3M™ Acid Mist Suppressant FC-1100

Product Description

3M™ Acid Mist Suppressant FC-1100 is a fluorochemical additive that provides outstanding sulfuric acid mist suppression in the copper electrowinning tankhouse without the formation of a stable foam blanket at the surface of the electrowinning cell. FC-1100 suppressant can significantly reduce tankhouse acid mist levels when used alone or in conjunction with mechanical barriers, such as polypropylene macrospheres, with no adverse effects to either the solvent extraction or electrowinning process.

Typical Physical Properties

The following technical information and data should be considered representative or typical only and should not be used for specification purposes. All values are determined at 77°F (25°C) unless otherwise specified.

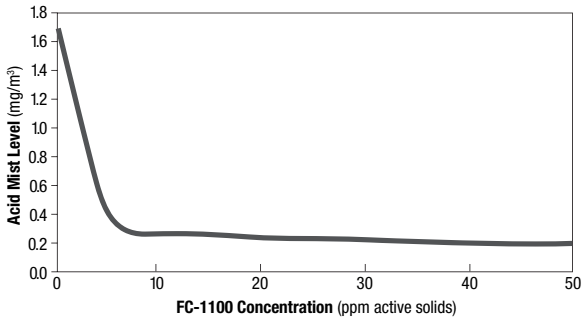
Appearance	Light Amber Liquid
Composition	45-55% Fluorochemical Solids, 45-55% Water
Density	1.2 g/ml
Viscosity	<100 cP
Flash Point	Not applicable

Advantages

Mist suppression studies in production electrowinning cells have shown that 3M acid mist suppressant FC-1100 can consistently provide exposure levels of less than 0.2 milligrams of sulfuric acid mist per cubic meter of air at normal use concentrations. Figure 1 shows the correlation between FC-1100 suppressant concentration and ambient acid mist levels. FC-1100 suppressant presents a significant advance over conventional fluorosurfactants by its ability to reduce tankhouse acid mist levels without the formation of a stable foam blanket. The formation of a stable foam tends to deplete the conventional surfactant from the electrolyte because a large percentage of the available surfactant accumulates in the foam, making the surfactant unavailable to reduce acid mist. The use of a low foaming product, like FC-1100 acid mist suppressant, allows more of the surfactant to remain in solution, significantly lowering product loss rates and maintaining a more consistent level of acid mist suppression in the tankhouse.

During contact with the various conventional organic chelating extractants used in commercial solvent extraction processing, FC-1100 suppressant at three times normal use levels does not increase phase disengagement times or adversely affect copper extraction kinetics.

Figure 1: Acid mist levels, measured in actual tankhouse air, are markedly reduced at active surfactant concentrations of only 20 ppm.



Application Information

The final step in the hydrometallurgical production of copper is the electrolytic deposition of copper metal from the electrolyte solution in the form of high purity cathodes in the electrowinning cells of the tankhouse. During this operation, oxygen gas rises to the surface of the electrowinning cell where the gas bubbles burst, releasing small amounts of sulfuric acid in the form of an aerosol. This aerosol forms a fine mist in the tankhouse, presenting a corrosive atmosphere, with its associated potential hazards, to both the personnel and the electrowinning tankhouse.

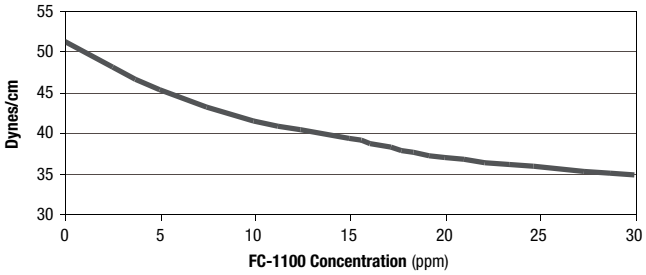
Fluorochemical surfactants have been used in copper electrowinning operations for over 25 years as an effective method of point source reduction in the suppression of sulfuric acid mist. The unique combination of stability to high concentrations of sulfuric acid in the tankhouse electrolyte, compatibility with solvent extraction organics, and surface activity allows the FC-1100 suppressant to provide a cost effective technique to improve working conditions during normal tankhouse operations.

The FC-1100 suppressant in the electrolyte is absorbed at the gas-liquid interface of the oxygen bubble as it rises through the cell, and acts to stabilize that interface. When the gas bubble reaches the surface of the electrowinning cell it does not instantaneously burst; instead, the electrolyte slowly drains from the bubble walls, significantly reducing the amount of electrolyte expelled into the air when the bubble eventually breaks.

3M™ Acid Mist Suppressant FC-1100 can be added directly to the tankhouse electrolyte. The product should be added at a point upstream from the introduction of the electrolyte to the tankhouse, preferably at the suction side of electrolyte circulation pumps, to ensure adequate mixing prior to reaching the electrowinning cells. The typical use range for FC-1100 suppressant in the tankhouse electrolyte is between 10 and 20 ppm active solids. Simple and reasonably accurate monitoring of surfactant concentration can be achieved by running interfacial tension measurements on the electrolyte so that consistent product performance can be maintained through control of appropriate use level. Figure 2 shows a liquid-liquid interfacial tension vs. concentration curve for FC-1100 suppressant in a typical copper electrolyte against a fluorocarbon fluid. The curve has sufficient linearity over the common use range of FC-1100 suppressant to enable monitoring of its concentration by measuring electrolyte/fluorocarbon interfacial tension.

Test methods for monitoring product use levels are available upon request. Actual use concentrations may vary. Please contact a 3M representative for more detailed product addition information.

Figure 2: FC-1100 suppressant concentration can be conveniently monitored by measuring interfacial tension between a fluorocarbon fluid and tankhouse electrolyte and used to maintain the correct concentration of suppressant.



Product Safety and Handling

Before using this product, please read the current product Material Data Safety Sheet (available through www.3m.com/mining or your 3M sales or technical service representative) and the precautionary statement on the product package. Follow all applicable precautions and directions.

The preferred disposal method, of unused material, is to incinerate in an industrial or commercial facility. Combustion products will include HF. Facility must be capable of handling halogenated materials. As a disposal alternative, dispose of waste product in a facility permitted to accept chemical waste. Refer to MSDS for additional disposal information.

Resources

3M acid mist suppressant FC-1100 is supported by global sales and technical support. For additional technical information on FC-1100 acid mist suppressant in the United States, call 3M Energy and Advanced Materials Division, **800-367-8905** or email us at **eamdcustomerservice.com**

For other 3M global offices, and information on additional 3M products, visit our web site at: **www.3m.com/energymarkets**

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