NOSB NATIONAL LIST
FILE CHECKLIST

PROCESSING

MATERIAL NAME: **#11 Glycerin**

✓ **NOSB Database Form**

✓ **References**

____ **MSDS (or equivalent)**

____ **FASP (FDA)**

✓ **TAP Reviews from:** **Joe Montecalvo, Rich Theuer**

NOSB/NATIONAL LIST
COMMENT FORM
PROCESSING

Material Name: #11 Glycerin

Please use this page to write down comments, questions, and your anticipated vote(s).

COMMENTS/QUESTIONS:

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1. In my opinion, this material is:
_____ Synthetic _____ Non-synthetic.

2. Should this material be allowed in an "organic food" (95% or higher organic ingredients)? _____ Yes _____ No
(IF NO, PROCEED TO QUESTION 3.)

3. Should this substance be allowed in a "food made with organic ingredients" (50% or higher organic ingredients)? _____ Yes _____ No

TAP REVIEWER COMMENT FORM for USDA/NOSB

Use this page or an equivalent to write down comments and summarize your evaluation regarding the data presented in the file of this potential National List material. Complete both sides of page. Attach additional sheets if you wish.

This file is due back to us by: Sept. 5, 1995

Name of Material: Glycerin (GLYCEROL)

Reviewer Name: R THEUER

Is this substance Synthetic or non-synthetic? Explain (if appropriate) SYNTHETIC

If synthetic, how is the material made? (please answer here if our database form is blank)

This material should be added to the National List as:

✓ Synthetic Allowed ____ Prohibited Natural

or, ____ Non-synthetic (Allowed as an ingredient in organic food)

____ Non-synthetic (Allowed as a processing aid for organic food)

or, ____ this material should not be on the National List

Are there any use restrictions or limitations that should be placed on this material on the National List?

SHOULD BE FROM FAT HYDROLYSIS TO BE COMPATIBLE WITH SUSTAINABLE AGRICULTURE

Please comment on the accuracy of the information in the file:

EXCELLENT

Any additional comments? (attachments welcomed)

GLYCERINE (GLYCEROL) IS/SHOULD BE A PREFERRED SOLVENT OVER PROPYLENE GLYCOL FOR FLAVORS IN ORGANIC FOOD.

Do you have a commercial interest in this material? ____ Yes; ✓ No

Signature [signature] **Date** 8/28/95

Please address the 7 criteria in the Organic Foods Production Act:
(comment in those areas you feel are applicable)

(1) the potential of such substances for detrimental chemical interactions with other materials used in organic farming systems;

NONE

(2) the toxicity and mode of action of the substance and of its breakdown products or any contaminants, and their persistence and areas of concentration in the environment;

NONE

(3) the probability of environmental contamination during manufacture, use, misuse or disposal of such substance;

LOW

(4) the effect of the substance on human health;

A NUTRIENT (CARBOHYDRATE) AND METABOLITE IN EVERY CELL OF THE BODY

(5) the effects of the substance on biological and chemical interactions in the agroecosystem, including the physiological effects of the substance on soil organisms (including the salt index and solubility of the soil), crops and livestock;

NONE

(6) the alternatives to using the substance in terms of practices or other available materials; and

ALTERNATIVES CAN BE WORSE - PROPYLENE GLYCOL.

(7) its compatibility with a system of sustainable agriculture.

FROM FAT HYDROLYSIS - EXCELLENT. THE OTHER PRODUCT IS FATTY ACIDS, WHICH HAVE THEIR SPECIFIC USES.

TAP REVIEWER COMMENT FORM for USDA/NOSB

Use this page or an equivalent to write down comments and summarize your evaluation regarding the data presented in the file of this potential National List material. Complete both sides of page. Attach additional sheets if you wish.

This file is due back to us by: Sept 5, 1995

Name of Material: Glycerin

Reviewer Name: DR JOE MONTECALVO

Is this substance Synthetic or non-synthetic? Explain (if appropriate)

Synthetic - Also called Glycerol or 1,2,3 Propanetriol

If synthetic, how is the material made? (please answer here if our database form is blank) - database is good! Historically, during WWI, quantities were produced by the "Protol" fermentation process from sugar and acetaldehyde and sodium sulfite. today, chiefly made from oils and fats as by product in the manufacture of soaps and fatty acids

This material should be added to the National List as:

✓ Synthetic Allowed ____ Prohibited Natural

or, ____ Non-synthetic (Allowed as an ingredient in organic food)

____ Non-synthetic (Allowed as a processing aid for organic food)

or, ____ this material should not be on the National List

Are there any use restrictions or limitations that should be placed on this material on the National List?

only for uses specified

Please comment on the accuracy of the information in the file: - O.K.

Any additional comments? (attachments welcomed)

Glycerin NEVER should come in contact with a strong oxidizing agent. An explosion may result. Note also used in the manufacture of nitroglycerin (i.e. dynamite)

Do you have a commercial interest in this material? ____ Yes; ✓ No

Signature [signature] **Date** 8/22/95

Please address the 7 criteria in the Organic Foods Production Act:
(comment in those areas you feel are applicable)

(1) **the potential of such substances for detrimental chemical interactions with other materials used in organic farming systems;**

It may - ie. contact with strong oxidizing compounds - ie. Potassium permanganate Potassium chlorate, Sodium chlorate

(2) **the toxicity and mode of action of the substance and of its breakdown products or any contaminants, and their persistence and areas of concentration in the environment;**

LD_{50} in rats (ml./Kg) > 20 orally = 20ml/Kg. of rat wt.
rats - IV = 4.4 ml/1 Kg. body wt.

(3) **the probability of environmental contamination during manufacture, use, misuse or disposal of such substance;**

can be broken down in the environment (ie. fermented) ∴ none.

(4) **the effect of the substance on human health;**

No human health studies done - data only available re - rats.

(5) **the effects of the substance on biological and chemical interactions in the agroecosystem, including the physiological effects of the substance on soil organisms (including the salt index and solubility of the soil), crops and livestock;**

None - See #1.

(6) **the alternatives to using the substance in terms of practices or other available materials; and** None; one of the most powerful humectants available

(7) **its compatibility with a system of sustainable agriculture.**

use only recomended for specific food products.

NOSB Materials Database

Identification

Common Name	**Glycerin**	**Chemical Name**	
Other Names	Glycerine, Glycerol, 1,2,3-Propanetriol		
Code #: CAS	56-81-5	**Code #: Other**	
N. L. Category	Synthetic Allowed	**MSDS**	○ yes ◉ no

Chemistry

Family	
Composition	$C_8H_8O_2$. Glycerine 99.7% and water.
Properties	Clear, colorless, syrupy liquid having a sweet taste. It is hygroscopic and its solutions are neutral. Miscible with water and alcohol. Insoluble in chloroform, ether and in volatile oils.
How Made	Hydrolysis of natural fats & oils (either animal or vegetable): heat, steam, and pressure "split" the glycerin from the oil. The glycerine is concentrated in multistage evaporators and refined. Purification is achieved through either an ion exchange process or a distillation system. It can be produced synthetically from propylene.

Use/Action

Type of Use	Processing
Specific Use(s)	Humectant, solvent for flavors and extracts, bodying agent. Also used in the manufacture of cellophane, cosmetics, and meat casings. One of the precursors of mono-glycerides.
Action	
Combinations	

Status

OFPA	
N. L. Restriction	
EPA, FDA, etc	FDA-GRAS
Directions	
Safety Guidelines	
State Differences	
Historical status	
Internationl status	

OFPA Criteria

2119(m)1: chemical interactions **Not Applicable**

2119(m)2: toxicity & persistence **Not Applicable**

2119(m)3: manufacture & disposal consequences

No reports of industrial poisoning in the manufacture or use of glycerol.

2119(m)4: effect on human health

It is easily digested with the same metabolism as the carbohydrates.

2119(m)5: agroecosystem biology **Not Applicable**

2119(m)6: alternatives to substance

synthetic glycerine from petrochemicals

2119(m)7: Is it compatible?

References

Jon L. Hetmann, Henkel Emery Co., 1994. Written communication.

USES OF GLYCERINE

THE unusual combination of properties of glycerine has resulted in its use in a great variety of products and processes. Some of these uses depend on its physical properties such as hygroscopicity, viscosity or high boiling point — while others depend on its chemical properties. In many cases it may be a combination of several of its properties, both physical and chemical, which make it applicable.

Another factor which makes glycerine widely useful is its non-toxicity. As a food it is easily digested; its metabolism places it with the carbohydrates, though it is present in combined form in all vegetable and animal fats. It is non-irritating to the skin and mucosa except in high concentration where it has a dehydrating effect.

Historically, glycerine was produced commercially as a by-product in the manufacture of soap. But for roughly the past 15 years, it has been produced synthetically from propylene and more recently by hydrogenolysis of carbohydrates as well as fermentation. Production from combined sources in 1963 totalled approximately 295 million pounds. Of this, more than one-half went into three major uses; alkyds, tobacco and cellophane. The remainder goes into literally thousands of products and processes.

FOODS

The solvent power of glycerine results in its use in many flavors and extracts, and such use frequently allows the elimination of part or all of the alcohol commonly used in such preparations. It has been used in vanilla flavors, and has been used in chocolate syrups to improve their body and smoothness. Flavor pastes and powders often contain glycerine. It is also a solvent for many food colors and the U.S.P. grade of glycerine, being completely non-toxic, is generally accepted by the Food and Drug Administration as a component of foods, except where specific food standards fail to list it as an optional ingredient.

Glycerine, as a by product of alcoholic fermentation is present in beer to the extent of 0.09 to 0.18 percent and in wine to the extent of about 10%. Also the addition of glycerine to distilled liquors improved their smoothness and body, and as such it has been suggested that a small amount of glycerine added to a cocktail would improve the flavor by making a smoother blend of the ingredients. With preparations of saponin and other foam-forming materials, glycerine has been used in heading liquids to produce foam on both carbonated and non-carbonated beverages.

The use of approximately 5% of glycerine in frozen eggs and frozen yolks prevents the formation of gummy lumps in the eggs, and cakes baked with glycerinated eggs have larger volume and better texture than cakes made with non-glycerinated eggs.

Glycerine enters into flavoring materials and curing salts and as a plasticizer in the many casings and coatings developed for the meat coating industry. It is used in both animal and artificial casings, the latter being composed essentially of regenerated cellulose. The glycerine increases the flexibility of the casings and their ease of handling and keeps them from drying out during shelf storage.

Jelly-like candies often use glycerine to prevent drying and graining, but it is also used in many other types of candies, particularly fudge, to maintain a soft texture and fine grain. Here the amount used is generally 9 to 10 percent of the weight of the sugar. In other candies the amount of glycerine may be from 5 to 15 percent of the weight of the sugar, depending on whether the candy should be firm or soft. In the same way it is used in cake icings. Here it acts to prevent the icing from graining but also from becoming hard and brittle, particularly in such things as wedding cakes where they are prepared ahead and must stand for some time before being cut.

Glycerine applied to dried fruits by dipping and spraying will reduce stickiness and inhibit surface crystallization of sugar. For the same reason, a small amount used in jams gives protection against crystallization. A recent development in this line is the preparation of citrus fruit peel for use in baking and other food preparation. In this process, the citrus peel is dehydrated by use of a high solid transfer medium made from dextrose, glycerine, corn syrup and starch. Here the transfer medium becomes the replacement agent, and results in a peel which is semi-translucent, has a natural peel color and retains the essential oils and "bite qualities" of the fresh form.

Glycerine, glycerine-salt and glycerine-invertsugar solutions have been found very satisfactory for direct contact quick freezing. The advantages of aqueous glycerine solutions for this type of freezing are: their suitable viscosities, good heat transfer ability, noncorrosive properties, in proper concentration, resistance to fermentation, their ability to retain natural color, and the fact that they have no objectionable odors or taste. They do not cause excessive rupture of the cells at cut surfaces and result in a natural looking product. Glycerine used for freezing fish has been tested and it has been found that freezing fish before rigor mortise sets in, glycerine at extremely low temperatures reduces the amount of ice formation and hence the tissue protein denaturation.

The addition of small amount of glycerine to peanut butter reduces oil separation and increases the stiffness of the butter. If added to the peanut butter after it is ground it has more effect and does not alter the taste. About 4% by weight of glycerine added to shredded coconut acts as a softener and humectant and keeps the coconut from drying out in the opened package. It is also used in cakes to preserve their moisture and retard staling. It gives an increased ratio of volume to weight when used in the proper amount. This will vary with the type of cake, but usually is in the neighborhood of ten percent of the weight of the sugar used.

An important but indirect use of glycerine in food processing is in the use of so called "mono-glycerides", which are emulsifiers and stabilizers for many products. They are the products of the reaction of glycerine with a wide variety of fats and fatty acids. The results are actually a mixture of mono-, di- and triglycerides, but they contain a high proportion of the monoglycerides and hence are called by that name. These monoglycerides impart surface activity, making the mixed ester both oil soluble and water dispersible. They are excellent emulsion stabilizers and hence are added to margarine to improve its stability and reduce spattering on heating; to shortenings to increase their plasticity; to dough mixture, to promote dispersion of the fat, help maintain moisture balance in the product and permit richer formulations with longer shelf life. In addition they are used in salad dressings, frozen desserts, candy and food coatings. One important use of these glycerides is as softening and anti-staling agents in the manufacture of white bread which is sliced and wrapped.

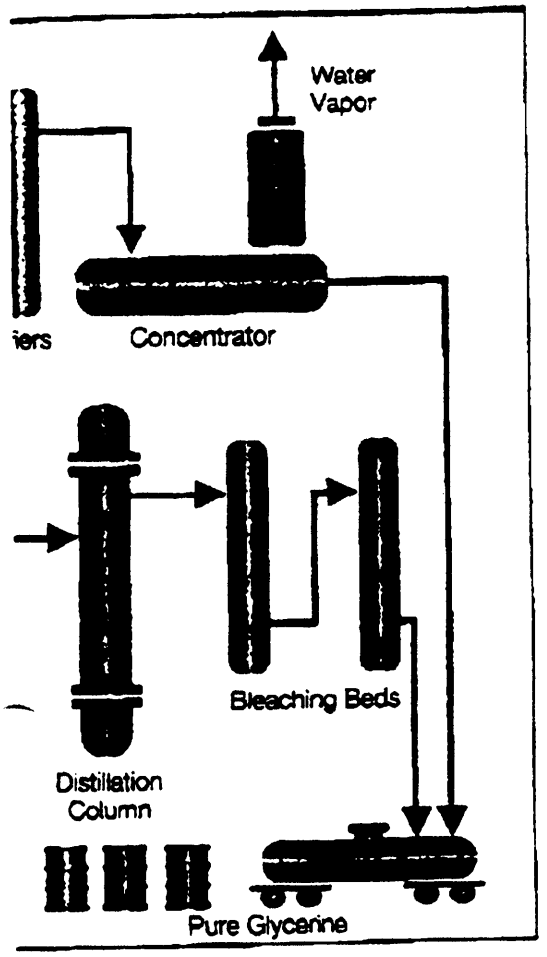
Another use of glycerine in the food field is in the manufacture of cork liners for bottle caps. Here the cork is treated with glycerine to maintain softness and pliability, thus preventing shrinkage of the cork, and insuring a tight seal. Whole corks are sometimes treated with glycerine by dipping the cork in the glycerine before inserting it in the wine bottle. The nontoxicity of glycerine as an ingredient of goods and beverages has been established through generations of safe use and clinical and scientific studies. It is recognized as safe by the U.S. Food and Drug Administration when it is of the synthetic product. Of course labeling laws as to ingredients must be followed.

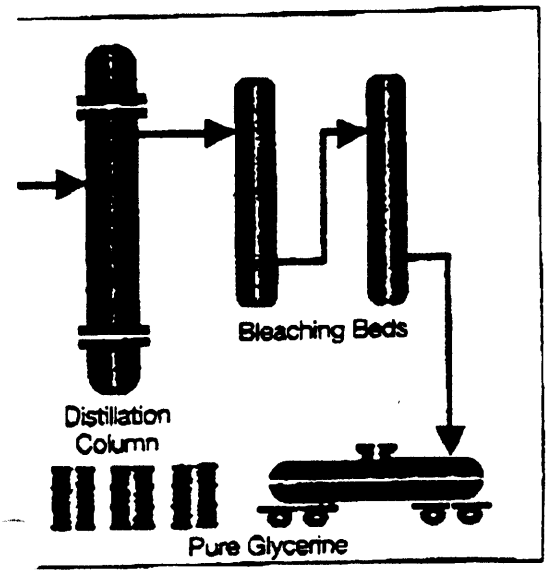
The polyglycerol esters are a more recent commercial development and range from di-glycerol to deca-glycerol esters. These are prepared from polyglycerols combined with fats and fatty acids. The esters which offer a wide range of hydrophylic and lipophilic emulsifiers are utilized by the body and broken down into glycerine and fatty acids. Besides use in foods they have applications as emulsifiers in pharmaceutical, cosmetic, and other industrial applications.

Henkel

Henkel Corporation
Emery Group

4900 Este Avenue, Cincinnati, Ohio 45232 Phone: 513/482-2100





Applications

Many commercial applications have taken advantage of the unique physical and chemical properties of glycerine. EMERY® glycerines, like all high purity glycerines, are used in a variety of industries.

In the production of alkyd resins, glycerine is employed as a reactive polyol in many formulations. Because of the polyfunctional nature of glycerine, polymer building reactions with difunctional organic acids occur readily. These glycerine based polymers are generally modified further by the addition of monobasic organic acids to achieve resins with either air cure or heat cure properties. The cosmetic industry has for many years used CP/USP glycerine in various creams and lotions to keep the skin soft and moist. In addition, glycerine is used in a variety of personal care products such as mouthwash, toothpaste, and shampoo where the glycerine serves as a solubilizer and viscosity modifier in the formulation. Glycerine is generally considered to be a flavor enhancer in mouthwash and toothpaste products in contrast to other polyol types which require masking of their particular taste characteristics.

The pharmaceutical industry uses glycerine extensively as a solvent and solubilizer in various drug vehicles for both internal and external uses.

One of the derivatives of glycerine, nitroglycerine, is used in treating *angina pectoris*. In this regard, it acts as a vasodilator to relieve pain in connection with coronary difficulties.

Glycerine is employed as a humectant in tobacco processing. Furthermore, in the food and beverage industry, glycerine is used as a solvent for food flavoring and coloring. Food grade fatty acid esters of glycerine are used extensively in food preparation requiring emulsification.

Glycerine is still used in the manufacture of explosive compounds and propellants for both military and industrial requirements.

Although the overall use of cellophane has declined, glycerine is used in the manufacture of this material and the use of glycerine in the manufacture of meat casings is a growing application.

Another important chemical use of glycerine is in the manufacture of polyether polyols, which in turn are used in the production of polyurethane resins and urethane foams.

Glycerine and glycerine derivatives continue to be used extensively in soaps and detergents, hair care products, chewing gum base, triacetin, lubricants, glass and ceramics and a variety of adhesives.

Shipping and Handling

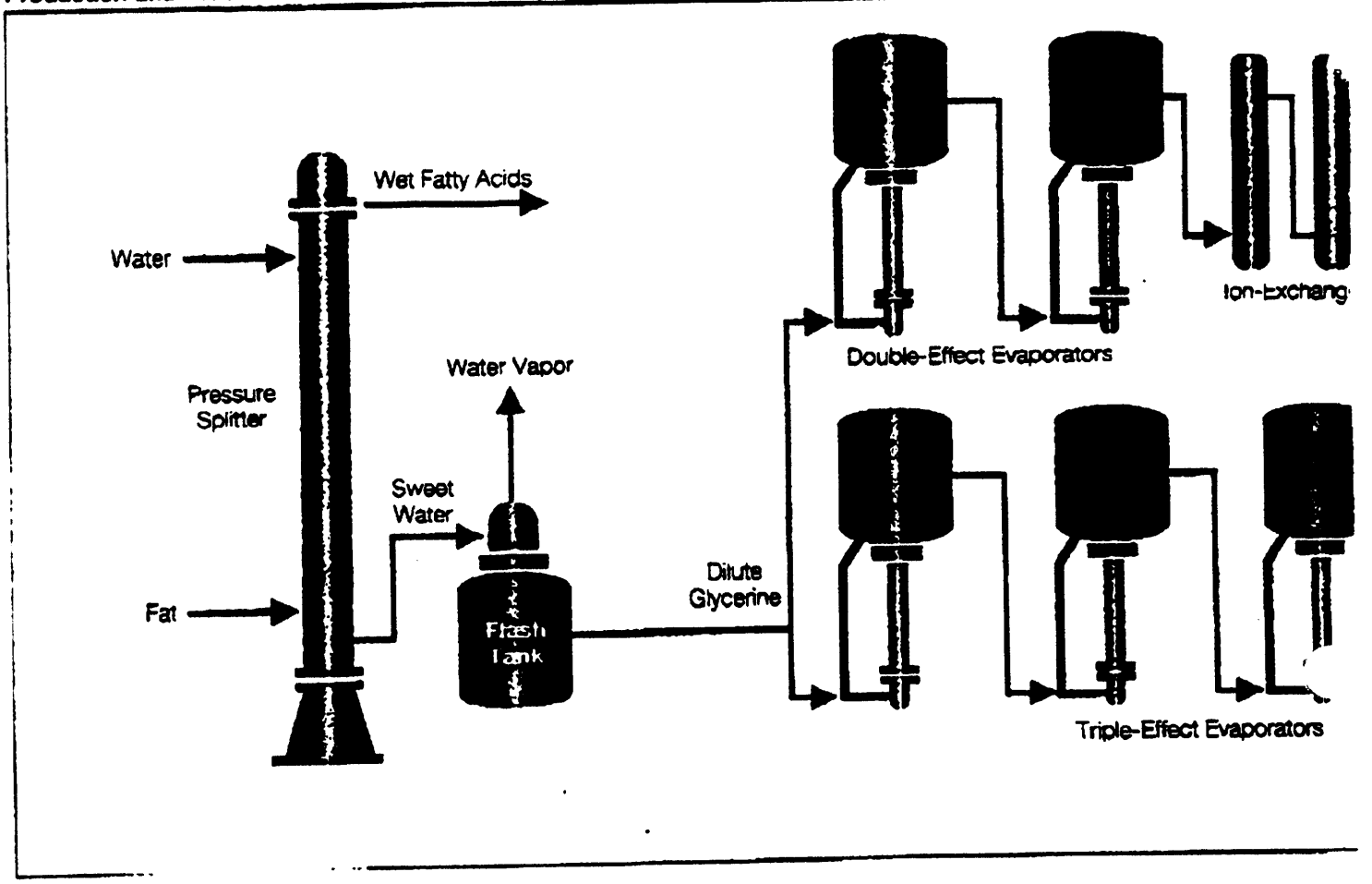
The Emery Group produces glycerine in the Midwest, West Coast, and Canada to help assure a continuous supply of high quality products from several geographical locations.

EMERY® CP/USP Glycerines are available in 55-gallon lined drums, lined tank cars, or stainless steel tank truck quantities.

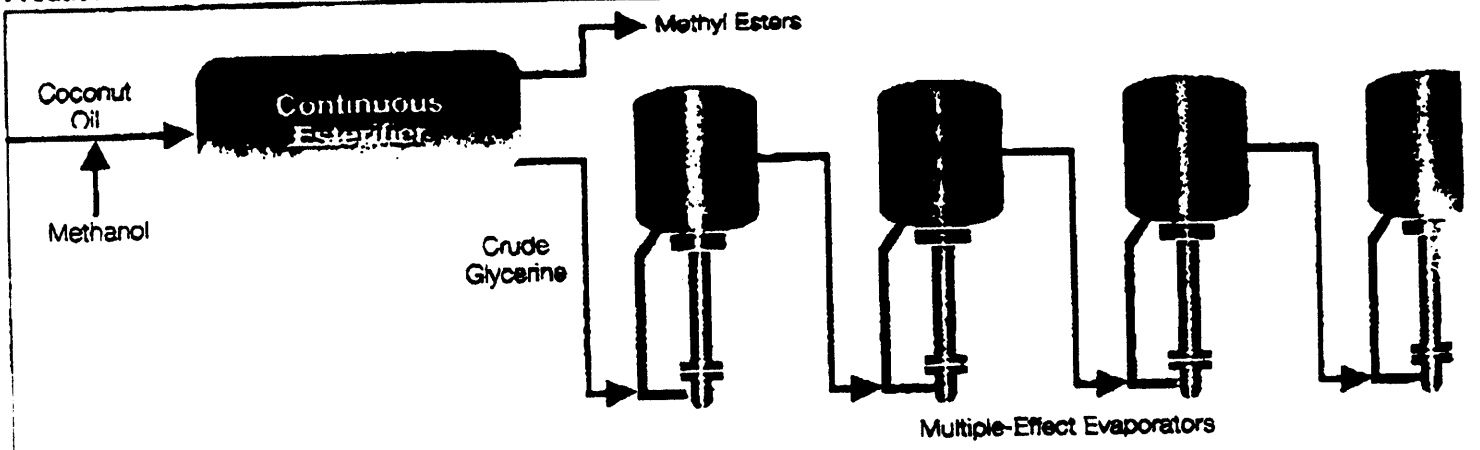
Stainless steel storage tanks, pumps, and transfer lines are recommended to help maintain product quality. Since glycerine may absorb moisture from the air, all bulk storage tanks should be equipped with a drier system.

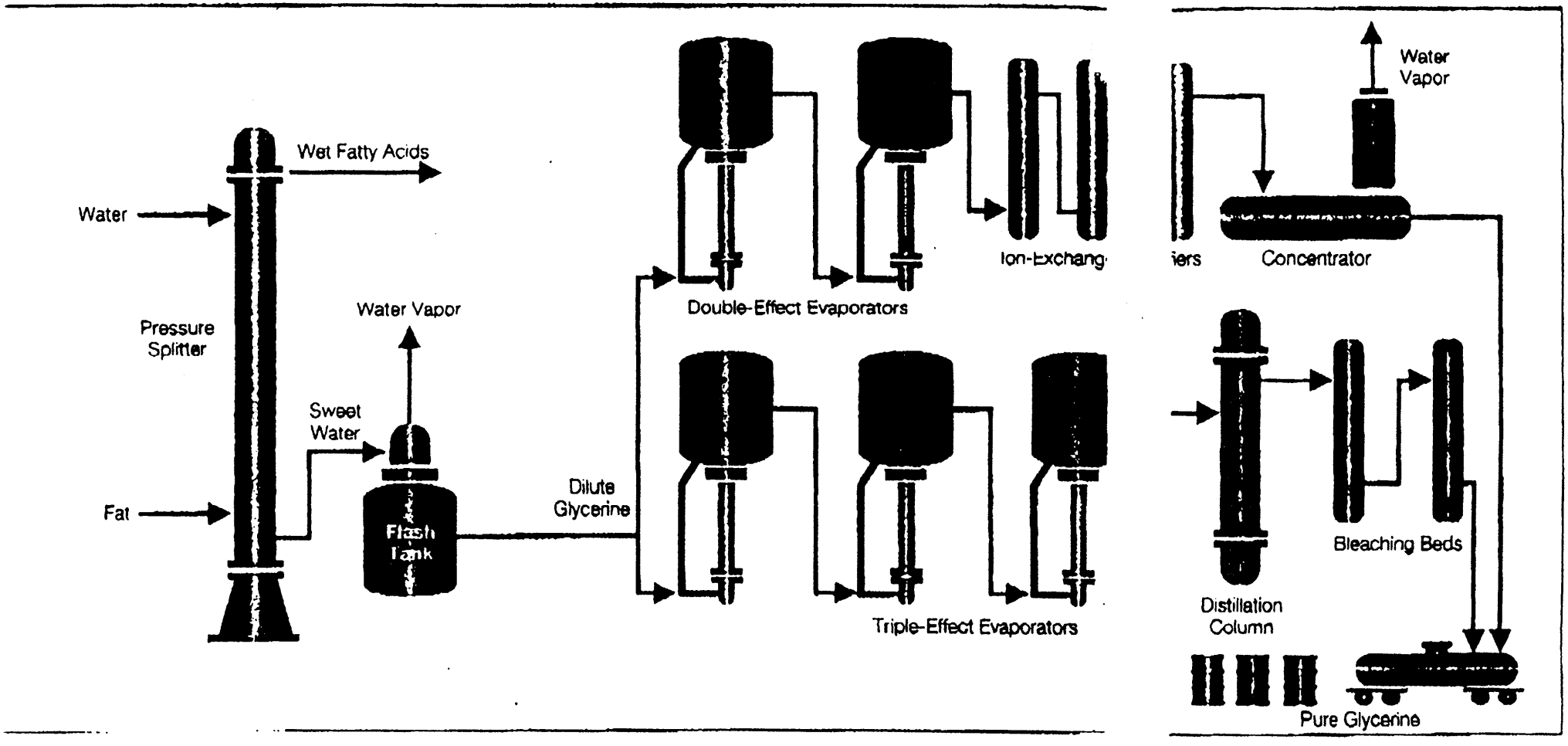
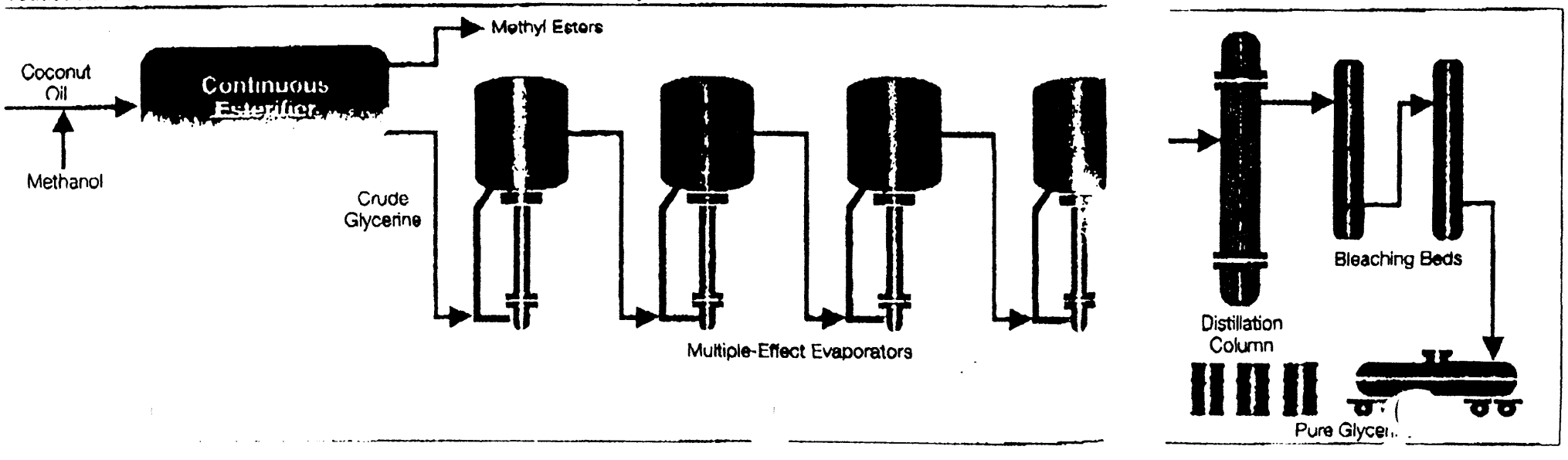
High purity glycerine are difficult to pump at temperatures below 38°C (100°F), but temperatures above 52°C (125°F) should be avoided in order to maintain optimum product color. Thus, pumping temperatures between 38°C and 52°C are recommended.

Production and Purification of EMERY® 912, EMERY® 916 and EMERY® 918 CP/USP Glycerine



Production and Purification of EMERY® 917 CP/USP Kosher Grade Glycerine





Production and Purification of EMERY® 917 CP/USP Kosher Grade Glycerine