Environmentally Benign Paper Coating For Food Packaging

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Abstract:

During the past two decades, the packaging industry has evolved from conventional methods of packing to new biodegradable materials. We should keep in mind that the packaged food is not always good & can cause contamination of food which can be hazardous to health. Therefore, health risks of materials and chemicals used in food packaging need to be controlled carefully.

Introduction:

From containers,leaves provided by nature to the use of complex materials & processes food packaging has changed a lot due to shifting lifestyles of people, discoveries,inventions,awareness and need of people & market competition.Nowadays,the major concerns while packing food is that the packing should be ecofriendly and the food should remain safe and hygienic.Paper and paperboard based material are one of the earliest and largest used food packaging material.[1]Various toxic chemicals like printing inks, phthalates,surfactants,bleaching agents and hydrocarbons are addedto improve the functional properties of paper during its production which may migrate into the food items causing serious health hazards.[2]The use of plastic in food industry had a negative impact on environment and plastic waste disposal problem associated with it.[3] Aluminium foil being durable and cheap has also been used to wrap food, cook food,bake & roast food. Wrapping of warm food in aluminium foil can reduce the growth of brain cells and can be harmful to people with bone diseases as some of the foil gets leached into the food we wrap. We should also never pack dishes made up of vinegar, tomato in aluminium foil as the acid in the food can interact with aluminium to erode the foil which can aggravate leaching process thus allowing bacteria & moisture into the food.Thus, finding suitable biodegradable alternatives in the near future is a priority.[4]Nowadays researchers have

developed a special coating on paper by using natural proteins and waxes with bio-based additives to improve the shelf life of food.

Experimental :

A.FORMULATION OF ANIOINIC PROTEIN BINDER (17%):

Demineralized Water(DM water) - 763.30gm

Casein -169.00gm

Diethanolamine (DEA) 50% -39.400gm

CMK (50%)-13.400gm

PMC (para meta cresol)-8.400gm

Heat demineralized water to 65℃ and add casein (natural milk protein) with stirring. Stir the solution for 2 hours. Add DEA &then add CMK & PMC preservatives. Stir the solution for 2 hours and cool the solution to 45℃.

B.FORMULATION OF ANIONIC WAX EMULSION (12%):

Beeswax – 5kg

Diethanolamine (DEA)-791gm

Demineralized water -791gm

Oleic Acid -2.863 gm

AAO(Ethylene oxide condensate 9.5 mole)-6.500 gm

Demineralized water -50kg

PCMC(para chloro meta cresol) -600gm

Demineralized water -800 gm

Make a solution of PCMC in DM water (Solution1). Make a solution of DEA in DM water (Solution 2).Make another solution of AAO(used as an emulsifier or surfactant) in DM water(Solution 3).Heat thebeeswax to 85℃ to melt and add solution 2.Now cool this solution to 45℃a and add solution 1&3 one by one slowly with stirring.

Mix A &B.The viscosity of the solution after mixing should be less than 1000 Cps. If required hot water can be added for dilution.The pH of the solution should be kept in between 7-9.

Result &Discussion :

The protein binders are excellent for adhesion and serve as an oxygen barrier. The waxes act as water vapour barrier and keeps the food fresh and does not allow the food to dry quickly. The addition of active compounds inhibits the growth of micro-organisms and oxidation of lipids. These coatings can be applied manually using foam, brush and spray guns and can be done mechanically using auto sprays and rollercoaters.These coated papers can be used as an alternative to all kinds of food including fruits, vegetables, meat, fish, cheese and confectionery items.

Conclusion:

These proteinbasedcoatings can be used as edible coatings and can be prepared by simply mixing, heating & stirring.These natural wax protein based impregnated paper is an excellent suitable alternative to packaging applications in terms of obtaining cleaner, sustainable and biodegradable food packaging material. Efforts by industry, government and consumers will promote continued improvement with regard to characteristic of product keeping in mind the environmental and waste management issues.

References:

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