



Teflon® PTFE K-20

fluoropolymer resin

Aqueous Dispersion

Brand

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Description

Teflon® PTFE K-20 is a negatively charged, hydrophobic colloid containing approximately 33% (by total weight) of 0.05 to 0.5 µm polytetrafluoroethylene (PTFE) resin particles suspended in water. A milky white liquid, *Teflon*® PTFE K-20 also contains approximately 3.5% (by weight of PTFE) of a nonionic wetting agent and stabilizer. Viscosity at room temperature is approximately 15 cPs. Nominal pH is 10.

Teflon® PTFE K-20 is used in applications where a minimum amount of surfactant is desired. The most common use for *Teflon*® PTFE K-20 is to reduce dust levels in host systems. When sheared, micro fibrils of PTFE are formed that interconnect the 0.2 µm particles. The presence of these micro fibrils reduces dust levels in many host systems.

When properly processed, the PTFE resin in *Teflon*® PTFE K-20 exhibits the superior properties typical of the fluoropolymer resins: retention of properties after service at 260°C (500°F), useful properties at -240°C (-400°F), chemical inertness to nearly all industrial chemicals and solvents, and low friction and antistick surfaces. Dielectric properties are outstanding and stable with frequency and temperature. Refer to **Table 1** for typical property data.

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Typical End Products

Typical products that have been successfully de-dusted include carbon powder, catalysts, fine chemicals, cement, and clays such as those in cat litter.

FDA Compliance

Properly processed products (sintered at high temperatures common to the industry) made from *Teflon*® PTFE K-20 resin can qualify for use in contact with food in compliance with FDA Regulation 21 CFR 177.1550. Products made from unsintered dispersion do not comply.

Processing

Typical levels of application range from 0.005 to 1%. A homogenous mixture of the host material and the *Teflon*® PTFE K-20 is first prepared. This can be done in either a batch or continuous process. Often the *Teflon*® PTFE K-20 is diluted with water and applied to the host material using a spray gun.

The second step in the de-dusting process is to generate the fibril network. This is accomplished by heat and shear, and both are important. Below 20°C (68°F) the fibril network will not form. Above this temperature, the PTFE undergoes a crystalline transformation that enables the fibril network to form. The fibril network will not survive temperatures above the melting point of PTFE (337°C [639°F]). Generally a temperature around 80°C (175°F) is a good starting point.

Proper shearing is also essential for development of an adequate fibril network. Often the intensity of the working of the material is dictated by the characteristics of the host material. A fragile host cannot be subjected to high-speed agitation to the point of disintegration.

Materials have been successfully de-dusted in ball mills, blenders, screw conveyors, and hammer mills.

Excessive agitation should be avoided to prevent breakup of the fibril network. Excessive agitation is usually indicated when a product becomes dust-free after a short working interval, then becomes dusty again as working continues.

Other solid or liquid ingredients can be added to *Teflon*® PTFE K-20 fluoropolymer to provide specific processing or finished product behavior.

Safety Precautions

WARNING!

VAPORS CAN BE LIBERATED THAT MAY BE HAZARDOUS IF INHALED.

Before using *Teflon*® PTFE K-20, read the Material Safety Data Sheet and the detailed information in the “Guide to the Safe Handling of Fluoropolymer Resins,” latest edition, published by the Fluoropolymers Division of The Society of the Plastics Industry—available from DuPont.

Open and use containers only in well-ventilated areas using local exhaust ventilation (LEV). Vapors and fumes liberated during hot processing, or from smoking tobacco or cigarettes contaminated with *Teflon*® PTFE K-20, may cause flu-like symptoms (chills, fever, sore throat) that may not occur until several hours after exposure and pass within about 24 hours. Vapors and fumes liberated during hot processing should be exhausted completely from the work area; contamination of tobacco with polymers should be avoided. Mixtures with some finely divided metals, such as magnesium or aluminum, can be flammable or explosive under some conditions.

Teflon® PTFE K-20 contains additives in the aqueous phase that are irritants. In case of skin contact, flush with water immediately. In case of eye contact, flush with water immediately and get medical help.

Storage and Handling

The dispersion particles in *Teflon*® PTFE K-20 will settle on prolonged standing or on heating above 66°C (150°F). They usually can be redispersed by mild agitation. Drums may be rolled or the product stirred gently just prior to use. The dispersion must be protected from freezing, which will cause irreversible settling.

Ammonium hydroxide is used by DuPont to set pH to approximately 10 at the time of shipment. High ambient temperatures can deplete the ammonia level and reduce the pH. Declining pH eventually favors bacterial growth, which causes odor and scum. The pH should be measured and maintained between 9.5 and 10.

Both very high and very low temperatures may be detrimental. Dispersions must not be allowed to freeze. The optimum storage temperature range is 7–24°C (45–75°F), with temperatures low in the range preferred. Storage at 7–32°C (45–90°F) is acceptable within nominal shelf life for standard dispersions. If dispersions are to be stored for extended periods beyond their nominal shelf life, low-temperature storage is especially desirable because the particles are harder at lower temperatures and, therefore, less likely to stick together as they settle.

High-speed stirring, pumping, or any other violent agitation must be avoided to minimize sheared particles or coagulation. Ideally, the dispersion should be conveyed by gravity from storage to processing stations.

Compared to PTFE dispersions with high solids (60%), *Teflon*® PTFE K-20 will show a faster separation of the dispersion into a clear upper layer and a PTFE-rich lower layer. This is normal and the dispersion can be homogenized with simple stirring. The rate of formation of irreversible sedimentation is the same as for *Teflon*® PTFE 30.

Storage and handling areas should be clean. Keep dispersion drums closed and clean to avoid both contamination and coagulation by drying at the liquid surface. High processing temperatures will cause even very small foreign particles to become visible or to make defects in finished products. Good housekeeping and careful handling are essential.

Table 1
Typical Property Data for *Teflon*[®] PTFE Fluoropolymer Resin Dispersion Grade K-20

Property	ASTM Standard	Unit	Nominal Value
Percent PTFE Resin Solids	D4441	%	33
Weight of PTFE Resin Solids	D4441	kg/m ³ (lb/gal)	383 (3.3)
Specific Gravity of Dispersion	D4441	—	1.22
Average Dispersion Particle Size	—	μm	0.22
pH (min.) of Dispersion	E70	—	9.5
Viscosity of Dispersion (at 25°C [77°F])	D2196	cP (Pa-sec)	15
Melting, Peak Temperature			
Initial	D1457	°C (°F)	337 (639)
Second	D1457	°C (°F)	327 (621)

Notes: *Teflon*[®] PTFE K-20 is ASTM D4441-98, I 3B.

Typical properties are not suitable for specification purposes.

Packaging

Teflon[®] PTFE K-20 is packaged in 19- and 114-L (5- and 30-gal) nonreturnable drums.

Freight Classification

Teflon[®] PTFE K-20, when shipped by rail or express, is classified “Plastics, Synthetic, Liquid, NOIBN.” Resin shipped by truck is classified “Plastics, Materials, Liquid, NOI.”

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CAUTION: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, see "DuPont Medical Caution Statement," H-50102.



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