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Research Article

PREPARATION AND UTILIZATION OF EMULSIFIERS IN SWEET BISCUITS

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Abstract

Emulsifiers have been prepared by blending soymilk , skim milk powder and baby food with combination of lecithin and glycerol mono-stearate along with sorbitol, sodium benzoate and water. Analysis of emulsifiers have been carried out for pH, moisture content, total solids content, acetone insoluble content, acid value, viscosity and percent stability. Samples of biscuits were formulated varying the amount of emulsifier with constant amounts of whole wheat flour, hydrogenated fat, sugar, sodium bicarbonate, ammonium bicarbonate, skim milk powder and strawberry. The biscuits were analyzed for carbohydrate content, protein content, fat content, ash content and moisture content along with standard biscuits. Sensory evaluation of biscuits was carried out by 9 point Hedonic scale score-card method taking into account attributes such as texture, taste, flavor and overall quality. It was observed that good quality biscuits could be prepared from the prepared emulsifiers. It is suggested that the emulsifiers prepared may be useful for other bakery products such as cake, cookies, bread etc.,

Keywords: Emulsifiers,biscuits, proximate composition, sensory evaluation.

Introduction

Emulsifiers have traditionally been described as ingredients that assist in formation and stabilization of emulsions An emulsifier is a type of surfactant usually used to maintain emulsion (the mixtures of two immiscible fluids consisting of water and oil phases) in good dispersion. Chemically, the emulsifiers have hydrophobic and hydrophilic groups. Emulsions are thermodynamically unstable and revert (Hasenhuett and Hartel, 2008) to two separate phases by fusion coalescence of droplet unless a third component, the emulsifier is added.

Glycerol monostearate(GMS) (Robbins and Nicholson., 1987) ,is a colorless, odorless, and sweet-tasting flaky hygroscopic powder. Chemically, it is a glycerol ester of stearic acid. Uses of GMS are in Cosmetics; Textile Auxilliaries ;Pharmacuticals etc. as an emulsifier, stabilizer, thickner and emollient.

Lecithin discovered in 1850, isolated from egg yolks (Ke-Shun Liu, 1997) is a naturally occurring fatty substance found in several foods including soybeans, whole grains and egg yolks. It is often used as an emulsification agent in processed foods. In sweet goods, the use of *2%* of lecithin can help to produce free-flowing batters, a more uniform colour and grain, smoother textures, better keeping quality and greater flavor stability. Soyamilk is a beverage made from soybeans (LaBell, 1997) and is a stable emulsion of oil, water, and protein. It is produced by soaking dry soybeans and grinding them with water. Skim milk powder, produced by removing water from non-fat milk (Hunziker, 1920), is free from preservatives, chemical additives, foreign matter and other impurities. It is a highly nutritious, versatile, and multi-functional food ingredient.The nutritive value of skim milk powder makes it an ideal ingredient for a variety of applications (Blyth, 1896) including nutrition bars and beverages, infant formulas, bakery products, and animal feed. This ingredient is ideal in baked goods and caramel confections due to its desirable browning characteristics. Bakery industry in India is the largest of the food industries with an annual turnover of about

Rs.3000 crores. India is the second largest producer of biscuits after USA. Bread and Biscuits form the major baked foods accountingfor over 80% of total bakery products produced in the country. Bakery products still remain the cheapest of the processed ready to eat products in the country. Biscuits represent a fast growing segment of food because of consumer demands for convenient and nutritious food products. The consumers demand has increased for the quality food products with taste, safety, convenience and nutrition

Biscuits are a popular foodstuff consumed by a wide range of population due to their varied taste, long shelf life and relatively low cost. Because of competition in the market and increased demand for healthy, natural and functional products, attempts are being made to improve the nutritive value of biscuits and functionality by modifying their nutritive composition All biscuits are nutritionals, contributing valuable quantities of iron, calcium, protein, calorie, fibre and some of the B-vitamins to our diet and daily food requirement.

Biscuit and other baked food products are important items that are sold in ready to serve form. Biscuits belong to the flour confectionery. It is flat crisp and may be sweetened or unsweetened according to preference. Biscuit can be made from hard and short or soft dough. It is produced by mixing various ingredients like flour, fat, sweeteners and water to form dough.

Flour, sugar, fat, water and salt are the main components in biscuit formulation Mechanical properties of biscuits are largely dependent on the fat component of the formulation responsible for tenderness, keeping quality, grain and texture. Leavening agents can be incorporated by beating eggs, sifting flour, beating batters or folding and rolling doughs. Eggs also contribute to the structure of a baked product Liquids such as milk and water, fruit juices, and potato water serve as toughеners to enhance the development of gluten and/or facilitate the gelatiniztion of starch, thus, contributing to structure.

Some work on production and evaluation of biscuits has been reported (Nwosu , 2013, Srivastava et al, 2012., Okpala and Okoli, 2011,Abayomi et al, 2013 Okpala and Eric, 2011).

Materials and Methods

Procurement of raw material:-Major ingredients such as wheat flour, sugar, baking powder, skim milk powder, soymilk, baby Food, lecithin, sorbitol, alcohol sodium benzoate, distilled water Glycerol mono stearate (GMS),)of standard specifications were purchased from local market of Nagpur and Nanded.

Methods

Formulation of emulsifiers:-

Five samples of emulsifiers namely, A, B, C, D and E, were formulated (Table 1)

Table 1. Formulation of emulsifiers

Ingredients	Samples				
	A	B	C	D	E
Skim milk powder	25	25	10	--	10
Soymilk	--	-	10	05	20
Baby food	5	5	10	15	
GMS	10	05	10	10	
Lecithin	15	10	10	20	20
Sorbitol(ml)	10	10	10	20	20
Alcohol(ml)	10	05	10	10	10
Sodium benzoate(ml)	5	10	10	05	10
Distilled Water(ml)	20	30	20	15	10

Analysis of Emulsifiers:- All the samples of Emulsifiers were analyzed.

(Table 2Aand 2B) for characteristics such as pH, moisture content, total solid content, acetone insoluble content, viscocity, acid value and percent stability by standard methods (Manual of Methods of Analysis of Foods, Directorate General of Health Services, Ministry of Hwalth and Family Welfare, Govt. of India, New Delhi,2005).

Table 2A: Analysis of Emulsifiers

Sample	pH	Moisture Content (%)	Total Solid Content (%)	Acetone Insoluble Content (%)	Viscocity (seconds) (10%) Concn.	Acid value
A	7-8	7.87	92.12	0.10	15	5.2
B	7-8	7.72	92.37	0.41	11	6.8
C	7-8	6.87	93.13	0.34	14	5.1
D	7-8	9.30	90.69	0.31	16	5.6
E	7-8	5.82	94.17	0.43	18	7.0

Table 2B : Analysis of Emulsifiers for stability studies

Sample	Volume of emulsion (ml)			
	At 0 hr.	After 1 hr	After 24 hrs.	% stability
A	49	32	29	60
B	49	40	32	80
C	49	43	28	59
D	48	48	32	66
E	48	48	42	87

Procedure for preparation of sweet biscuits

The formulation of biscuits (Srivastava et al, 2012) was carried out by taking whole wheat flour, ammonium bicarbonate, hydrogenated fat ,sugar, sodium bicarbonate, skim milk powder, strawberry, emulsifier samples (0.1% of fat), with Soymilk, Baby food and GMS. The method used for the preparation of dough was the creaming method where fat and sugar were creamed together using the Kenwood mixer at medium speed for two min. After creaming flour, baking powder and milk were added and mixed until dough was well mixed. The dough was manually kneaded to ensure uniformity. The dough was then transferred to a clean tray and gently rolled using a roller. The dough sheath was cut into round shapes using a cutter. Shaped dough pieces were placed into a greased pan and baked in the oven at 200 ^{0} C for 15min. until pale and golden The baked biscuits were placed on a cooling rack for 30 min. to cool before packaging.

The procedure can be represented as follows:-

Fig : Process flow chart of Biscuit preparation

Analysis of Biscuits

Proximate Analysis*:-* Analyses were performed in triplicate for each batch of biscuits . The proximate analysis of the samples was carried out for moisture content, ash content, fat content, protein content according to AOAC and AACC methods and carbohydrate content was determined by the method of STAS. The conversion factor for total nitrogen to protein of 5.75 was used.

Table 3: Analysis of Biscuits

Sample	Moisture content (%)	Fat content (%)	Ash Content (%)	Protein content (%)	Carbohydrate content (%)
A	5.9	18.9	1.8	7.2	66.2
B	5.8	21.4	1.0	7.6	64.2
C	6.2	21.4	2.0	9.0	61.4
D	7.1	21.7	1.2	6.1	63.9
E	6.2	25.1	0.5	7.0	61.2
Standard	5.3	21.3	1.5	6.2	65.6

Sensory Evaluation

Sensory evaluation of biscuit samples was conducted using a 20 member untrained panelists drawn from the general public and . from College Of Food Technology, Naigaon (BZ), Nanded The test was conducted while the samples were still fresh. The panelists were required to observe the sample, taste and score. Then rinse their mouth with water before tasting another sample/product. The products were analyzed based on the following parameters of appearance, texture, crispness, flavor and overall quality using a nine-point hedonic scale of 9 = Excellent to I = poor as described by Ihekoronye and Ngoddy (1985).

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Table 4 : Sensory evaluation of sweet biscuits

Attributes	A	B	C	D	E	Standard biscuit
Color	7.2	7.2	7.4	7.4	7.4	8.7
Appearance	6.7	7.0	6.8	8.0	6.4	8.1
Texture	6.5	7.8	7.3	8.1	7.9	8.1
Taste	6.9	7.5	7.5	7.8	7.9	8.1
Flavor	7.2	6.7	6.7	7.7	6.2	8.8
Overall quality	7.1	7.0	7.4	.8.0	7.1	8.4

Scale: 8-9- Excellent, 6-7 -very good 4 – 5 - Good 2 - 3 -Fair 0 – 1- poor

Discussion

Proximate Analysis

Analysis of Emulsifiers for pH, moisture content, total solid content ,acetone insoluble content, viscocity, acid value and stability studies are recorded in Table 2A and 2B.The pH ranged from 7 -8. The moisture content showed a content of 5-10 percent. The total solid content and the acetone insoluble content ranged from 90-95 and 0.10 -0.43 percent respectively. The viscocity recorded a range of 11-18 seconds and the acid value was found to be in between 5-7.The stability studies showed a stability up to 87 Percent

Analysis of biscuits is shown in Table 3.

The moisture content of the biscuit ranged from 5.8 to 7.1%. Moisture content of the biscuits was found to be optimum and comparable with standard biscuit sample.

The fat is energy source of for biscuits (Olaoye et al, 2007]. It contributes to the appearance of biscuits, improves the flavor and gives a good feeling in mouth. Fat plays a significant role in the shelf life of a food products and higher fat content could be undesirable in baked food product because fat can promote rancidity in food, leading to development of unpleasant and odorous compounds.

The fat content of biscuit ranged from 18.9 to25.1%. Significant differences exist on the fat content of various biscuits compared with standard biscuit sample (21.3%).

Ash is a non-organic compound containing mineral content of food and nutritionally it aids in the metabolism of the other organic compound such as fat and carbohydrate. Ash content of the biscuits ranges from 0.5 to 2%. Significant differences exist on the ash content of the biscuits.

Carbohydrates are found in almost all living things and play a critical role in the proper functioning of the immune system, fertilization, blood clotting, and human development. Carbohydrates are an ideal source of energy for the body. This is because they can be converted more readily into glucose, the form of sugar that's transported and used by the body, than proteins or fats can. Carbohydrate content varied from 61.2 to 66.2% compared with 65.6 % of standard samples. The protein content varied from 6.1 to 9.0 % as against 6.2 % of the standard.

The sensory evaluation (Table 4) was carried out as per 9 point hedonic scale include: texture, colour, taste, odor and aroma. The values are the means of ten readings. The product were evaluated for it is quality attributes by giving marks according to the hedonic scale All the properties of biscuit products were compared with that of standard biscuits and were found to have comparable properties.

From the result; the appearance and the texture of biscuit samples was fairly good. Results from this work have shown that the biscuits made from EMULSIFIER D had close proximity and acceptance to standard biscuits followed by EMULSIFIER E getting very good to excellent grade.

It is also concluded that this emulsifier may be good for other bakery products such as cake, cookies, bread etc. this publication is a addition to some papers published on this topic (Olaoye et al, 2007, Onweluzo and Iwezu,1998,.Tsen, 1976,.Gandhi et al, 2001, Simona Man et al, 2014, Claughton and Pearce , 1989,and Vasantharuba Seevaratnam et al, 2012).

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