



## Chapter 32 – Thiourea Dioxide

Thiourea dioxide, or formamidine sulfinic acid (UN 3341, Class 4.2), is a white to pale yellow, crystalline powder used as a reductive agent in the paper industry and a bleaching agent in the textile industry. It is produced by oxidation of thiourea with hydrogen peroxide.

During 1996–97, there were several incidents related to the decomposition of thiourea dioxide. In one incident in the Far East, 400 workers were evacuated from a marine terminal and several workers required hospitalisation. At that time, the chemical was not included in the IMDG Code.

### 32.1 Stowage

The IMDG Code (Reference 19) requires this cargo to be packed in hermetically-sealed drums. Stowage should be in cool dry areas at ambient temperatures. Stowage should be away from heat sources, such as steam pipes, heating coils, heated bunker tanks and main engine bulkheads. Under-deck stowage is not recommended (IMDG Stowage and Segregation, Category D) because ships' holds may reach 65°C in certain tropical zones. However, temperatures in containers carried on deck and exposed to sunlight at the edge of a container stow may also reach 65°C. Containers within the centre of a stow are protected from these high temperatures to some extent.

This cargo must only be transported in hermetically sealed (vapour tight) drums. Any other form of transportation should be rejected by the shipper.

## 32.2 Decomposition

When exposed to heat above 50°C and/or moisture, thiourea dioxide is likely to decompose visibly and rapidly, a reaction that may be catalysed by metal salts. This decomposition is accompanied by the release of toxic and corrosive gases, including sulphur oxides, ammonia, carbon monoxide, nitrogen oxides, hydrogen sulphide, etc. Sulphur oxides can further react with moisture to form acidic conditions and the acid may then attack neighbouring cargo, leaving solid residue and causing contamination.

Some manufacturers have shipped this cargo under the names 'Thiourea D' or 'Thiourea De', claiming that it is less hazardous than thiourea dioxide, although this is not the case.

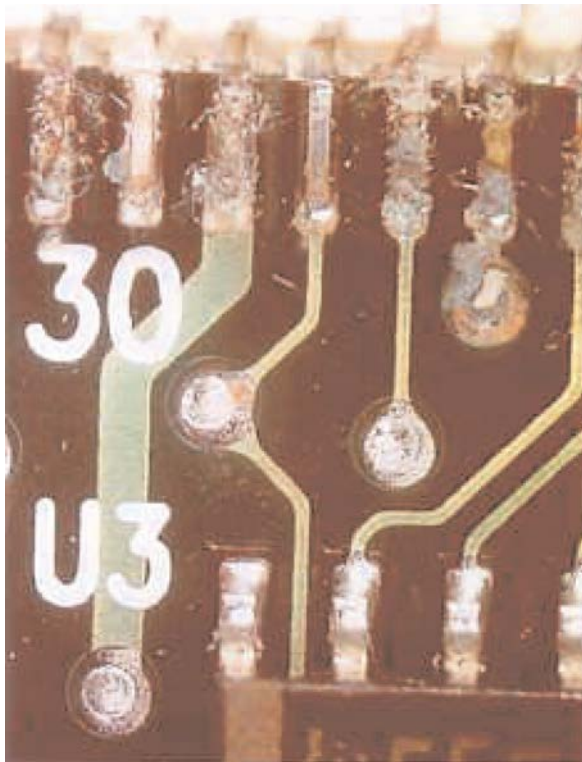
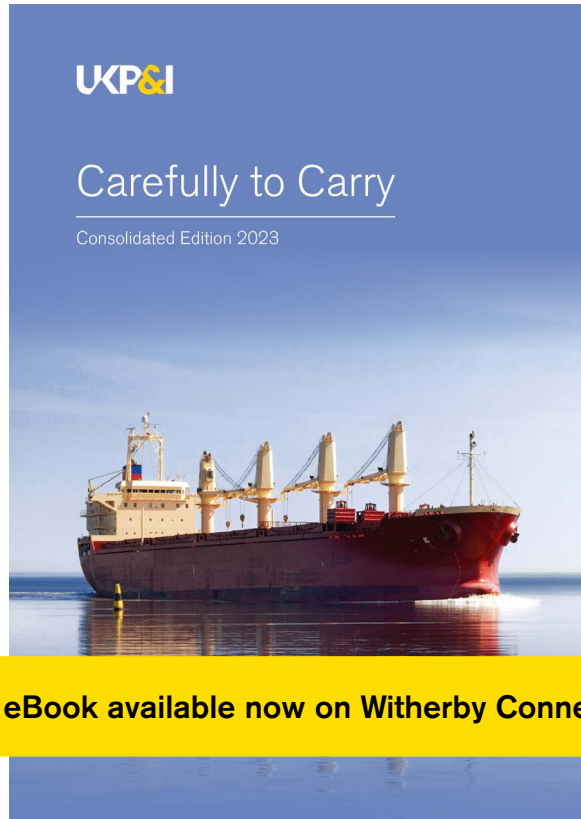


Figure 32.1: Decomposition.

Ships' crew should be made fully aware of the hazards concerning the carriage of thiourea dioxide. If there is any doubt as to the safety of its carriage, shipowners should reject the request to carry thiourea dioxide on board.



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