INTRODUCTION
JEFFCAT catalysts are high quality products which perform in a superior manner as polyurethane catalysts when handled and used in accordance with prescribed procedures. Proper storage and handling methods are essential for maintaining the high degree of purity with which these products are manufactured and shipped.

It is important to understand the hazard potential when working with the JEFFCAT catalysts. A thorough knowledge of the chemical, physical, and toxicological properties of these products will permit the customer to handle and use JEFFCAT catalysts in a safe manner. Generally, JEFFCAT products are relatively volatile materials which can pose fire hazards and are severely irritating to the skin and eyes. Care must be taken to avoid skin and eye contact.

In addition to the information provided in this bulletin on the safe storage and handling of JEFFCAT catalysts, users are referred also to the technical bulletins and Material Safety Data Sheets of the individual products offered by Huntsman Corporation. These bulletins are available on request from any Huntsman Corporation sales office.

I. SAFETY

A. Toxicity
In general, JEFFCAT catalysts are slightly to moderately toxic by ingestion in single doses and by single skin applications. The principal hazards that arise in working with these products are those associated with similar organic amines; namely, a corrosive action on skin and eyes. Precautions should be taken to prevent contact with these parts of the body. Persons handling concentrated solutions of these materials should be provided with:

1. Rubber gloves
2. Rubber footwear
3. Chemical goggles
4. Protective coveralls

JEFFCAT catalysts should be handled only in well ventilated areas. Wherever practicable, process equipment should be provided with exhaust ventilation to prevent build-up of vapor concentrations in the workroom atmosphere.

B. Eye Protection
JEFFCAT catalysts can cause burns of eyes. Goggles or face shield should be worn where there is danger of splashing or eye contact. In cases of eye contact, the eye should be continuously irrigated with water for at least 15 minutes, and a physician should be consulted immediately.

C. Skin Protection
JEFFCAT catalysts can cause burns of skin. Prolonged skin contact with concentrated products will produce severe irritation. In addition, skin sensitivity may occur in susceptible persons upon prolonged contact or repeated exposure. All spills on the skin should be washed off promptly with copious amounts of soap and water. Contaminated clothing should be thoroughly laundered before reuse.
D. Fire Hazards
Since JEFFCAT catalysts have relatively low flash points, adequate precautions should be observed to reduce fire hazards. These products should be used only in a well-ventilated area and precautions should be taken to avoid exposure to sparks and open flames. Because of the flammable nature of JEFFCAT NMM, DMP, DM-70, MM-70, PM, DPA-50, Z-65, NEM, DMEA, and DMCHA catalysts (PMCC flash points of 55°F, 72°F, 102°F, 105°F, 114°F, 110°F, 88°F, 90°F, 105°F, and 104°F, respectively), installation of a flame arrestor on any vent discharge is recommended on storage tanks.

Ground wires should be welded to the storage tank to reduce the chances of static electricity build-up. Where possible, equipment should be electrically bonded.

Either float-type or manometer-type gauges are recommended for liquid level tank metering. Gauge glasses are not recommended for this service as they are subject to accidental breakage, resulting in a serious fire hazard.

Proper fire-fighting equipment should be available wherever amine catalysts are handled. Carbon dioxide, dry chemical, foam and water spray are effective in controlling fires involving these products.

Fumes from the burning of JEFFCAT catalysts may include carbon monoxide, carbon dioxide, and ammonia. Therefore, personnel fighting fires involving these products should be equipped with self-contained breathing apparatus and protective clothing.

Polyurethane products made from components including JEFFCAT catalysts may present a serious fire hazard if improperly used or allowed to remain exposed or unprotected. The character and magnitude of any such hazard will depend upon a broad range of factors which are controlled or influenced by the manufacturing or production process, by the mode of application or installation, and by the function and usage of the particular product. Each person, firm or corporation engaged in the manufacture, production, application, installation, or use of any polyurethane product should carefully determine whether there is a potential fire hazard associated with such product in a specific usage, and utilize all appropriate precautionary and safety measures.

E. Spills
In case of JEFFCAT catalyst spills, eliminate all sources of ignition. Spills should be removed by absorbing with dry absorbent materials or by washing with water.

F. Material Safety Data Sheets
Material Safety Data Sheets for JEFFCAT catalysts are available on request through a Huntsman Corporation sales representative.

II. STORAGE AND HANDLING
A. Gas Blanketing
JEFFCAT catalysts should be protected against contact with air and water. Atmospheric oxygen will cause color to develop in these products. In addition, these products are hygroscopic. Moisture will also cause rust to form in carbon steel tanks, lines, etc., which may result in discoloration and contamination of the amine catalysts with iron compounds. For these reasons, it is recommended that these products be stored under a dry inert gas blanket, such as nitrogen, to minimize contamination.

A good gas blanketing system for a conventional tank requires two regulators — one on the gas to the tank and one on the vent to the atmosphere. Because of the flammable nature of the catalysts specifically mentioned in section I.D. above, it is recommended a flame arrestor be installed on any vent discharge. The inlet regulator should be set for approximately two or three ounces of pressure, while the outlet regulator should be set for about four or five ounces; and certainly not more pressure than that for which the tank was designed. The inlet and outlet regulators should be sized very carefully to allow for maximum pumping into and out of the tank, otherwise air may be pulled into the tank or the tank structure may collapse. Inspect
vent valves (twice/year) for build-up of amine carbonates which results from reaction of atmospheric CO2 and amine fumes vented from the storage tank.

The handling and transfer of JEFFCAT catalysts should be performed so that no contact with air occurs. All receiving containers, transfer lines, and pumps should be flushed with dry inert gas prior to use. Dry inert gas should also be used to fill the container from which the products are being removed. The provision to purge pumps and transfer lines after use will help to reduce losses due to product holdup in the pumps and lines.

B. Materials of Construction

Storage tanks constructed according to a recognized code, using carbon steel as a material of construction, generally are satisfactory. However, carbon steel is prone to rust if moisture is present, which may cause discoloration and contamination of the catalysts. In those cases where additional precautions are needed to preserve low color, stainless steel or aluminum should be used. Copper, or alloys containing copper, should be avoided since complex salts form that will result in product discoloration as well as corrosion and eventual plugging of the foam machine orifices and lines.

Pumps, lines, valves and other parts of the transfer system may be constructed of either stainless steel or carbon steel. If carbon steel is used, adequate precautions must be observed to guard against rust contamination and potential plugging of lines. Although a centrifugal pump is preferred, a rotary pump can be used. Rotary pumps, where used, should be equipped with externally lubricated bearings.

Transfer lines should be joined by welds or flanges. Garlock 721 gasket material, Teflon polypropylene, or equivalent, is satisfactory for use with flanged connections in JEFFCAT catalyst service. Nitrile rubbers such as Viton®, buna N, and neoprene should be avoided. Screwed joints are subject to failure unless backed-welded because the catalysts will leach conventional pipe dopes. For flexible connections, stainless steel hose is preferred to rubber, since rubber will generally deteriorate in JEFFCAT catalyst service.

C. Storage Temperature

Most JEFFCAT catalysts have extremely low viscosities and freezing points. Most will not freeze or become viscous during normal handling even though subjected to very severe weather conditions.

However, JEFFCAT DMP catalyst has a freezing point of 30.3°F, and it may be necessary to equip storage and handling facilities with special heating equipment where severe weather conditions exist. Insulation of the tank will probably be desirable. Possible advantages of indoor storage to prevent freezing, although not normally recommended, should be considered.

In areas where the ambient temperature is expected to fall below 31°F, JEFFCAT DMP catalyst storage tanks should be heated by means of stainless steel steam coils of a suitable area to heat the tank contents using low pressure steam (10 psig max.). The heating coil should be designed according to standard engineering practices. It should be sloped with no low spots or legs to trap condensate; it should be all welded construction; installed high enough to allow for convenient cleaning of the tank. When steam heat is to be used continuously to prevent freezing of the product, a temperature regulator should be installed which throttles either the steam or condensate. The temperature of the JEFFCAT DMP catalyst should not exceed the flash point of 72°F.

Thawing a tank or tank car of JEFFCAT DMP catalyst is accomplished by applying low pressure steam (10 psig max.) to the heating coils of the tank or tank car. Use of a circulating pump to agitate the liquid product will accelerate thawing. Temperature of the thawed product should not be permitted to rise above the flash point of 72°F.

Transfer lines and pumps for JEFFCAT DMP catalyst service should be adequately protected at temperatures of 35°F or below. Where required, hot water tracing can be installed by wrapping 1/4-to 3/8-inch copper tubing entirely around the line or by running a 1/2-inch line parallel to the transfer line.
D. Drum Storage and Handling
The same storage and handling information discussed above applies to drum material.

JEFFCAT catalysts may be removed from drums by either pumping or draining. While material is being removed from a drum, a dry inert gas blanket or purge should be maintained or, optionally, the 3/4-inch bung can be fitted with a suitable dryer tube. Adequate ventilation and suitable protective devices should be employed.

If drums of JEFFCAT DMP catalyst are stored at temperatures below the freezing point of 30.3°F, the product may be thawed by applying low pressure steam to a Plate coil, wraparound, drum heater or by placing in a warm room at 65-70°F. Precautions should be observed to prevent the temperature of the thawed product from rising above the flash point of 72°F.

In special instances, drums may be filled from bulk facilities after ensuring that (1) the air in any lines and drums has been replaced by an inert gas, (2) the equipment has been electrically bonded and grounded, (3) the equipment is clean and free of water, and (4) adequate ventilation and suitable protective devices are employed.

E. New Facilities and Cleaning
Although it is not recommended to clean tanks and transfer lines frequently, it is sometimes necessary as the result of contamination or accumulation of foreign material in the system. For such cleaning, a water wash is generally satisfactory. Tank cleaning is accomplished by thoroughly sluicing the interior of the tank with a water jet and following this with cloth or chamois drying. Once clean and dry, the tank should be sealed and purged with dry inert gas to avoid undue condensation and rust formation.

New systems frequently introduce line scale, rust, and the like, which will be a source of contamination and possible plugging. These solids can be effectively removed with either a “y” strainer, using a 150-200 mesh stainless steel screen, or with a commercial type cloth filter. A good grade of woven cotton canvas, 12 ounce or heavier, is suitable as a cloth filter medium. Wool and synthetic fibers have not been found to be satisfactory.

III. JEFFCAT CATALYST BULLETINS
For additional information on JEFFCAT catalysts see our technical bulletins on these materials. These bulletins are available upon request from any Huntsman Corporation sales office.