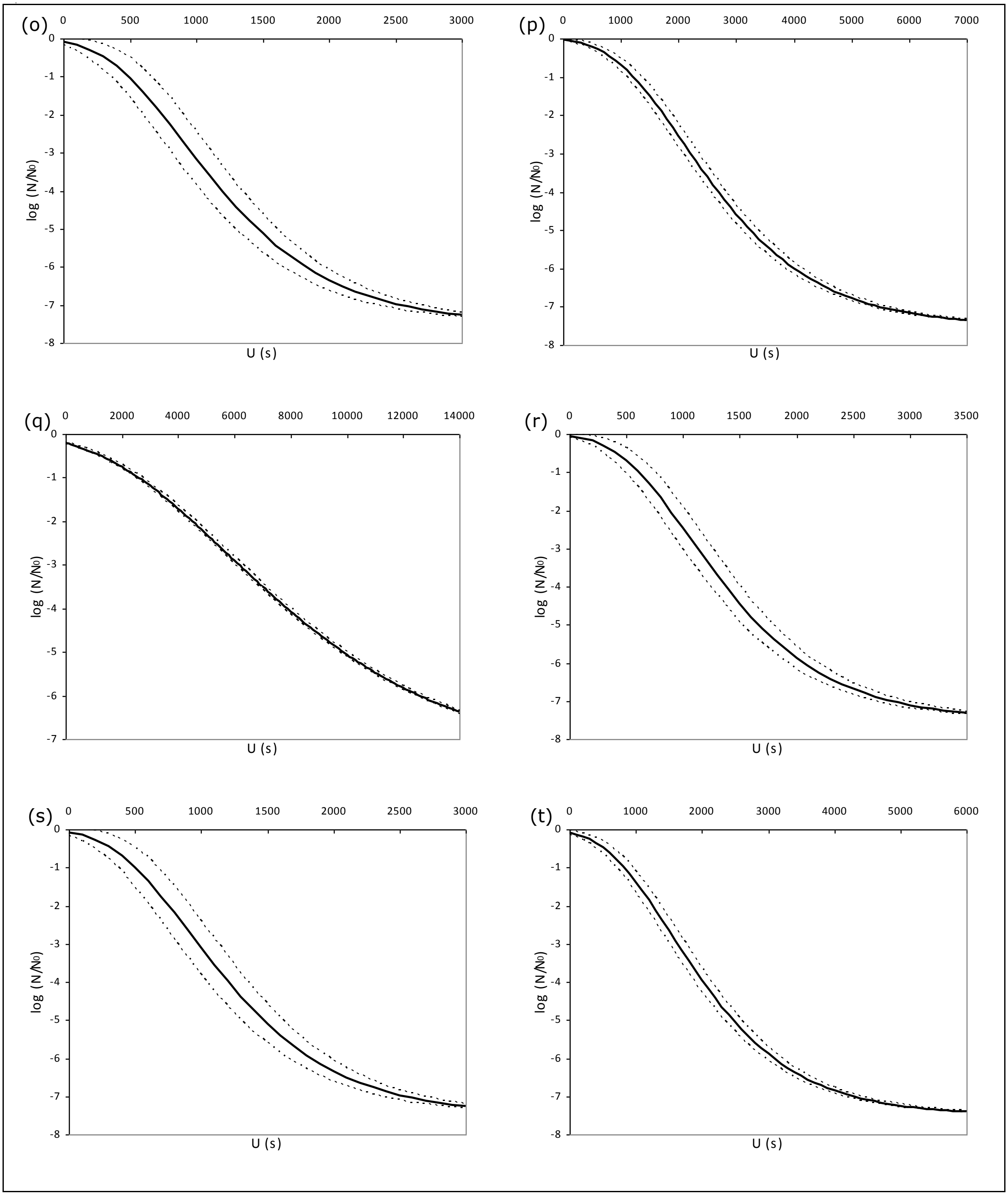
Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables: T (°C) = 60.08; C (mg L^{-1}) = 737.5. Kinetic parameters: k_{max} (s^{-1}) = 6.9480x10^{-3} (eq. 2.3); λ (s) = 1.9179x10^{+2} (eq. 2.4). Predicted bands: $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
2100	-7.3349	0.0664	-7.4013	-7.2686
2200	-7.3714	0.0519	-7.4233	-7.3195
2300	-7.3998	0.0406	-7.4404	-7.3592
2400	-7.4220	0.0317	-7.4537	-7.3903
2500	-7.4393	0.0247	-7.4640	-7.4146

Table B.6.2.14 Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 15 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables T (°C) = 61.98 C (mg L^{-1}) = 498.0 Kinetic parameters k_{max} (s^{-1}) = 6.1736x10^{-3} (eq. 2.3) λ (s) = 1.7976x10^{+2} (eq. 2.4) Predicted bands $\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
0	-0.1288	0.1866	-0.3154	0.0578
100	-0.2910	0.3373	-0.6283	0.0463
200	-0.5582	0.5179	-1.0761	-0.0403
300	-0.9397	0.6979	-1.6376	-0.2418
400	-1.4251	0.8471	-2.2722	-0.5780
500	-1.9881	0.9459	-2.9340	-1.0422
600	-2.5945	0.9880	-3.5825	-1.6065
700	-3.2098	0.9783	-4.1881	-2.2315
800	-3.8052	0.9283	-4.7335	-2.8769
900	-4.3597	0.8513	-5.2110	-3.5085
1000	-4.8606	0.7596	-5.6203	-4.1010
1100	-5.3022	0.6632	-5.9655	-4.6390
1200	-5.6840	0.5691	-6.2530	-5.1149
1300	-6.0089	0.4815	-6.4904	-5.5274
1400	-6.2820	0.4029	-6.6848	-5.8791
1500	-6.5092	0.3341	-6.8433	-6.1750
1600	-6.6967	0.2751	-6.9719	-6.4216
1700	-6.8506	0.2253	-7.0758	-6.6253
1800	-6.9761	0.1836	-7.1597	-6.7925
1900	-7.0781	0.1491	-7.2272	-6.9290
2000	-7.1608	0.1207	-7.2815	-7.0400

Table B.6.2.14 (continued) Predicted results of *B. subtilis* inactivation by the model that integrated process conditions (eq. 2.5) and band of prediction (considering the maximum fluctuations of EO concentration) for cycles of RUN 15 condition

Time (s)	$\log\frac{N}{N_0}$ (eq. 2.5)	Process variables		
		T (°C) = 61.98		
		C (mg L^{-1}) = 498.0		
		Kinetic parameters		
		k_{max} (s^{-1}) = 6.1736x10^{-3} (eq. 2.3)		
		λ (s) = 1.7976x10^{+2} (eq. 2.4)		
		Predicted bands		
		$\left[\frac{\partial\left(\log\frac{N}{N_0}\right)}{\partial C}\right]$ (eq. B.9)	Upper band	Lower band
2100	-7.2275	0.0975	-7.3251	-7.1300
2200	-7.2813	0.0786	-7.3600	-7.2027
2300	-7.3247	0.0633	-7.3880	-7.2613
2400	-7.3595	0.0509	-7.4104	-7.3086
2500	-7.3874	0.0409	-7.4284	-7.3465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log (N/N0)
U (s)
(q)
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log (N/N0)
U (s)
(r)
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log (N/N0)
U (s)
(s)
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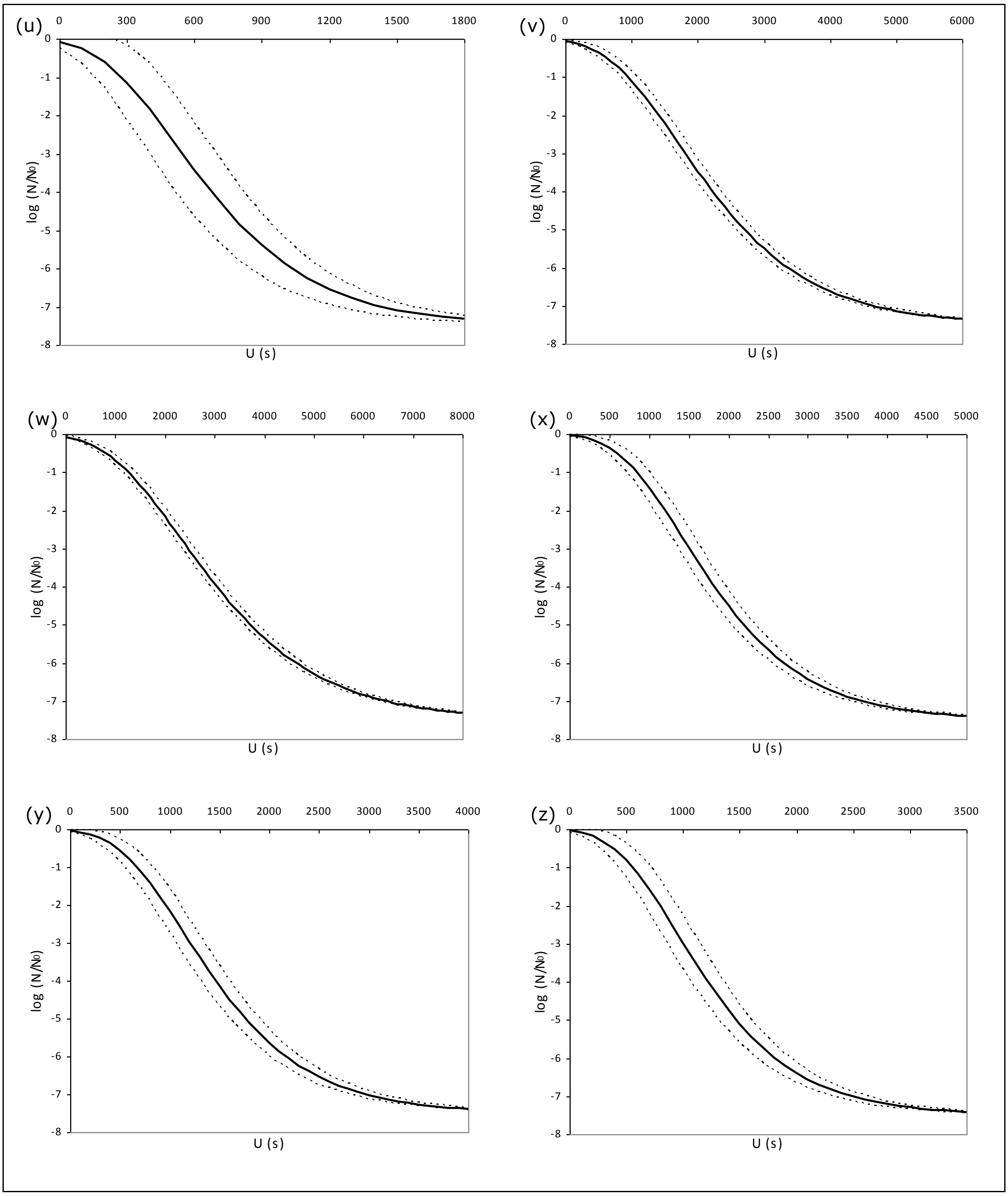
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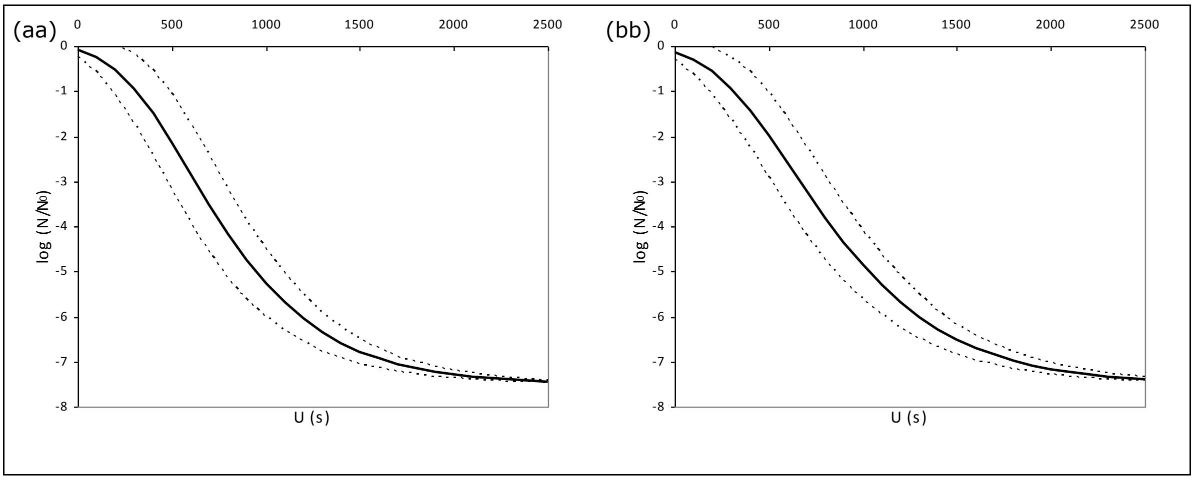

Figure B.6.2 Inactivation of *B. subtilis* spores by EO sterilisation.

Predicted data by eq. 2.5

------- Upper and lower limits of predicted data, considering that EO concentration fluctuates in a random and independent way of 1 %

o) Run1 T=60 °C; C=233 mg L^{-1}; RH=63 %

p) Run2 T=44 °C; C=257 mg L^{-1}; RH=86 %

q) Run3 T=34 °C; C=222 mg L^{-1}; RH=60 %

r) Run4 T=40 °C; C=980 mg L^{-1}; RH=90 %

s) Run5 T=59 °C; C=266 mg L^{-1}; RH=83 %

t) Run6 T=33 °C; C=940 mg L^{-1}; RH=61 %

u) Run7 T=59 °C; C=1004 mg L^{-1}; RH=98 %

v) Run9 T=37 °C; C=674 mg L^{-1}; RH=73%

w) Run10 T=37 °C; C=456 mg L^{-1}; RH=80%

x) Run11 T=51 °C; C=247 mg L^{-1}; RH=80%

y) Run12 T=51 °C; C=447 mg L^{-1}; RH=67%

z) Run13 T=50 °C; C=675 mg L^{-1}; RH=72%

aa) Run14 T=60 °C; C=738 mg L^{-1}; RH=71%

bb) Run15 T=62 °C; C=498 mg L^{-1}; RH=77%

Appendix C

Appendix to Chapter 3

C.1 Ethylene oxide permeability through surgical drape material

The experimental transient flow curves (of permeant EO pressure versus time) obtained by the permeation apparatus for the three replicate samples of surgical drape material are included in Figure 3.4. The individual data points used for construction of the curves are contained in the compact disk (CD), file named “Appendix C.1”.

The data summary are included in Table C.1.1.

Table C.1 Intermediate data and ethylene oxide transport coefficients, at 48 °C and 3.2 bar, in surgical drape material

	Run 1	Run 2	Run 3
Linar equations of adjustment	y = 4.80 x - 3.70	y = 4.46x - 3.23	y = 4.49 x - 3.48
$\mathscr{P}$ (mol s^{-1} m^{-1} Pa^{-1})	2.83×10^{-12}	2.63×10^{-12}	2.65×10^{-12}
Lag time, θ (s)	7.72×10^{-1}	7.24×10^{-1}	7.74×10^{-1}
D (m^2 s^{-1})	7.63×10^{-9}	8.13×10^{-9}	7.61×10^{-9}
S (mol m^{-3} Pa^{-1})	3.71×10^{-4}	3.23×10^{-4}	3.48×10^{-4}

T (K) = 321.15; Membrane thickness (m) = 1.88×10^{-4}; Upstream pressure (Pa) = 3.20×10^{5}; Membrane area (m^2) = 1.89×10^{-3}; Downstream volume (m^3) = 5.05×10^{-3};

Appendix D

Appendix to Chapter 4

D.1 Cycle parameters and dosimeter results

Table D.1.1 Process variables and colour progression in dosimeters (within head-space)

Cycle no. 592	
Process variables	Colour progression in dosimeter (cm)
T (°C) = 61	1.60
C (mg L^{-1}) = 280	1.70
U (s) = 1345	1.95
C* (mg L^{-1} h^{-1}) = 104.61	1.55
Cycle no. 605	
Process variables	Colour progression in dosimeter (cm)
T (°C) = 64	2.10
C (mg L^{-1}) = 250	2.50
U (s) = 2000	1.80
C* (mg L^{-1} h^{-1}) = 138.89	2.00
Cycle no. 588	
Process variables	Colour progression in dosimeter (cm)
T (°C) = 62	2.30
C (mg L^{-1}) = 240	2.00
U (s) = 1537	2.05
C* (mg L^{-1} h^{-1}) = 102.47	1.85
Cycle no. 598	
Process variables	Colour progression in dosimeter (cm)
T (°C) = 65	1.65
C (mg L^{-1}) = 220	1.70
U (s) = 942	1.50
C* (mg L^{-1} h^{-1}) = 57.57	
Cycle no. 620	
Process variables	Colour progression in dosimeter (cm)
T (°C) = 65	2.20
C (mg L^{-1}) = 420	1.80
U (s) = 1684	1.90
C* (mg L^{-1} h^{-1}) = 196.47	2.00
	1.80
	2.15
	2.30
	2.20

Table D.1.1 (continued) Process variables and colour progression in dosimeters (within head-space)

Cycle no. 628	
Process variables	Colour progression in dosimeter (cm)
T (°C) = 50	5.90
C (mg L^{-1}) = 560	4.90
U (s) = 6929	6.80
C* (mg L^{-1} h^{-1}) = 1077.84	6.20
	6.80
	4.90
	7.40
	6.20

Table D.1.2 Process variables and colour progression in dosimeters (within the load)

Cycle no. 604	
Process variables	Colour progression in dosimeter (cm)
T (°C) = 63 / T (K) = 336.15	1.65
C (mg L^{-1}) = 260	1.90
U (s) = 1669	2.10
C* (mg L^{-1} h^{-1}) = 120.54	1.55
Cycle no. 605	
Process variables	Colour progression in dosimeter (cm)
T (°C) = 64 / T (K) = 334.15	1.80
C (mg L^{-1}) = 250	2.20
U (s) = 2000	1.65
C* (mg L^{-1} h^{-1}) = 138.89	1.55
Cycle no. 1574	
Process variables	Colour progression in dosimeter (cm)
T (°C) = 61 / T (K) = 334.15 C (mg L^{-1}) = 250	2.60
U (s) = 5642 C* (mg L^{-1} h^{-1}) = 391.81	2.80

Table D.1.2 (continued) Process variables and colour progression in dosimeters (within the load)

Cycle no. 1575	
Process variables	Colour progression in dosimeter (cm)
T (°C) = 61 / T (K) = 334.15	3.75
C (mg L^{-1}) = 250	
U (s) = 8614	3.50
C* (mg L^{-1} h^{-1}) = 598.19	

D.2 Ethylene oxide concentration predicted by colour progression in EO dosimeters

Using the equation that integrates the EO concentration head-space, *x* (directly monitored by an infrared analyser) with the colour progression in EO dosimeters, *y* (data included in Table D.1), $y = 4.41 \times 10^{-3}x + 1.34$, one can predict the EO concentration within the load, based on the results achieved with correspondent EO dosimeters.

Table D.2 EO concentration within the load estimated by EO dosimeters colour progression

Cycle	Dos_{int} (cm)[†]	C* ($mg\ L^{-1}\ h^{-1}$) $= \frac{P_{int}(cm) - 1.34}{4.41 \times 10^{-3}}$	C ($mg\ L^{-1}$) $= \frac{3600\ .\ C\ (mg/LH)}{U(s)}$
604	1.800	104.31	224.99
605	1.800	104.31	187.76
1574	2.700	308.39	196.77
1575	3.625	518.14	216.54

[†] Average colour progression in interior dosimeters

D.3 Ethylene oxide concentration as predicted by Fick's second law of diffusion

D.1 $$\frac{C - C_b}{C_0 - C_b} = \frac{4}{\pi}\sum_{n=0}^{\infty}\frac{(-1)^n}{2n+1}\cos\left(\frac{(2n+1)\pi}{2L}\chi\right)\exp\left(-\frac{(2n+1)^2\pi^2 D}{4L^2}t\right)$$

being,

D.2 $$C_b = S.\mathscr{P}$$

where,

R (J mol^{-1} K^{-1})	8.314472	
MM_{EO} (g mol^{-1})	44.05	
S (mol m^{-3} Pa^{-1})	3.47×10^{-4}	(Chapter 3)
D (m^2 s^{-1})	7.79×10^{-9}	(Chapter 3)
L (m)	5.0×10^{-3}	
C_0(mol m^{-3})	0	
$\mathscr{P}$ (mol s^{-1} m^{-1} Pa^{-1})	2.70×10^{-12}	(Chapter 3)

Table D.3.1 Cycle conditions and EO concentration within the load achieved by Fick's second law of diffusion

Cicle parameters	Cycle no. 604	Cycle no. 605	Cycle no. 1574	Cycle no. 1575
C_b(mol m^{-3})	5.73	5.52	5.47	5.47
C_b(mg L^{-1})	252	243	241	241
U (s)	1669	2000	5642	8614
P (Pa)†	1.65 x10^4	1.59 x10^4	1.58 x10^4	1.58 x10^4
C (mg L^{-1})	189.3	196.2	238.3	240.8

† Ideal gas law, $PV = nRT$; Temperature data included in Table D.2

Table D.3.2 Cycle conditions and EO concentration within the load achieved by Fick's second law of diffusion, for the runs described in chapter 2

Cycle parameters	Run no. 1	Run no. 5	Run no. 7	Run no. 14	Run no. 15
T (K)	332.7	332.0	332.4	332.7	335.1
$C_{head\text{-}space}$ (mg L^{-1})	233	266	1004	738	498
P (Pa)	1.46x10^4	1.66x10^4	6.30x10^4	4.64x10^4	3.15x10^4
C_b(mol m^{-3})	5.07	5.77	21.9	16.1	10.9
C_b(mg L^{-1})	233	254	964	709	482
$C_{within\ load\ at\ 3000s}$ (mg L^{-1})	203	232	878	646	439
$C_{within\ load\ close\ to\ -7.5logN/N0}$ (mg L^{-1})	219	250	878	646	452

Appendix E

Appendix to Chapter 5

E.1 Experimental data points of ethylene oxide desorption throughout aeration processes

Table E.1.1 Results of EO desorption throughout aeration time at medium temperature, for viscose/polyethylene material (surgical drape, 488-103)

Time (s)	C [mg(EO)/g(device)]	C/C_0 †	$\overline{C}$ ††	Residues†††
0	$5.216\text{x}10^{-3}$	$1.086\text{x}10^{0}$	$9.908\text{x}10^{-1}$	$9.715\text{x}10^{-1}$
0	$4.394\text{x}10^{-3}$	$9.145\text{x}10^{-1}$		$9.731\text{x}10^{-1}$
2400	$3.947\text{x}10^{-3}$	$8.214\text{x}10^{-1}$	$8.361\text{x}10^{-1}$	$6.925\text{x}10^{-1}$
2400	$3.806\text{x}10^{-3}$	$7.921\text{x}10^{-1}$		$6.927\text{x}10^{-1}$
4800	$3.752\text{x}10^{-3}$	$7.809\text{x}10^{-1}$	$7.682\text{x}10^{-1}$	$5.844\text{x}10^{-1}$
4800	$3.706\text{x}10^{-3}$	$7.713\text{x}10^{-1}$		$5.845\text{x}10^{-1}$
7200	$2.905\text{x}10^{-3}$	$6.046\text{x}10^{-1}$	$7.161\text{x}10^{-1}$	$5.087\text{x}10^{-1}$
7200	$3.230\text{x}10^{-3}$	$6.722\text{x}10^{-1}$		$5.082\text{x}10^{-1}$
9360	$3.000\text{x}10^{-3}$	$6.243\text{x}10^{-1}$	$6.763\text{x}10^{-1}$	$4.533\text{x}10^{-1}$
9360	$3.136\text{x}10^{-3}$	$6.527\text{x}10^{-1}$		$4.532\text{x}10^{-1}$
11700	$3.107\text{x}10^{-3}$	$6.466\text{x}10^{-1}$	$6.381\text{x}10^{-1}$	$4.032\text{x}10^{-1}$
11700	$3.386\text{x}10^{-3}$	$7.047\ \text{x}10^{-1}$		$4.029\text{x}10^{-1}$
13500	$2.961\text{x}10^{-3}$	$6.162\ \text{x}10^{-1}$	$6.113\text{x}10^{-1}$	$3.700\text{x}10^{-1}$
13500	$2.960\text{x}10^{-3}$	$6.160\ \text{x}10^{-1}$		$3.700\text{x}10^{-1}$
17400	$2.534\text{x}10^{-3}$	$5.274\ \text{x}10^{-1}$	$5.587\text{x}10^{-1}$	$3.093\text{x}10^{-1}$
17400	$2.341\text{x}10^{-3}$	$4.872\ \text{x}10^{-1}$		$3.096\text{x}10^{-1}$
20400	$2.822\text{x}10^{-3}$	$5.873\ \text{x}10^{-1}$	$5.224\text{x}10^{-1}$	$2.699\text{x}10^{-1}$
20400	$2.620\text{x}10^{-3}$	$5.453\ \text{x}10^{-1}$		$2.701\text{x}10^{-1}$
22800	$2.593\text{x}10^{-3}$	$5.396\ \text{x}10^{-1}$	$4.953\text{x}10^{-1}$	$2.428\text{x}10^{-1}$
22800	$2.254\text{x}10^{-3}$	$4.691\ \text{x}10^{-1}$		$2.431\text{x}10^{-1}$
24600	$2.397\text{x}10^{-3}$	$4.989\ \text{x}10^{-1}$	$4.761\text{x}10^{-1}$	$2.244\text{x}10^{-1}$
24600	$2.327\text{x}10^{-3}$	$4.843\ \text{x}10^{-1}$		$2.244\text{x}10^{-1}$
27000	$2.216\text{x}10^{-3}$	$4.612\ \text{x}10^{-1}$	$4.517\text{x}10^{-1}$	$2.020\text{x}10^{-1}$
31800	$1.966\text{x}10^{-3}$	$4.092\ \text{x}10^{-1}$	$4.068\text{x}10^{-1}$	$1.639\text{x}10^{-1}$
31800	$1.880\text{x}10^{-3}$	$3.913\ \text{x}10^{-1}$		$1.639\text{x}10^{-1}$
40200	$1.824\text{x}10^{-3}$	$3.796\ \text{x}10^{-1}$	$3.389\text{x}10^{-1}$	$1.136\text{x}10^{-1}$

† $C_0 = \left(C_{0(1)} + C_{0(2)}\right)/2$

††† $\text{Residues} = \left(\overline{C} - \dfrac{C}{C_0}\right)^2$

†† $\overline{C} = \dfrac{8\overline{C_0}}{\pi^2}\sum_{n=0}^{\infty}\dfrac{1}{(2n+1)^2}\exp\left[-\left\{\dfrac{(2n+1)\pi}{2L}\right\}^2 Dt\right];\ \overline{C_o} = 1$

Table E.1.2 Results of EO desorption throughout aeration time at low temperature, for viscose/polyethylene material (surgical drape, 488-103)

Time (s)	C [mg(EO)/g(device)]	C/C_0 †	$\bar{C}$ ††	Residues†††
0	4.343×10^{-3}	9.178×10^{-1}	9.908×10^{-1}	9.732×10^{-1}
0	5.121×10^{-3}	1.082×10^{0}		9.717×10^{-1}
6600	4.927×10^{-3}	1.041×10^{0}	8.795×10^{-1}	7.649×10^{-1}
6600	4.507×10^{-3}	9.525×10^{-1}		7.656×10^{-1}
23100	3.912×10^{-3}	8.267×10^{-1}	7.750×10^{-1}	5.946×10^{-1}
23100	4.496×10^{-3}	9.501×10^{-1}		5.937×10^{-1}
39300	3.596×10^{-3}	7.599×10^{-1}	7.065×10^{-1}	4.941×10^{-1}
39300	2.917×10^{-3}	6.164×10^{-1}		4.950×10^{-1}
50100	3.030×10^{-3}	6.403×10^{-1}	6.686×10^{-1}	4.430×10^{-1}
50100	3.182×10^{-3}	6.724×10^{-1}		4.428×10^{-1}
86100	2.197×10^{-3}	4.643×10^{-1}	5.656×10^{-1}	3.175×10^{-1}
86100	2.130×10^{-3}	4.501×10^{-1}		3.175×10^{-1}
102600	2.775×10^{-3}	5.864×10^{-1}	5.260×10^{-1}	2.738×10^{-1}
102600	2.745×10^{-3}	5.801×10^{-1}		2.738×10^{-1}
123600	1.930×10^{-3}	4.079×10^{-1}	4.803×10^{-1}	2.288×10^{-1}
123600	2.388×10^{-3}	5.046×10^{-1}		2.284×10^{-1}
135300	2.264×10^{-3}	4.784×10^{-1}	4.567×10^{-1}	2.065×10^{-1}
135300	2.096×10^{-3}	4.429×10^{-1}		2.067×10^{-1}

Table E.1.3 Results of EO desorption throughout aeration time at medium temperature, for viscose/polyester material (baby blanket, 454-300)

Time (s)	C [mg(EO)/g(device)]	C/C_0 †	$\bar{C}$ ††	Residues†††
0	2.711×10^{-1}	9.828×10^{-1}		5.180×10^{-1}
0	2.660×10^{-1}	9.643×10^{-1}	9.908×10^{-1}	5.254×10^{-1}
0	2.857×10^{-1}	1.036×10^{0}		4.972×10^{-1}
11988	9.398×10^{-2}	3.407×10^{-1}		6.422×10^{-2}
11988	9.827×10^{-2}	3.562×10^{-1}	3.474×10^{-1}	6.207×10^{-2}
11988	9.475×10^{-2}	3.435×10^{-1}		6.383×10^{-2}
42012	1.551×10^{-2}	5.623×10^{-2}	4.159×10^{-2}	6.803×10^{-4}
42012	1.810×10^{-2}	6.562×10^{-2}		5.519×10^{-4}
98388	1.006×10^{-2}	3.647×10^{-2}		8.625×10^{-5}
98388	8.650×10^{-3}	3.136×10^{-2}	7.731×10^{-4}	6.205×10^{-5}
98388	1.045×10^{-2}	3.788×10^{-2}		9.364×10^{-5}
124812	1.036×10^{-2}	3.756×10^{-2}		1.049×10^{-4}
124812	7.026×10^{-3}	2.547×10^{-2}	1.194×10^{-4}	4.770×10^{-5}
124812	9.297×10^{-3}	3.370×10^{-2}		8.423×10^{-5}
184788	6.308×10^{-3}	2.287×10^{-2}		3.977×10^{-5}
184788	9.667×10^{-3}	3.504×10^{-2}	1.721×10^{-6}	9.342×10^{-5}
184788	6.845×10^{-3}	2.481×10^{-2}		4.683×10^{-5}
211212	5.332×10^{-3}	1.933×10^{-2}		2.843×10^{-5}
211212	5.716×10^{-3}	2.072×10^{-2}	2.657×10^{-7}	3.267×10^{-5}
211212	5.730×10^{-3}	2.077×10^{-2}		3.283×10^{-5}

Table E.1.4 Results of EO desorption throughout aeration time at medium low temperature, for viscose/polyester material (baby blanket, 454-300)

Time (s)	C [mg(EO)/g(device)]	C/C_0 †	$\bar{C}$ ††	Residues†††
0	2.711×10^{-1}	9.828×10^{-1}		5.180×10^{-1}
0	2.660×10^{-1}	9.643×10^{-1}	9.908×10^{-1}	5.254×10^{-1}
0	2.857×10^{-1}	1.036×10^{0}		4.972×10^{-1}
49788	2.464×10^{-2}	8.932×10^{-2}		4.695×10^{-3}
49788	2.698×10^{-2}	9.781×10^{-2}	9.316×10^{-2}	4.380×10^{-3}
49788	1.944×10^{-2}	7.047×10^{-2}		5.435×10^{-3}
82800	9.473×10^{-3}	3.434×10^{-2}		1.619×10^{-4}
82800	1.174×10^{-2}	4.256×10^{-2}	2.220×10^{-2}	1.093×10^{-4}
82800	9.650×10^{-3}	3.498×10^{-2}		1.574×10^{-4}
136188	4.650×10^{-3}	1.686×10^{-2}		6.093×10^{-6}
136188	5.324×10^{-3}	1.930×10^{-2}	2.182×10^{-3}	9.875×10^{-6}
136188	4.605×10^{-3}	1.669×10^{-2}		5.873×10^{-6}
169200	4.833×10^{-3}	1.752×10^{-2}		1.860×10^{-5}
169200	4.090×10^{-3}	1.483×10^{-2}	5.197×10^{-4}	1.275×10^{-5}
169200	4.007×10^{-3}	1.453×10^{-2}		1.216×10^{-5}

Table E.1.5 Results of EO desorption throughout aeration time at low temperature, for viscose/polyester material (baby blanket, 454-300)

Time (s)	C [mg(EO)/g(device)]	C/C_0†	$\bar{C}$††	Residues†††
0	2.711×10^{-1}	9.828×10^{-1}		5.180×10^{-1}
0	2.660×10^{-1}	9.643×10^{-1}	9.908×10^{-1}	5.254×10^{-1}
0	2.857×10^{-1}	1.036×10^{0}		4.972×10^{-1}
69588	9.036×10^{-2}	3.276×10^{-1}		6.902×10^{-2}
69588	9.170×10^{-2}	3.324×10^{-1}	3.531×10^{-1}	6.832×10^{-2}
69588	8.963×10^{-2}	3.249×10^{-1}		6.940×10^{-2}
150588	3.632×10^{-2}	1.317×10^{-1}		9.570×10^{-3}
150588	4.739×10^{-2}	1.718×10^{-1}	1.341×10^{-1}	7.527×10^{-3}
150588	3.367×10^{-2}	1.221×10^{-1}		1.010×10^{-2}
233388	2.662×10^{-2}	9.650×10^{-2}		5.416×10^{-4}
233388	2.004×10^{-2}	7.265×10^{-2}	4.989×10^{-2}	8.911×10^{-4}
233388	1.864×10^{-2}	6.757×10^{-2}		9.767×10^{-4}
330588	1.050×10^{-2}	3.806×10^{-2}		2.625×10^{-5}
330588	8.977×10^{-3}	3.254×10^{-2}	1.562×10^{-2}	4.417×10^{-5}
330588	9.510×10^{-3}	3.448×10^{-2}		3.737×10^{-5}
571788	5.047×10^{-3}	1.830×10^{-2}		1.740×10^{-5}
571788	4.361×10^{-3}	1.581×10^{-2}	8.759×10^{-4}	1.215×10^{-5}
571788	6.119×10^{-3}	2.218×10^{-2}		2.749×10^{-5}
675288	7.148×10^{-3}	2.591×10^{-2}		4.752×10^{-5}
675288	4.303×10^{-3}	1.560×10^{-2}	2.544×10^{-4}	1.639×10^{-5}
675288	4.837×10^{-3}	1.753×10^{-2}		2.100×10^{-5}
767988	3.837×10^{-3}	1.391×10^{-2}		1.408×10^{-5}
767988	5.585×10^{-3}	2.025×10^{-2}	8.406×10^{-5}	3.026×10^{-5}
767988	3.835×10^{-3}	1.390×10^{-2}		1.407×10^{-5}
1187388	4.871×10^{-3}	1.766×10^{-2}		2.372×10^{-5}
1187388	4.807×10^{-3}	1.743×10^{-2}	5.608×10^{-7}	2.310×10^{-5}
1187388	2.926×10^{-3}	1.061×10^{-2}		8.558×10^{-6}
1279188	6.034×10^{-3}	2.187×10^{-2}		3.641×10^{-5}
1279188	4.230×10^{-3}	1.533×10^{-2}	1.873×10^{-7}	1.789×10^{-5}
1279188	5.034×10^{-3}	1.825×10^{-2}		2.534×10^{-5}
1396188	4.533×10^{-3}	1.643×10^{-2}		2.055×10^{-5}
1396188	2.876×10^{-3}	1.043×10^{-2}	4.630×10^{-8}	8.271×10^{-6}
1396188	2.802×10^{-3}	1.016×10^{-2}		7.851×10^{-6}

Table E.1.6 Results of EO desorption throughout aeration time at high temperature, for polyvinylchloride material (Nasal aspirator pear, 127-007)

Time (s)	C [mg(EO)/g(device)]	C/C_0 †	$\bar{C}$ ††	Residues†††
0	2.399×10^{0}	1.132×10^{0}	9.908×10^{-1}	1.983×10^{0}
0	1.841×10^{0}	8.684×10^{-1}		7.228×10^{-1}
3000	9.683×10^{-1}	4.567×10^{-1}	5.368×10^{-1}	1.862×10^{-1}
3000	9.266×10^{-1}	4.371×10^{-1}		1.520×10^{-1}
5400	8.190×10^{-1}	3.863×10^{-1}	3.833×10^{-1}	1.898×10^{-1}
5400	1.037×10^{0}	4.892×10^{-1}		4.273×10^{-1}
6600	6.862×10^{-1}	3.237×10^{-1}	3.245×10^{-1}	1.308×10^{-1}
6600	9.204×10^{-1}	4.342×10^{-1}		3.551×10^{-1}
9000	4.245×10^{-1}	2.002×10^{-1}	2.326×10^{-1}	3.684×10^{-2}
9000	5.400×10^{-1}	2.547×10^{-1}		9.451×10^{-2}
10800	3.222×10^{-1}	1.520×10^{-1}	1.812×10^{-1}	1.989×10^{-2}
16800	1.788×10^{-1}	8.434×10^{-2}	7.881×10^{-2}	9.997×10^{-3}
16800	1.219×10^{-1}	5.750×10^{-2}		1.856×10^{-3}
18600	1.290×10^{-1}	6.085×10^{-2}	6.140×10^{-2}	4.570×10^{-3}
18600	8.479×10^{-2}	4.000×10^{-2}		5.472×10^{-4}
20400	5.568×10^{-2}	2.626×10^{-2}	4.783×10^{-2}	6.163×10^{-5}
20400	6.720×10^{-2}	3.170×10^{-2}		3.752×10^{-4}

Table E.1.7 Results of EO desorption throughout aeration time at medium temperature, for polyvinylchloride material (Nasal aspirator pear, 127-007)

Time (s)	C [mg(EO)/g(device)]	C/C_0 †	$\bar{C}$ ††	Residues†††
0	$1.033x10^{0}$	$1.111x10^{0}$		$1.449x10^{-2}$
0	$1.022x10^{0}$	$1.099x10^{0}$	$9.908x10^{-1}$	$1.178x10^{-2}$
0	$7.338x10^{-1}$	$7.894x10^{-1}$		$4.059x10^{-2}$
36900	$2.699x10^{-1}$	$2.903x10^{-1}$		$3.016x10^{-3}$
36900	$1.821x10^{-1}$	$1.959x10^{-1}$	$2.354x10^{-1}$	$1.563x10^{-3}$
36900	$1.797x10^{-1}$	$1.933x10^{-1}$		$1.774x10^{-3}$
52200	$8.593x10^{-2}$	$9.244x10^{-2}$		$2.358x10^{-3}$
52200	$1.784x10^{-1}$	$1.919x10^{-1}$	$1.410x10^{-1}$	$2.592x10^{-3}$
52200	$1.322x10^{-1}$	$1.422x10^{-1}$		$1.477x10^{-6}$
90000	$4.090x10^{-2}$	$4.400x10^{-2}$		$1.819x10^{-5}$
90000	$3.345x10^{-2}$	$3.598x10^{-2}$	$3.973x10^{-2}$	$1.406x10^{-5}$
90000	$7.010x10^{-2}$	$7.541x10^{-2}$		$1.273x10^{-3}$
118800	$2.911x10^{-2}$	$3.131x10^{-2}$		$2.617x10^{-4}$
118800	$3.826x10^{-2}$	$4.116x10^{-2}$	$1.514x10^{-2}$	$6.770x10^{-4}$
118800	$5.960x10^{-2}$	$6.411x10^{-2}$		$2.399x10^{-3}$
135900	$4.239x10^{-2}$	$4.560x10^{-2}$	$8.535x10^{-3}$	$1.374x10^{-3}$
135900	$2.305x10^{-2}$	$2.480x10^{-2}$		$2.644x10^{-4}$
174600	$1.105x10^{-2}$	$1.189x10^{-2}$		$9.126x10^{-5}$
174600	$8.310x10^{-3}$	$8.939x10^{-3}$	$2.334x10^{-3}$	$4.363x10^{-5}$
174600	$6.637x10^{-3}$	$7.140x10^{-3}$		$2.310x10^{-5}$
221400	$3.969x10^{-3}$	$4.270x10^{-3}$		$1.431x10^{-5}$
221400	$4.494x10^{-3}$	$4.834x10^{-3}$	$4.864x10^{-4}$	$1.890x10^{-5}$
221400	$6.654x10^{-3}$	$7.158x10^{-3}$		$4.451x10^{-5}$
258300	$3.011x10^{-3}$	$3.239x10^{-3}$		$9.596x10^{-6}$
258300	$1.567x10^{-3}$	$1.686x10^{-3}$	$1.413x10^{-4}$	$2.385x10^{-6}$
258300	$2.903x10^{-3}$	$3.123x10^{-3}$		$8.890x10^{-6}$
532800	$1.311x10^{-3}$	$1.410x10^{-3}$		$1.989x10^{-6}$
532800	$1.273x10^{-3}$	$1.369x10^{-3}$	$1.431x10^{-8}$	$1.875x10^{-6}$
532800	$1.400x10^{-3}$	$1.506x10^{-3}$		$2.268x10^{-6}$

Table E.1.8 Results of EO desorption throughout aeration time at low temperature, for polyvinylchloride material (Nasal aspirator pear, 127-007)

Time (s)	C [mg(EO)/g(device)]	C/C_0 †	$\overline{C}$ ††	Residues†††
0	1.295×10^{0}	1.142×10^{0}		2.284×10^{-2}
0	9.730×10^{-1}	8.580×10^{-1}	9.908×10^{-1}	1.764×10^{-2}
0	1.134×10^{0}	1.000×10^{0}		8.374×10^{-5}
239400	7.069×10^{-1}	6.234×10^{-1}		2.428×10^{-2}
239400	5.878×10^{-1}	5.183×10^{-1}	4.676×10^{-1}	2.579×10^{-3}
239400	5.805×10^{-1}	5.119×10^{-1}		1.966×10^{-3}
271800	6.211×10^{-1}	5.477×10^{-1}		1.301×10^{-2}
271800	6.618×10^{-1}	5.836×10^{-1}	4.337×10^{-1}	2.247×10^{-2}
271800	6.543×10^{-1}	5.770×10^{-1}		2.054×10^{-2}
325800	6.290×10^{-1}	5.547×10^{-1}		2.956×10^{-2}
325800	8.352×10^{-1}	7.365×10^{-1}	3.827×10^{-1}	1.251×10^{-1}
325800	7.321×10^{-1}	6.456×10^{-1}		6.909×10^{-2}
412200	4.903×10^{-1}	4.324×10^{-1}		1.411×10^{-2}
412200	3.927×10^{-1}	3.463×10^{-1}	3.136×10^{-1}	1.070×10^{-3}
412200	3.946×10^{-1}	3.480×10^{-1}		1.182×10^{-3}
498600	6.703×10^{-1}	5.911×10^{-1}		1.116×10^{-1}
498600	6.899×10^{-1}	6.084×10^{-1}	2.570×10^{-1}	1.235×10^{-1}
498600	6.798×10^{-1}	5.995×10^{-1}		1.173×10^{-1}
621000	1.569×10^{-1}	1.384×10^{-1}	1.938×10^{-1}	3.076×10^{-3}
621000	2.071×10^{-1}	1.826×10^{-1}		1.252×10^{-4}
844200	1.762×10^{-1}	1.554×10^{-1}		1.559×10^{-3}
844200	2.326×10^{-1}	2.051×10^{-1}	1.159×10^{-1}	7.961×10^{-3}
844200	3.118×10^{-1}	2.750×10^{-1}		2.530×10^{-2}
1468800	8.999×10^{-2}	7.936×10^{-2}		2.691×10^{-3}
1468800	9.161×10^{-2}	8.078×10^{-2}	2.748×10^{-2}	2.841×10^{-3}
1468800	1.085×10^{-1}	9.568×10^{-2}		4.651×10^{-3}

Table E.1.9 Results of EO desorption throughout aeration time at high temperature, for polypropylene material (galipot, 489-312)

Time (s)	C [mg(EO)/g(device)]	C/C_0†	$\bar{C}$††	Residues†††
0	3.115×10^{-1}	1.010×10^{0}	9.908×10^{-1}	4.615×10^{-1}
0	3.053×10^{-1}	9.899×10^{-1}		4.700×10^{-1}
3600	2.680×10^{-1}	8.690×10^{-1}	6.051×10^{-1}	1.136×10^{-1}
3600	2.190×10^{-1}	7.101×10^{-1}		1.491×10^{-1}
6300	1.329×10^{-1}	4.309×10^{-1}	4.784×10^{-1}	1.194×10^{-1}
6300	1.408×10^{-1}	4.565×10^{-1}		1.140×10^{-1}
8712	1.344×10^{-1}	4.358×10^{-1}	3.902×10^{-1}	6.542×10^{-2}
8712	1.344×10^{-1}	4.358×10^{-1}		6.542×10^{-2}
14112	7.496×10^{-2}	2.431×10^{-1}	2.479×10^{-1}	2.990×10^{-2}
14112	6.396×10^{-2}	2.074×10^{-1}		3.382×10^{-2}
18000	5.347×10^{-2}	1.734×10^{-1}	1.788×10^{-1}	1.571×10^{-2}
18000	5.236×10^{-2}	1.698×10^{-1}		1.599×10^{-2}
20412	3.607×10^{-2}	1.170×10^{-1}	1.460×10^{-1}	1.209×10^{-2}
20412	3.607×10^{-2}	1.170×10^{-1}		1.209×10^{-2}
24012	1.404×10^{-2}	4.553×10^{-2}	1.079×10^{-1}	8.818×10^{-3}
24012	1.404×10^{-2}	4.553×10^{-2}		8.818×10^{-3}
26712	1.749×10^{-2}	5.671×10^{-2}	8.605×10^{-2}	4.700×10^{-3}
26712	2.189×10^{-2}	7.098×10^{-2}		4.116×10^{-3}
29700	1.264×10^{-2}	4.099×10^{-2}	6.695×10^{-2}	2.950×10^{-3}
29700	8.823×10^{-3}	2.861×10^{-2}		3.379×10^{-3}
36000	9.027×10^{-3}	2.927×10^{-2}	3.945×10^{-2}	9.255×10^{-4}
36000	8.710×10^{-3}	2.824×10^{-2}		9.449×10^{-4}
48312	3.211×10^{-3}	1.041×10^{-2}	1.403×10^{-2}	1.171×10^{-4}
48312	3.211×10^{-3}	1.041×10^{-2}		1.171×10^{-4}

Table E.1.10 Results of EO desorption throughout aeration time at medium temperature, for polypropylene material (galipot, 489-312)

Time (s)	C [mg(EO)/g(device)]	C/C_0 †	$\bar{C}$ ††	Residues†††
0	9.217×10^{-1}	1.010×10^{0}	9.908×10^{-1}	3.678×10^{-4}
0	9.034×10^{-1}	9.900×10^{-1}		7.671×10^{-7}
16200	7.042×10^{-1}	7.717×10^{-1}		1.087×10^{-2}
16200	6.745×10^{-1}	7.391×10^{-1}	6.674×10^{-1}	5.145×10^{-3}
16200	7.081×10^{-1}	7.760×10^{-1}		1.178×10^{-2}
30600	5.122×10^{-1}	5.613×10^{-1}		3.337×10^{-4}
30600	5.208×10^{-1}	5.707×10^{-1}	5.430×10^{-1}	7.668×10^{-4}
30600	5.231×10^{-1}	5.732×10^{-1}		9.128×10^{-4}
59400	3.469×10^{-1}	3.801×10^{-1}		1.159×10^{-4}
59400	3.254×10^{-1}	3.566×10^{-1}	3.694×10^{-1}	1.637×10^{-4}
59400	3.261×10^{-1}	3.574×10^{-1}		1.447×10^{-4}
95400	1.355×10^{-1}	1.485×10^{-1}		6.536×10^{-3}
95400	1.634×10^{-1}	1.791×10^{-1}	2.293×10^{-1}	2.527×10^{-3}
95400	2.039×10^{-1}	2.234×10^{-1}		3.467×10^{-5}
145800	9.969×10^{-2}	1.092×10^{-1}		7.141×10^{-5}
145800	9.390×10^{-2}	1.029×10^{-1}	1.177×10^{-1}	2.189×10^{-4}
145800	1.067×10^{-1}	1.169×10^{-1}		5.910×10^{-7}
192600	5.197×10^{-2}	5.695×10^{-2}	6.335×10^{-2}	4.096×10^{-5}
192600	4.160×10^{-2}	4.559×10^{-2}		3.155×10^{-4}
232200	3.170×10^{-2}	3.474×10^{-2}		7.674×10^{-6}
232200	2.328×10^{-2}	2.551×10^{-2}	3.751×10^{-2}	1.439×10^{-4}
232200	2.982×10^{-2}	3.268×10^{-2}		2.333×10^{-5}
279000	8.565×10^{-3}	9.386×10^{-3}		1.167×10^{-4}
279000	9.440×10^{-3}	1.034×10^{-2}	2.019×10^{-2}	9.691×10^{-5}
279000	1.357×10^{-2}	1.487×10^{-2}		2.829×10^{-5}
318600	5.363×10^{-3}	5.877×10^{-3}		3.692×10^{-5}
318600	5.699×10^{-3}	6.245×10^{-3}	1.195×10^{-2}	3.259×10^{-5}
318600	4.355×10^{-3}	4.772×10^{-3}		5.157×10^{-5}
372600	3.683×10^{-3}	4.036×10^{-3}		3.288×10^{-6}
372600	4.876×10^{-3}	5.343×10^{-3}	5.849×10^{-3}	2.560×10^{-7}
372600	3.388×10^{-3}	3.713×10^{-3}		4.565×10^{-6}
592200	1.076×10^{-3}	1.179×10^{-3}		7.385×10^{-7}
592200	6.272×10^{-4}	6.873×10^{-4}	3.198×10^{-4}	1.351×10^{-7}
592200	7.917×10^{-4}	8.676×10^{-4}		3.001×10^{-7}

Table E.1.11 Results of EO desorption throughout aeration time at low temperature, for polypropylene material (galipot, 489-312)

Time (s)	C [mg(EO)/g(device)]	C/C_0 †	$\bar{C}$ ††	Residues†††
0	1.009×10^{0}	9.854×10^{-1}	9.908×10^{-1}	3.022×10^{-5}
0	1.039×10^{0}	1.015×10^{0}		5.664×10^{-4}
111600	9.491×10^{-1}	9.269×10^{-1}	8.769×10^{-1}	2.499×10^{-3}
111600	9.657×10^{-1}	9.431×10^{-1}		4.383×10^{-3}
193212	9.750×10^{-1}	9.521×10^{-1}	8.383×10^{-1}	1.297×10^{-2}
193212	8.792×10^{-1}	8.586×10^{-1}		4.137×10^{-4}
424800	8.567×10^{-1}	8.366×10^{-1}	7.602×10^{-1}	5.846×10^{-3}
424800	7.733×10^{-1}	7.552×10^{-1}		2.486×10^{-5}
518400	7.739×10^{-1}	7.558×10^{-1}	7.350×10^{-1}	4.291×10^{-4}
518400	8.335×10^{-1}	8.140×10^{-1}		6.228×10^{-3}
702612	7.709×10^{-1}	7.528×10^{-1}	6.915×10^{-1}	3.757×10^{-3}
702612	7.723×10^{-1}	7.542×10^{-1}		3.927×10^{-3}
790812	6.727×10^{-1}	6.569×10^{-1}	6.727×10^{-1}	2.499×10^{-4}
790812	6.727×10^{-1}	6.569×10^{-1}		2.499×10^{-4}
1017900	5.984×10^{-1}	5.844×10^{-1}	6.287×10^{-1}	1.966×10^{-3}
1017900	6.422×10^{-1}	6.271×10^{-1}		2.443×10^{-6}
1229400	6.427×10^{-1}	6.276×10^{-1}	5.920×10^{-1}	1.272×10^{-3}
1229400	5.941×10^{-1}	5.802×10^{-1}		1.391×10^{-4}
1663812	5.187×10^{-1}	5.065×10^{-1}	5.255×10^{-1}	3.604×10^{-4}
1792512	6.020×10^{-1}	5.879×10^{-1}	5.077×10^{-1}	6.436×10^{-3}
1792512	4.978×10^{-1}	4.861×10^{-1}		4.636×10^{-4}
2595312	4.154×10^{-1}	4.057×10^{-1}	4.103×10^{-1}	2.185×10^{-5}
2595312	3.891×10^{-1}	3.800×10^{-1}		9.216×10^{-4}
3003012	4.049×10^{-1}	3.954×10^{-1}	3.686×10^{-1}	7.193×10^{-4}
3003012	4.471×10^{-1}	4.366×10^{-1}		4.628×10^{-3}
3508812	2.694×10^{-1}	2.631×10^{-1}	3.227×10^{-1}	3.556×10^{-3}
3508812	2.643×10^{-1}	2.581×10^{-1}		4.175×10^{-3}
3666600	2.570×10^{-1}	2.510×10^{-1}	3.096×10^{-1}	3.439×10^{-3}
3666600	2.919×10^{-1}	2.851×10^{-1}		6.031×10^{-4}