Research progress in glycerin fatty acid ester emulsifier

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Abstract—Emulsifier is a stabilizing agent of the emulsion and a kind of surfactant. Food industry commonly uses emulsifier glycerol fatty acid esters of monoglycerides. This paper introduces the characteristics of three glycerin fatty acid ester emulsifier function, synthesis methods and application situation. Moreover, based on these details, some suggestions of the future development are indicated.

Index Terms—glycerin fatty acid ester; stabilizer; emulsifier; surfactant

1 INTRODUCTION

Emulsifier rely on emulsification mechanism [1] can induce two immiscible liquid to form a stable emulsion of substances , food emulsifier is one of the most important food additive , since the 1980s , the people of emulsifier t0he multifunction , high- purity , low stimulation , high - efficiency higher demands to develop more new emulsifier .Currently, the most common glycerol fatty acid ester emulsifiers monoglycerides, it is the world's largest amount of emulsifier varieties occupy 60% of the market in the emulsifier molecular distillation technology , product monoglyceride content from 40% to 95% [2] .Scholars emulsifier mostly concentrated in the mixed emulsifiers and other additives , a complex theoretical studies [3] , and the security and other aspects . In this paper, the chemical properties of several glycerol fatty acid ester emulsifiers , synthetic methods and applications in the field of food processing status quo and put forward recommendations for its future development direction , in order to provide a reference for related research .

2 GLYCERIN FATTY ACID ESTER EMULSIFIER RESEARCH

The combination of different fatty acids with glycerol, glycerol fatty acid esters can be divided into monoglycerides, diacylglycerol and triglycerides.The monoglycerides, diacylglycerol and its mixture of single and double glyceride is the most widely used in the food , history oldest emulsifier .

2.1 MONOGLYCERIDES

Monostearyl (alkyl) acid glycerol esters of the formula $C_{42}H_{84}O_8$, the Vulgar list Mannuronicate , also known as glycerol monostearate , and is a non-ionic surface active agent .Monoglyceride molecules both hydroxyl hydrophilic group there are long-chain alkyl lipophilic groups , wetting, emulsifying , foaming and other features , our food additives health standards (GB2760-1996) monoglyceride as a safe food additive .

Synthesis of monoglycerides using traditional transesterification method , the synthesis of fatty acid and propylene oxide and direct esterification method .Li Hong et al [4] , a soybean oil and glycerol as raw materials under the conditions of base-catalyzed phase transfer agent was added tetrabutylammonium bromide , as a method to improve the miscibility of the oil with glycerol , results show that the quality of the monoglycerides Score can reach 62.6% , the production of the product quality and esterification considerable , but the experiment glycerol have self-polymerization reaction .In recent years scholars more enzymatic studies , South China University of Technology Zhuqi Si et al [5] in the reaction of tert-butyl alcohol in the system with enzyme Novozym435 catalytic safflower seed oil and glycerin glycerol solution , monoglycerides content of 63% .Mehdi Ghandi [6] studied experimental conditions Enzymatic synthesis of monoglycerides in polar solvents , and the results show that the the monoglycerides best yield can reach 90% , but the reaction by-products in the water influence the reaction rate and enzyme activity .Overall , the enzyme-catalyzed synthesis with high selectivity , mild reaction conditions , equipment not ask for much higher prices , but the enzyme , and other byproducts of their reactions affect larger [7-8], research also just stay at the laboratory stage.The monoglycerides there are two configurations , namely : α -MG and β -MG .Other recent research scholar Wang Ming nano SiOx / single monoglyceride Chitosan coating modified study [9] , Abid Riaz Ahmed drug delivery systems , drug release and sterilization situ cubic phase forming monoglyceride [10], as well as scholars Sara Da Pieve monoglycerides viscosity material response, in order to improve its dispersion [11] .

Our country monoglycerides and mostly limited to experience mixed quality of their products is not high, should strengthen the related theoretical studies, to avoid complex with blindness.

2.2DIGLYCERIDE

Diglyceride referred diacylglycerol, double Mannuronicate, abbreviated as DG, DAG, is a minor component of the natural plant oils and fat metabolism of endogenous intermediates, recognized as safe (GRAS) food ingredients , safety , nutrition, processing the adaptive human compatibility many advantages , with a wide range of applications . The end of 2000, DG FDA included in the safety of the food industry generally accepted. In 2003, DG internationally popular and became the best-selling healthy fats. The United States and Japan are DG has a high degree of attention [12]. December 22, 2009, the Ministry of Health approved under the Food Safety Law of the

People's Republic of China" and the new resources of food management approach diacylglycerol oil (the main component of diacylglycerol) as a new source of food [13].
Mechanized on the DG's industrial production is not only to the pursuit of the high purity of the DG , and should meet industrial long-term continuous operation, and to achieve maximum enzyme use and DG yield.

2.3TRIGLYCEROL FATTY ACID ESTER

Triglycerol fatty acid ester (TG) referred to triglycerides, also known as neutral fats, a molecular formula of C39H74O6, also known as neutral fats, glycerol formed by 3 molecules of fatty acid and one molecule, is the main source of energy in the body, is stored up heat source. Triglycerides are the main component of natural oils having certain health care function.

The presence of traditional chemical synthesis of glyceride reaction temperature, severe corrosion of the equipment, product color and poor shortcomings enzymatic method has mild reaction conditions, high product selectivity and advantages of environmentally friendly . Chen Xiaoe, and Wang Weifei etc. [14-15], respectively, by the enzyme-catalyzed ester exchange reaction of the triglycerides .

3CONCLUSION

In summary , the emulsifier has emulsifying , wetting, solubilization, gluten , wetting , dispersing , suspension , viscosity adjustment, controlled crystallization, defoaming or blistering starch anti-aging , anti-aging , antimicrobial preservation, nutritional supplements , health care, improve memory , improve blood circulation , vascular scavenger prevention of cardiovascular and cerebrovascular diseases , brain puzzle , the prevention of Alzheimer's disease , the patron saint of the liver , diabetes, nutrition and reduce the surface tension of many features , so widely used in the food area .However , the type of emulsifier also need to improve aspects , for the direction of future research should focus on its security add amount fats crystallized improve , the combined use of effects , the best application of the effect of the special features of functional emulsifier , emulsifier products , improve food system foamability and shape retention .
Food to security first, additives must be safe, harmless to the human body , and therefore has a natural , non-toxic (poison damage small) , green , environmental protection , health care and other multifunctional emulsifiers will become the mainstream. Emulsifier to be more perfect, also increase illegal Abuse, excess additives punishment .

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