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**COMMITTEE OF EXPERTS ON THE
TRANSPORT OF DANGEROUS GOODS**

**(Twentieth session,
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agenda item 2 (c))**

**WORK OF THE SUB-COMMITTEE OF EXPERTS
ON THE TRANSPORT OF DANGEROUS GOODS**

Draft amendments to the Model Regulations on the Transport of Dangerous Goods

Listing and Classification

Copper sulphate, solid or solution

Transmitted by the Expert from Germany

1. Large volumes of copper sulphate and copper sulphate pentahydrate are shipped. Copper solutions are of industrial importance not only for use as a basis for fungicidal or algicidal preparations. In the past, Copper sulphate and copper sulphate solutions had been regulated under UN 3010 COPPER BASED PESTICIDES according to Class 6.1 criteria based on the entry "copper compounds" in the List of Common Pesticides. This was a sufficient regulation, until the list was deleted.
2. A proposal transmitted by the Expert from Germany (see document ST/SG/AC.10/C.3/1998/51) had been discussed at the fifteenth session of the Sub-Committee of Experts in July 1998. As several experts asked for additional explanations concerning scientific knowledge of the toxicity for humans, the Expert from Germany offered to provide supplementary information (see document ST/SG/AC.10/C.3/1998/30, para. 100).

3. Oral LD₅₀ values of copper sulphate between 300 and 960 mg/kg are common for the rat, but e.g. as low as 87 mg/kg in mouse experiments. The reason for large species differences is not known mainly because the biochemical mechanism of excessive doses of copper is not well understood.

4. Several cases of accidental or suicidal ingestion have shown that a total of less than 500 mg copper, equivalent to less than 30 mg/kg, have been fatal. A number of toxicological reports on human poisonings have been published in the last decades inter alia by

- Hayes, W.J., Laws, E.R.: Handbook of pesticide toxicology. Academic Press 1991;
- Lamont, D.L.: Copper sulfate - not a harmless chemical. Am. J. Forens. Med. Path. 9 : 226-227 (1988)
- Hayes, W.J.: Pesticides studied in man. Williams and Williams 1982
- Stein, R.S. et al.: Death after use of Cupric sulfate as emetic. JAMA 235 : 801 (1976)
- Csiky P.: On acute poisonings with copper sulphate. Arch. Toxicol. 17 : 20-26 (1958).

The medium fatal dose is difficult to estimate because of vomiting, but it is about 140 mg/kg.

5. The corrosive effect of large doses of copper sulphate to mucous membranes in the gastrointestinal tract leads to shock. Patients often die in shock 2 or 3 hours after ingestion. If they survive, the absorption of copper produces severe hemolysis, icterus or liver granulomas or/and renal failure. Therefore, transport classification of copper sulphate and its solutions has to be based on human experience.

6. We evaluated the toxicological reports on human experience and extrapolated the fatal dose for adults in respect to the classification criteria for packing group III of Class 6.1 (given as mg/kg dose limits for experimental animals). In analogy, we concluded that solutions of more than 25% copper sulphate only would represent a relatively low toxicity risk according to the UN Recommendations (Model Regulations).

Proposal

7. Following amendments to the Recommendation are proposed:

Add to Chapter 2:

"UN 3XXX COPPER SULPHATE, SOLID or SOLUTION 6.1 279, 2XX III"

Add two special provisions:

279 The substance is assigned to this classification or packing group based on human experience rather than the strict application of classification criteria set out in these Model Regulations.

"2XX Mixtures or preparations containing less than 25 percent copper sulphate are not subject to these Recommendations."

Add to index:

"Copper sulphate pentahydrate, see 6.1 UN 3XXX"

"Copper sulphate pentahydrate solution, see 6.1 UN 3XXX"

The following Packing Instructions should be assigned to the dangerous goods list:

For Copper sulphate, solid or solid mixture, Packing Instruction P 002 and IBC 05 should be assigned, for solutions P 001 and IBC 03 respectively.

The following tank codes should be assigned to the dangerous goods list:

For Copper sulphate, solid or solid mixtures, T 1 should be assigned, for solutions T 4 and T 6 respectively.
