all the causes. After thermal treatment, the amount of Si migration from all the films was higher in retort compared to that of MK. The Si migration at the end of one month storage was comparable for the two processes. This work indicates an added advantage of nanocomposite films over coated films at barrier layers and emphasizes the need for migration of metals into foods after thermal processing.

152-26
Odor quality analysis of colored cap liners used for beverage
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The quality of beverages can be influenced by contaminants that could leak from the container or its components. Plastic containers, closures and liners are known to have caused off-odors in beverages. The potential for contamination caused by plastic components coming in contact with the liquid in the bottle is greater when materials are used to add color. This study describes the analysis of uncolored cap liners assessed as "normal" by sensory evaluation and 2 other types of colored cap liners obtained with the same manufacturing process but with 2 different inks (A, B).

An electronic nose was employed to measure the odor profile of colored and uncolored plastic liners to determine if any could be a potential source of contamination. The e-nose system Heracles features a library of chemical compounds and associated odor characters to assist in the further characterization of the off-odor it could create when present. The system also features multiple statistical models for results interpretation, in this case the widely used SQUF chart to compare the overall odor profiles of specimens to a model that describes the acceptable character as a statistical band. Upon examining samples, it was evident some compounds found in the colored plastic liners outside the acceptable odor quality band could be labeled as suspects of potential undue influencors of odors in the beverage. Based on this model, cap liners A were found to be of unacceptable quality whereas cap liners B had a "normal" odor character.

This study demonstrated a powerful tool to rapidly assess the character of plastic liners and minimize the risk of contamination due to the presence of unintended components in the product. In addition it could be used to qualify suppliers and packaging components and select those that are less prone to give up any contaminants while better protecting the product.

152-28
Optimization of conditions for the preparation of biodegradable microcapsule containing flavonoids
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Controlled release technology has taken on greater importance in food and pharmaceutical industries and bio-degradable microencapsulation has been considered as a favorable method, providing from anticemic decomposition by gastric digestion and delivering nutrients to selective target. The aims of this work were to optimize conditions for the preparation of bio-degradable microcapsule containing flavonoids from sub-critical water extraction and investigate its release properties under the conditions of an in-vivo digestion model. For the production of double-layer microcapsule of flavonoids, highly stable emulsion (water/oil/water type) was formed and subsequently, the microencapsulate suspension was prepared by spray-chilling into a dispersion fluid. The flowability of microcapsule as content of emulsifier (50-250 µmol), pH of water material to wall material (Cw) (pH 6.1-0.9, X), and temperature of dispersion fluid (5-25°C) were optimized by response surface methodology. A polynomial regression model equation was as follow: yield of microencapsulation (YM %) = 98.60 + 6.89 X - 2.26 X2 + 1.64 X3.

The results suggest that incorporation of hydrophobic agents. Application of film forming solution over food suspension was used as hydrophobic agent. Amylopectin chain-length distribution was studied for designing optimum film forming solution conditions. Films were obtained by casting and water vapor permeability (WVP), opacity, thickness, and solubility were determined.

152-31
Prediction model of headspace CO₂ concentration inside perishable food package as a supplementary tool to control microbial shelf life
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Shelf life of perishable foods is often limited by microbial spoilage. Growth kinetics of specific spoilage organisms are used for determining their shelf life. Physical and chemical indices correlating with microbial growth have also been searched for monitoring the shelf life on-line. Among those indices, carbon dioxide gas, a major by-product of microbial growth has been reported to parallel the microbial spoilage and controlling the shelf life of foods. A new e-nose system Heracles features a library of chemical compounds and associated odor characters to assist in the further characterization of the off-odor it could create when present. The system also features multiple statistical models for results interpretation, in this case the widely used SQUF chart to compare the overall odor profiles of specimens to a model that describes the acceptable character as a statistical band. Upon examining samples, it was evident some compounds found in the colored plastic liners outside the acceptable odor quality band could be labeled as suspects of potential undue influencors of odors in the beverage. Based on this model, cap liners A were found to be of unacceptable quality whereas cap liners B had a "normal" odor character.

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152-32
Biodegradable composite films based on -carrageenan/locust bean gum blends and clays: Physical and antimicrobial properties
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Biopolymer films offer a variety of advantages compared to synthetic films: biodegradability, use of renewable sources and potential biodegradability. Improvements in the functional properties of these films have been made by reinforcement of the polymer matrix with layered clays. In this study, film forming solutions were prepared by adding x-carrageenan and locust bean gum into the w-x-carrageenan/LBG solution (40/60 wt%), with 0.3% of glycerol. Barrier properties (water vapor permeability, WVP, CO₂ and O₂, permeability) of the films were determined.

All starches were capable of forming thin (average 41.7 µm) continuous films, WVP ranging 0.4-0.7 g m⁻² d⁻¹ kPa⁻¹. Chemical modifications and their interactions with the hydrophobic agent affected barrier properties, due to bonding across polymer bottle layers. In relation to hydrophobic agents, lowest WVP was seen for beeswax, while oil negatively affected films opacity, and solubility. According to length distribution, film formation mechanisms appear to be related to an amylopectin stabilized by short chains interactions. From flow curves, edible films may be formed at amylopectin concentrations ranging 3.5-4.5 % (w/w), except for x-carrageenan. The results suggest that incorporation of films into bacterial outgrowth may lead to disruption of interactions among amylopectin chains which can be used to modulate appearance and rheological film properties, and may contribute to the mildness of tailor made coatings.
CHI (2%w/v in 1%v/v acetic acid), MO viscosity (34 mPa.s), and four emulsifier types (two oil- and two water-soluble; 1%w/v of MO/CH) were used to prepare MO/CH (25:75) emulsions. All coated eggs (10 replicates per treatment) were evaluated weekly at 25°C and every 5 weeks at 4°C for weight loss, Haugh unit, grade, yolk index, and albumen pH. Data were statistically analyzed (95% confidence level).

For all eggs, Haugh unit and yolk index decreased whereas weight loss increased as storage time increased. Regardless of emulsifier types, all MO/CH emulsion coatings minimized weight loss (<1.5%) and preserved albumen and yolk quality of eggs (with the final Biggs grade >82) for at least 3 weeks longer than those observed for noncoated eggs at 25°C. At 4°C all coated eggs changed from AA to A-grade after 5 weeks and maintained this grade up to 10 weeks. Although refrigeration alone could maintain the B-grade for noncoated eggs for up to 20 weeks, coating was necessary to keep weight loss below 2% and yolk cell membrane rupture to a minimum.

This study demonstrated that, regardless of emulsifier types, MO/CH emulsion coatings could preserve internal quality, prolong shelf-life, and minimize weight loss (<2%) of eggs. Furthermore, MO/CH emulsions required much less drying time than MO alone when applied on eggshell surface.