



Product Stewardship Summary

Cesium Formate

Overview

This Product Stewardship Summary is intended to provide a general overview of cesium formate produced by Cabot Specialty Fluids. Cesium formate is produced mainly as a concentrated aqueous solution (brine), and is intended for use in the development of high pressure, high temperature (HPHT) oil and natural gas wells. Cesium formate is both high-value and limited in supply; thus, it is subject to very careful husbandry. Significant efforts are made to minimize losses and recycle the material. Throughout its life cycle, it is handled exclusively by trained personnel working according to appropriate Standard Operating Procedures (SOPs) as well as good industrial safety and hygiene practices. For these reasons, exposure to both workers and the environment are very low; therefore the subsequent risks are expected to be minimal.

Chemical Identity

Cesium formate brine has a concentration range of 60-84% cesium formate (CsCHO_2) (CAS # 3495-36-1). Occasionally, a small quantity of powder is produced from the brine. The powder is employed only to formulate or adjust the specific gravity of brine solutions.

Physical and Chemical Properties

Cesium formate brine is a colorless liquid. It has a low vapor pressure, and is not expected to volatilize. It is not flammable, combustible or explosive.

Uses

Cesium formate is intended for use in the development of HPHT oil and natural gas wells. In the form of brine, it has applications in several phases of HPHT well construction and maintenance operations, namely drilling (e.g. reservoir drill-in fluids), completion (e.g. perforation of the actual oil/gas reservoir, well testing, suspension and packer fluids), work-overs/interventions (e.g. servicing of wells already in existence) and special applications (e.g. stuck pipe pills¹ and hydrate-melting pills).

Health Effects

Animal studies indicate that cesium formate may be irritating to eyes and skin. Cesium formate powder may be irritating to the respiratory tract. Based on rat feeding studies, cesium formate may cause toxicity if swallowed.

Based on animal studies, cesium formate is not expected to be corrosive, or cause skin sensitization. Cesium formate was not mutagenic in a number of different studies.

¹ A 'pill' is a one-off discrete dose of cesium formate fluid, usually a few barrels, used in problem-solving interventions.

Over 10 years of field use, with rigorous health and safety protection standards in place which encourage workers to report all accidents and near misses, no cases of irritation, corrosion, skin sensitization, acute or systemic toxicity linked to exposure to cesium formate have been reported.

Environmental Effects

Cesium formate will break down rapidly in both fresh and sea water by bacteria. Given its composition, only the formate anion of cesium formate is degraded, whereas the cesium cation remains unaffected. Cesium formate is highly water soluble, and will not bioaccumulate in aquatic or terrestrial organisms. Cesium formate was tested for toxicity to fish, invertebrates, algae and sediment-dwellers and was found to have low toxicity.

Exposure Potential

Cesium formate has a very specific industrial use, namely, in the development of HPHT oil and natural gas wells. It is both high-value and limited in supply; therefore, Cabot Specialty Fluids has a program in place to reclaim cesium formate brine and reuse it in multiple wells. For these reasons, the potential for exposure to cesium formate is quite low. Cesium formate is intended for industrial use only, therefore there is very low potential for exposure to the general public. Cesium formate is transported and stored in intermediate bulk containers (IBCs). During the transport, recycling and disposal processes, there is little potential for worker exposure. There is also limited potential for worker exposure during the routine handling of cesium formate brine at oil/gas well sites. All of the transport and well site workers are trained and experienced, and work according to specific SOPs; thereby limiting the potential for exposure.

Risk Management

Cesium formate has limited supply, therefore all efforts are made to minimize losses and to recycle the material. Exposure to both workers and the environment are very low; therefore the subsequent risks are expected to be minimal.

Cabot Corporation Contacts

We appreciate your interest in cesium formate. If you need additional information, please feel free to contact Cabot's Product Support and Toxicology Group at (978) 663-3455.

Disclaimer

This Product Stewardship Summary is intended to provide the general public with an overview of this chemical substance. It is not intended to provide emergency response, medical or treatment information. In-depth safety and health information can be found on the current Material Safety Data Sheet (MSDS) for the product.