

CITGO White Mineral Oils



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**HARWICK STANDARD
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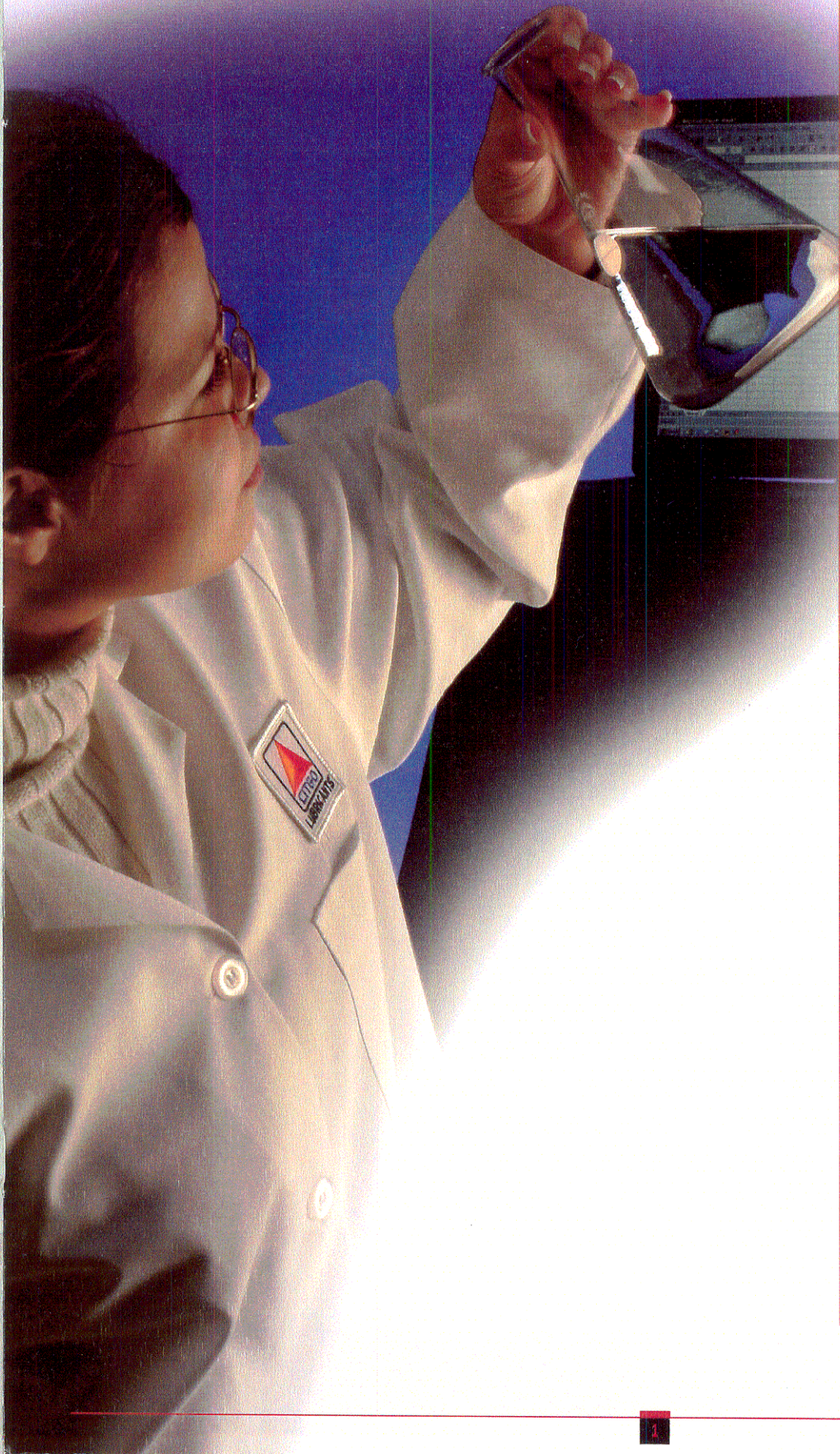
CITGO Petroleum Corporation • P.O. Box 3758 • Tulsa, OK 74102

CITGO - Experienced Producer of White Mineral Oils

Very few products in the oil industry can claim the prestige and purity of white mineral oils. Their high degree of purity and inertness makes them eminently suitable for a wide variety of uses including many applications found in the food industry where the finished product may have direct or indirect contact with food for human consumption, and in the pharmaceutical and cosmetic industries, where the finished products must meet the most stringent government and industry standards of quality and purity.

To maintain the purity of the oils, an ultra clean, dedicated facility is a must. With over 40 years of experience and a manufacturing facility that is ISO 9001-2000 certified, CITGO is one of four North American white oil producers.

White mineral oils are derived from paraffinic feedstocks in the lubricating range through the use of severe hydrogenation. CITGO employs a unique two-stage hydrogenation process to produce white mineral oils (see Figure 1). Our DUOTREAT hydrogenation process (DHN) saturates all aromatic and olefinic compounds while effectively eliminating all nitrogen and sulfur. The finished products are water white mineral oils spanning the viscosity range of 70 to 500 SUS @ 100°. Since natural oxidation inhibitors are also removed during the process, a small amount of Vitamin E is added to inhibit oxidation.



Complete Line to Satisfy Wide Range of Industrial Applications

There are at least three main categories in which white mineral oils can be further classified: Non-formulated, Formulated and Dust Suppression. CITGO is a strong producer in all three categories.

Non-formulated white mineral oils are essentially straight white mineral oils with no additives. These oils are used in a wide range of food grade and technical grade applications where purity of the oil is extremely important due to the possibility of direct contact with food for human consumption.

Formulated white mineral oils, also known as Food Grade Lubricants, are straight white mineral oils which contain an FDA approved additive system that provides excellent rust protection, oxidation inhibition, and good anti-wear. These oils are used in applications where there is a possibility of incidental contact with food for human consumption. CITGO's food grade greases are an example of formulated white mineral oils. These greases provide excellent rust protection, oxidation inhibition, good high-temperature properties and good adhesion/cohesion properties, and can be used with food processing and packaging machinery where there is a possibility of incidental contact with food.

CITGO also offers food grade petrolatums. They are odorless and tasteless, non-drying and rich in emollient properties. They are used in cosmetics and pharmaceuticals as a base for salves, creams and ointments. Petrolatums are also used in veterinary applications.

CITGO's dust suppression oils are food grade white mineral oils designed for dust suppression in all grain handling operations. These oils have good low temperature flow characteristics, and will retain their dust suppression ability through several grain handling operations. They will not develop rancidity or in any way affect the quality of the grain.



White Mineral Oils - Regulations and Approvals



When it comes to questions about regulations and approvals, the answer is simple: White mineral oils cannot be labeled food grade unless they pass approval tests.

DEFINING REQUIREMENTS

FDA grade white mineral oil quality, use and guidelines for manufacturing, were originally provided by the United States Pharmacopoeia (USP) and the National Formulary (NF). The USP and the NF are national consortiums of medical, pharmaceutical and industrial representatives. Current nomenclature describes the heavier grades as "Mineral Oil, USP", while the lighter viscosity products bear a "Light Mineral Oil, NF" designation.

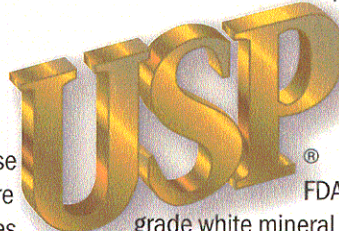
The following is a current list of regulations for food grade white mineral oils as described by the USP and NF consortiums:

- Colorless, odorless & tasteless
- Free or nearly free of fluorescence
- Neutral to litmus
- Pass Readily Carbonizable Substances Test
- Meet limits for Polynuclear Compounds (FDA UV Test)
- Pass Solid Paraffin Test at 0 °C

SETTING REGULATIONS

The Federal Food, Drug and Cosmetic Act and the Food Additives Amendment, establish the regulations for any material which could become a part of food either by direct addition or by incidental food contact. Food grade white mineral oils must meet certain standards of purity set down by the FDA in regulations 21 CFR 172.878, governing direct food

additives permitted for human consumption, and 21 CFR 178.3620 (a) which governs food additives resulting from contact with containers or equipment. CITGO's food grade white mineral oils have also been registered with the NSF as 3H oils, which are defined as release agents where there could be direct contact with food for human consumption.



Technical grade white mineral oils are also regulated. The FDA defines technical grade white mineral oils in 21 CFR 178.3620(b) as oil refined to a minimum +20 Saybolt Color which passes less stringent ultraviolet absorbency limits.

Most FDA regulations are very specific as to the application and the maximum quantity that can be used. Inserted in the back pocket, you will find two tables. Table 1 is *Permissible Applications* and suitable grades for each use. Table 2 is a tabulation of those applications specifically regulated by the FDA and the appropriate oil suitable for the job.

FDA REGULATIONS OF FOOD GRADE LUBRICANTS

The FDA recognized the need for food grade lubricants and issued regulation 21 CFR 178.3570 governing their use on food processing machinery where incidental food contact is expected. These products are registered as H-1 lubricants for incidental food contact by NSF, for use in food plants under the jurisdiction of the USDA.

CITGO food grade lubricants and white mineral oils are registered with the NSF as H-1 lubricants and may be used as an anti-rust film on equipment and machine parts in locations exposed to edible



products, and may also be used as release agents on gaskets or seals of tank closures. The amount used should be the minimum required to accomplish the intended effect.

OTHER ADVISORY AND REGULATORY ASSOCIATIONS

The Cosmetic, Toiletry and Fragrance Association (CTFA) is merely and advisory body to the cosmetic trade. Specifications governing the use of white mineral oil as a dust control agent for animal feeds and mineral feed supplements are supervised by the Association of American Feed Control Officials (AAFCO).

OTHER APPROVALS

In addition to the advisory and regulatory associations, Kosher certification determines which foods are acceptable according to Jewish Law. Some consumers only purchase products that are Kosher certified. The demand for Kosher products is increasing rapidly. Carrying certified Kosher products helps distributors and manufacturers take advantage of this growing market.



THE ANSWER IS SIMPLE. CITGO PASSES THE TEST.

CITGO's white oils meet US FDA, USP and NF requirements. Most are registered with the NSF as H1 and 3H lubricants, and are Kosher certified.

As a leader in white oil processing, CITGO Petroleum Corporation provides white mineral oils and food grade lubricants of the very highest quality and purity for use in the food, cosmetic and pharmaceutical industries.

Uses and Applications



FOOD INDUSTRIES

Because of possible direct or indirect food contact, white mineral oils have numerous uses in many applications in the food industry. White mineral oil-based lubricants and greases are used in the machinery for processing, manufacturing and packaging of foods and as a rust preventive in canning and bottling. Some white mineral oils are used as a protectorant on shell eggs.

Dust suppressant oils are excellent for the processing of grains, such as rice and wheat. CITGO's dust suppression oils are specifically designed for all grain handling operations including storing, drying and milling. Because of their low temperature flow characteristics and highest degree of purity, our dust suppressant white mineral oils help create safer and cleaner working conditions, without affecting the quality of the grains.

COSMETICS INDUSTRY

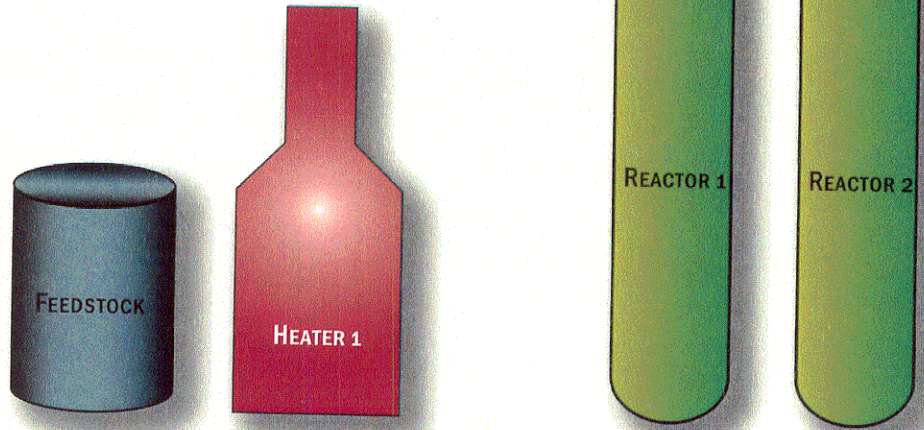
Because of contact with the face and body, the cosmetic industry is a big user of white mineral oils. Straight white mineral oils are not only found in aesthetic cosmetics, such as lipsticks and eye shadows, but their purity makes them ideal for sensitive skin products such as baby oil.

PHARMACEUTICAL INDUSTRY

White mineral oils are used as processing aids in the preparation of pharmaceuticals and their components. White mineral oils also serve as moisture barrier in many pharmaceutical applications. CITGO produces bulk pharmaceutical excipients using FDA and USP guidelines.

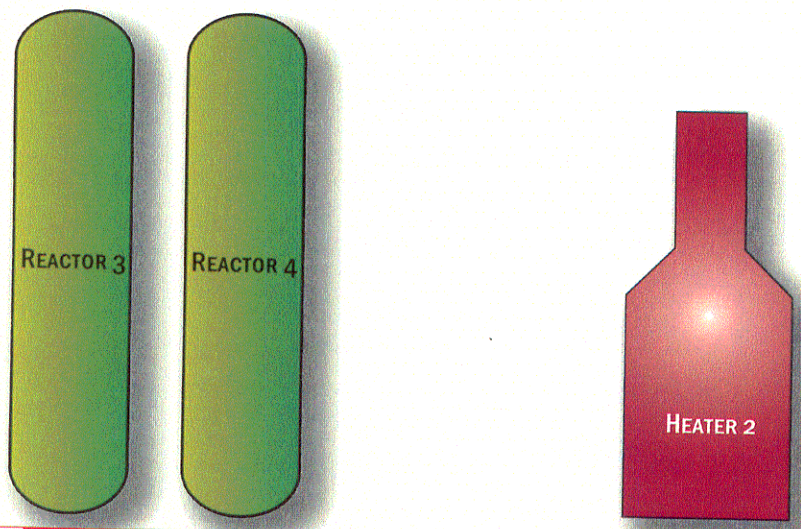


DHN Unit figure 1



1 Heater 1 raises blocked feedstock temperatures to reactor 1 level

2 Reactors 1 and 2 remove nitrogen, sulfur and most aromatics



4 Reactors 3 and 4 complete the removal of all aromatics

3 Heater 2 raises in-process material to reactor 3 level



5 Each viscosity grade of Food Grade White Mineral Oil is stored in segregated tanks

Permissible Applications Table 1

APPLICATION	USE	RECOMMENDED GRADES (SUS @ 100°F)
ADHESIVE TAPES, MEDICAL	Plasticizer	Food Grade Mineral Oil (90, 200, 350, 500)
ANIMAL FEED CONCENTRATES	Dust control, Process aid Crystex® AF-L, AF-M	Food Grade Mineral Oil (70, 90), Technical Grade (70, 90)
ANIMAL MEDICATION	Laxative	Food Grade Mineral Oil (90, 200, 350)
BAKING INDUSTRY		
Release agent	Release agent	Food Grade Mineral Oil (200, 350, 500)
Dough divider	Prevents sticking	Food Grade Mineral Oil (90, 200, 350, 500)
COATINGS		
Hot melt food coating	Plasticizer	Food Grade Mineral Oil (90, 200, 350)
Fruits and Vegetables	Protective coating	Food Grade Mineral Oil (70, 90)
Shell egg spray	Protective coating	Food Grade Mineral Oil (70, 90), Technical Grade (70, 90)
COSMETICS, DRUGS		
Hair preparations	Basic Ingredients	Food Grade Mineral Oil (70, 90) Technical Grade (70, 90)
Ointments/Lotions	Basic Ingredients	Food Grade Mineral Oil (70, 90)
Baby oil	Basic Ingredients	Food Grade Mineral Oil (70, 90)
Suntan oil	Basic Ingredients	Food Grade Mineral Oil (70, 90) Technical Grade (70, 90)
Bath oil	Basic Ingredients	Food Grade Mineral Oil (70, 90)
Drug processing	Basic Ingredients	Food Grade Mineral Oil (90)
DEFOAMER		
Beet sugar manufacturing	Foam control	Food Grade Mineral Oil (70, 90) Technical Grade (70,90)
Penicillin, Antibiotics	Foam control	Food Grade Mineral Oil (70, 90)
Paper for food packaging	Foam control	Food Grade Mineral Oil (70, 90)
FOOD PROCESSING		
Wine, Vinegar	Evaporation control	Food Grade Mineral Oil (70, 90)
Pickles	Evaporation control	Food Grade Mineral Oil (70, 90)
Peas, lima beans, etc.	Froth flotation aid	Food Grade Mineral Oil (70, 90)
Canning, Machinery	Lubricant/Rust prevention	Food Grade Mineral Oil, Technical Grade & Food Grade Lubricants - several grades
Fish cannery	Knife Lubricant	Food Grade Mineral Oil (200, 350, 500), Technical Grade 90
Meat packing	Rust prevention for trays, hooks, knives, etc	Food Grade Mineral Oil & Technical Grade (70, 90)
GRAIN	Dust control	Food Grade Mineral Oil (70, 90, 500)
PAPER SATURATE		
Butcher, Meat & fruit wrap	Waterproof, Protective barrier	Food Grade Mineral Oil (70, 90)
PELLETIZING AID		
Drug & Food products	Moisture barrier	Food Grade Mineral Oil (200, 350, 500)
PLASTICS		
Polyethylene	Pigment Dispersant	Food Grade Mineral Oil (70, 90)
Polystyrene	Process aid Mold release agent	Food Grade Mineral Oil (350, 500) Food Grade Mineral Oil (90, 350, 500)
Ethyl Cellulose	Primary Plasticizer	Food Grade Mineral Oil (200, 350)
RELEASE AGENT		
Egg white solid, yeast	Process aid	
Dried fruit/vegetables	Process aid	Food Grade Mineral Oil (70, 90, 200, 350)
Confectionery	Process aid, Polishing molding agent	
FOOD MACHINERY		
Lubricant	Lubricant	Food Grade Lubricants

Permissible Applications Table 2

USE (MAXIMUM FDA LIMITS)	FDA REGULATION	FOOD GRADES (SUS @ 100°F)					TECHNICAL GRADES (SUS @ 100°F)	
		70	90	200	350	500	70	90
ANIMAL FEEDS - DIRECT USE Component of animal feed to reduce dusting and serve as lubricant and moisture barrier in preparation of pellets, cubes, etc. (3% supplement - 0.06% total ration)	573.680	•	•				•	•
HUMAN FOOD - DIRECT USE As defoamer in food.	173.340	•	•					
As release agent, binder and/or lubricant in: a) or on capsules and tablets containing concentrates of flavoring, spices, condiments and nutrients intended for addition to food excluding confectionery.(max 0.06%)	172.878			•	•			
b) or on capsules or tablets containing food for special dietary use. (max 0.06%)				•	•			
c) bakery products. (max. 0.15%)				•	•	•		
d) dehydrated fruits and vegetables. (max. 0.02%)		•	•	•	•			
e) egg white solids. (max. 0.1 %)		•	•	•	•			
f.) manufacturing of yeast. (max. 0.15%)		•						
g) manufacturing of confectionery, and as sealing and polishing agent. (max. 0.2%)		•	•	•	•			
As a float to prevent or retard access of air, evaporation and/or wild yeast contamination during fermentation of: a) Wine.	172.878	•	•					
b) Vinegar.		•	•					
c) Curing pickles. (do not exceed good manufacturing practice)		•	•					
Component of hot melt coatings for frozen meat. (max. 0.095% of meat)	172.878		•	•	•			
Protective coating for raw fruits and vegetables (do not exceed good manufacturing practice)	172.878	•	•					
Anti-dusting agent in sorbic acid food use. (max. 0.25% in sorbic acid)	172.878	•	•					
In molding starch used in manufacturing confectionery. (max. 0.3% of starch)	172.878	•	•					
As dust control agent for grains. (max. 0.02% weight of grain)	172.878	•	•					

(over)

Use (Maximum FDA Limits)	FDA Regulation	Food Grades (SUS @ 100°F)					Technical Grades (SUS @ 100°F)	
		70	90	200	350	500	70	90
HUMAN FOOD - INDIRECT USE								
Plasticizer in polymeric substances intended for food packaging (do not exceed good manufacturing practice)	178.3740		•	•	•	•		
Surface lubricant of resinous and polymeric coatings in contact with food.	175.300	•	•	•	•	•		
Defoamer in manufacturing of paper for food packaging.	176.210	•	•				•	•
Defoamer in manufacturing of adhesives used in food packaging.	175.105	•	•				•	•
Component of coated or impregnated paper or paperboard in contact with food.	176.170	•	•	•	•	•		
Lubricant for drawing, stamping forming and rolling of metallic foil used in food packaging (max. 0.015 mg residue per square inch contact surfaces when used for rolling; max. 0.2 mg residue per square inch contact surfaces when used for drawing, stamping and forming)	178.3910	•	•				•	•
Defoamer in manufacturing of animal glue for food packaging.	178.3120	•	•				•	•
Fiber lubricant and in manufacturing of food containers from textile fiber. (max. 0.15% of finished fiber)	177.2800	•	•				•	•
Lubricant and rust preventative for food machinery and other equipment where minimal food contact is expected. (max. 10 ppm in food)	178.3570 [†]	•	•				•	•
Defoamer in manufacturing and application of coatings used in food packaging.	176.200	•	•				•	•
Plasticizer for rubber use in conveyer belts, hoses rollers, etc. in contact with food. (max. 30% based on rubber product)	177.2600*			•	•			
Process aid in the production of resin bonded filter fibers.	177.2260	•	•				•	•
*High viscosity technical grade white oils may also be used in this application.								
[†] Ideal FG Oils® may also be used in this application.								



The ultimate
in prestige
and purity