Chapter 30

Calcium Hypochlorite

Under the *International Maritime Dangerous Goods Code* (IMDG Code), (Reference 19), anhydrous (UN 1748), hydrated (UN 2880) and bleaching powder (UN 2208) forms of calcium hypochlorite (UN numbers 1748, 2208, 2880, 3485, 3486 and 3487) are to be stowed on deck only (Category ‘D’). They should be stowed out of direct sunlight and the use of bulk packages, IBCs, bags or sacks for transportation is not permitted. Packing the materials in drums facilitates airflow through a stow of such receptacles when they are stuffed into a freight container. This is important as airflow will assist in the dissipation of heat generated by these reactive materials.

30.1 Stowage Issues

The critical ambient temperature (CAT) for calcium hypochlorite depends on the package shape and size. The CAT is higher for smaller packages because they can dissipate heat in the atmosphere more quickly due to larger surface area for the amount of the contents. Therefore, the bigger the package, the lower the CAT and, therefore, the higher the risk of exothermic decomposition, ie release of chlorine and oxygen gases if exposed to temperatures of between 30° to 55°C or above due to stowage under direct sunlight or above bunker tanks.
When released, oxygen will sustain any fire caused due to the decomposition reaction already taking place. As chlorine is toxic, the International Group of P&I Clubs (IG P&I) recommends that stowage should be clear of living quarters. It also recommends a package limit of 45 kg with a limit of 14 t total mass per 20 ft container where a CAT of 40°C should still be expected (Reference 53). If cost is not an issue, carriage in reefer containers at controlled temperatures of 10°C should be considered. However, failure of refrigeration should be risk assessed as it may lead to disaster.

The IG P&I recommendations are based on a better understanding of the properties of the hydrated form of the material UN 2880 than had been available when, in the late 1970s, the IMDG Code entry for this material was discussed. Research carried out in Australia by Professor B F Gray and Dr B W Haliburton highlighted the need to be more aware of the sensitivity of these materials to spontaneous decomposition, which may lead to explosion and fire and which could occur at temperatures as low as 30°C for freight containers stuffed with large drums (about 200 kg) of UN 2880 (Reference 54). Such temperatures are encountered in the holds of container vessels where there are heated fuel oil tanks. Therefore, the materials should not be stowed where their critical ambient temperature can be attained. If there is a risk with on-deck stowage that freight containers could be subjected to long periods of direct sunlight, steps should be taken to restow them. If this is not possible, they should be covered with tarpaulins to provide shade.

The ocean transportation history of calcium hypochlorite suggests that all forms pose special challenges concerning safe carriage. The safety issues are complex and are aggravated by a high degree of product variability.

The 2000 amendment to the IMDG Code (Amendment 30) (Reference 19), effective from 1st January 2001, states the following for calcium hypochlorite, UN numbers 1748, 2208 and 2880:

“Stowage and Segregation, Category D. Cargo transport units should be shaded from direct sunlight and stowed away from sources of heat. Packages in cargo transport units should be stowed so as to allow for adequate air circulation throughout the cargo. ‘Separated from’ powdered metals and their compounds, ammonium compounds, cyanides, hydrogen peroxides and liquid organic substances.”

### 30.2 Synonyms for Calcium Hypochlorite

- B-K powder
- bleaching powder
- bleaching powder, containing 39% or less chlorine
calcium chlorohydrochlorite
calcium hypochloride
calcium hypochlorite
calcium oxychloride
caporit
Cch
chloride of lime
chlorinated lime
Hth
HY-chlor
hypochlorous acid
calcium salt
lime chloride.

Some calcium hypochlorite shipped out of China is declared as:
- Prechloroisocyanoric acid (UN 2465)
- sodium di-isocyanorate (UN 2466).

It may also be shipped as water purification tablets and swimming pool cleanser.

### 30.3 Case Studies

**‘Eugen Maersk’**

In June 2013, the ‘Eugen Maersk’ container ship suffered a fire that broke out in one container and spread to several others nearby. The containers had all been declared as containing household goods and none should have held anything hazardous that might have caught fire in such a way. Containers with flammable contents are usually stored on deck to minimise the risks of fire but, if the contents are misdeclared, they may be stored in locations that cause serious hazards to the ship’s crew and cargo.

**MSC ‘Flaminia’**

In July 2012, the MSC ‘Flaminia’ suffered a severe fire that led to an explosion on board. Three crew members were killed in the incident and it again raised questions over whether the nature of the cargo had been correctly declared.