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A series of *n*-hexadecane emulsions were prepared (20 wt% oil in 2 wt% polyoxyethylene sorbitan monolaurate) and characterized by static light scattering ($d_{32}=0.8 \mu\text{m}$). The emulsions were diluted to 0.04 wt% oil in ethanol solutions (0-20%) containing additional surfactant (0 or 2 wt% polyoxyethylene sorbitan monolaurate) and the size and concentration of the droplets was measured kinetically (0-600 h) by light scattering and turbidity measurements. Initially there was a rapid solubilization of oil in the aqueous phase proportional to the ethanol concentration (up to 0.01 wt% in 20% ethanol) with no associated change in droplet size. Subsequently there was a slow solubilization of oil in the micellar phase (if present) over the next 600 h and a simultaneous increase in droplet size. The rate of this second solubilization process depended on alcohol concentration but not the amount of oil solubilized did not. Results are discussed in terms of the interactions between alcohols, micelles and oil droplets.

23D-33

EVOLUTION OF VOLATILE FLAVOR COMPOUNDS OF KOREAN WHITE WINE BY DIFFERENT YEAST STRAINS

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A great variety of volatile metabolic by-products is formed in yeast cell during alcohol fermentation. The *seibel* grape (*Vitis labrusca*) is cultivated in the Southern Korea is used for wines. The objective of this research was to identify the volatile flavor compounds formed during alcohol fermentation. *Saccharomyces cerevisiae* and *Schizosaccharomyces pombe* were inoculated in *seibel* grape juice at 12 °C. The lag, stationary and death phases of fermentation volatile flavor compounds were extracted by ether-hexane extraction. Extracts were concentrated to 250 μl . Identification of fermentation volatile flavor compounds was performed by gas chromatography/mass spectrometer (GC/MS).

The fermentation volatile flavor compounds during alcohol fermentation were determined by a Hewlett-Packard 5890 series II plus GC which was equipped with a Supelcowax 10 fused silica capillary column (60m \times 0.32mm \times 0.25 μm film thickness) coated with polyethyleneglycol. The scan detection method allowed the comparison of spectrum from the chromatogram of fermentation volatile flavor compounds with those in Wiley's base library. Among the volatile flavor compounds collected by ether-hexane extraction method, 30 compounds were identified. They consisted of 4 alcohols, 5 ketones & acids, 1 terpenoid, 9 esters, 1 aldehyde, 2 furan & phenol and 8 others.

A panel of 32 tasters and a modified hedonic scale were used of the sensory evaluation of wines. The significance of the differences between the average score of the wine samples were determined by using SAS and Duncan's multiple range test. The taste of wine fermented by *Schiz. pombe* was significantly better than that of *S. cerevisiae* ($p<0.05$).

23D-34

CULTIVARS OF VITIS VINIFERA USED FOR WHITE WINE PRODUCTION: INITIAL CHARACTERISATION OF SELECTED PORTUGUESE VARIETIES

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As a traditional wine producing country, Portugal possesses a long established "appellation" system in which the regional characteristics of wine styles are determined and controlled by official bodies. The varieties encountered within these demarcated regions are considered characteristic and although in some cases certain native varieties have close relatives in other (predominantly southern European) regions, most are apparently unique to Portugal. Many of these varieties can produce wines of high quality and export market acceptability, despite the fact that very little is known about these varieties aside from basic ampelographic descriptions.

The global objective of the study from which the results here are taken concerns the aromatic and chemical characterisation of wines produced from selected varieties from the *Vinho Verde* (Loureiro, Trajadura and Paderná), *Bairrada* (Maria Gomes, Bical, Cercial and Arinto) and *Dão* (Encruzado) regions of Central and Northern Portugal.

Wines from the 1995 harvest were analysed for standard enological parameters, for volatile profiles (GC), selective volatile compounds (monoterpenes, higher alcohols and esters) and were submitted to a rigorous sensorial analysis by a panel of trained tasters.

Concerning these varieties from the *Vinho Verde* region only Loureiro showed high and sensorially detectable levels of free monoterpenes. Of the varieties from *Bairrada* region, Maria Gomes was considered sensorially differentiated due to fruity and floral characteristics. All of the wines from the Encruzado variety (*Dão região*) were particularly rich in fermentation-derived aroma compounds complicating the identification of the underlying fruit-derived aromas.

23D-35

PHENOLIC CONTENT AND SUPEROXIDE RADICAL INTENSITY OF KOREAN WINES

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Oxidation and production of free radicals are an integral part of human metab-

olism. At high concentrations, free radicals, superoxide radical anion react with non radicals and can initiate advanced chain reactions such as lipid peroxidation. Because of their high potential to damage vital biological systems, free radicals have been implicated as contributing factors to aging and development of chronic disease, including heart disease and cancer.

The objective of this research was to study the phenolic content and superoxide radical scavenging activity of Korean wines. Superoxide radical intensity was measured by electron spin resonance spectrometer using spin trapping methodology in the hypoxanthin-xanthin oxidase (HPX-XOD) superoxide generating system. The phenolic content of Korean red wines ranged from 1379.5 to 2412.9mg/L, and that of white wine was from 279.6 to 294.8mg/L. Total sulfur dioxide content ranged from 60.4 to 189.6mg/L. Superoxide radical intensity was from 0.64 to 1.00 for white wine, and that of red wine were ca. three times lower. A direct negative correlation between the color of wine ($r=-0.9335$, $P<0.01$), phenolic content ($r=-0.9413$, $P<0.01$) and the superoxide radical intensity was established by a simple regression analysis. In this result, phenolic compounds of Korean red wines were demonstrated to possess superoxide radical scavenging activity.

23D-36

FRACTIONATION (MW) AND PARTIAL CHARACTERIZATION OF ANTHOCYANINS FROM RED WINE

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The food industry and consumers demand for natural pigments is increasing. Anthocyanins (Acy) have become the center of interest, because of the wide spectrum of color they show (from orange through red to black), but most show little stability during processing and storage. Research has focused recently on ways of stabilizing Acy, including Acy with complex structures (glycosylated and acylated), the use of copigments and Acy modified during fermentation (vinylbenzene adducts and polymerized Acy). The effects of pH, a_w and SO_2 on the stability of polymerized Acy fraction from red wine was studied. Red wine Acy was purified using polyvinyl-pyrrolidone (PVPP) and Adsorbex RP-18 columns and then concentrated in a rotary evaporator. The Acy were separated into three fractions using a PVPP-silica gel column: monomeric anthocyanins (methanol-soluble), oligomeric anthocyanins (oAcy, formic acid:water soluble, MW <2000) and polymeric anthocyanins (pAcy, formic acid-soluble, MW >2000). The effect of pH (3.5, 4.5 and 5.5), a_w (0.9, 0.925 and 0.95) and sulfite on the Acy fractions was studied. oAcy was affected by a high pH, but the pAcy fraction showed higher hue angle values at high pH (5.5) than the oAcy at pH 3.5. Both oAcy and pAcy were bleached by sulfite (decrease of hue angle), although the bleaching effect did not occur immediately with the pAcy fraction. A higher a_w decreased the hue angle values for the oAcy fraction, while the pAcy fraction was not affected by a_w , between 0.90 to 0.95. The net change in color values indicate that both oAcy and pAcy change continuously in color with time.

23D-37

CONCENTRATION AND SPRAY DRYING OF PUPLE SWEET POTATO PIGMENT FOR USE AS FOOD COLORANTS

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Studies on concentration and spray drying of purple sweet potato (PSP) pigment were performed to provide the utilization of PSP as a new source of natural food colorant. Anthocyanin pigment from purple sweet potato were extracted, concentrated and dried into fine powders which could easily be used for coloring a wide variety of food products.

Crude pigment solution of PSP was concentrated by membrane filtration method using DDS Lab-unit, Type 20(Denmark). PSP pigment solution was successfully separated into clean solvent and concentrated pigment solution after passing through the membranes. Various bulking agents were added to the concentrated pigment solution then spray dried to make a pigment powder. Crude pigment solution was spray dried using SD-05 Spray drier(England). The effects on moisture, bulk density, and degradation of anthocyanin pigments were noted, and powder collections were made at the following outlet air temperatures(90°C, 100°C, 110°C and 120°C). The tested bulking agents was measured by apparent color change of powdered pigment, crude pigment content, degradation index, hygroscopicity, and Hunter L, a and b-value.

During the concentration, flux was decreased continuously as the concentration time passed and the pigment content was increased. Color change expressed as DI(Degradation Index) was not significant by the concentration of membrane filtration. Stability of anthocyanin pigments occurred when the outlet air temperature was below 90°C. Among the tested bulking agents, maltodextrin and gum arabic were found to be most effective in keeping the color quality.

23D-38

SUPERCRITICAL CO₂ EXTRACTION OF PAPRIKA CAROTENOIDS PRODUCES ENRICHED AND CONCENTRATED OLEORESINS.

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Paprika oleoresin extraction was performed using supercritical carbon dioxide (SCF-CO₂). Extraction conditions varied with different pressures (2000 to 7000 psi).