



**Committee of Experts on the Transport of Dangerous Goods
and on the Globally Harmonized System of Classification
and Labelling of Chemicals****Sub-Committee of Experts on the Transport of Dangerous Goods****Forty-seventh session**

Geneva, 22 – 26 June 2015

Item 3 of the provisional agenda

Listing, classification and packing**Substances which could be identified as toxic and corrosive****Transmitted by the expert from the Republic of Korea¹****Introduction**

1. At the eighteenth session of the IMO Sub-Committee on Dangerous Goods, Solids cargoes and Containers (DSC 18, 2013), the Republic of Korea made a proposal (DSC18/7/8) on marine pollutant information on the Dangerous Goods List in the IMDG Code concerning the substances which meet the criteria for environmentally hazardous substances according to the GESAMP Hazard Profiles (BLG.1/Circ.34, Annex 7).
2. The proposal was made to provide correct information for shipper and carriers, and the Sub-Committee agreed the proposal and these substances are identified as marine pollutants in the IMDG Code (Amendment 37-14) after verification of E&T 20.
3. As same purpose above, assuming that the GESAMP hazard evaluation criteria and the classification of oral and dermal toxicity or skin irritation and corrosion of the United Nations Model Regulations follow the same United Nations GHS criteria, the information of oral and dermal toxicity or skin irritation and corrosion of the substances in the GESAMP Hazard Profiles (PPR.1/Circ.1, Annex 5) could be valuable data to determine the hazard of substances which are listed in the Dangerous Goods List (DGL) of the United Nations Model Regulations.

¹ In accordance with the programme of work of the Sub-Committee for 2015–2016 approved by the Committee at its seventh session (see ST/SG/AC.10/C.3/92, paragraph 95 and ST/SG/AC.10/42, para. 15).

Discussion

4. The grouping criteria of the Division 6.1 for oral and dermal toxic substance and Class 8 for skin corrosive substance in the Model regulations are the same as the criteria in the GESAMP Hazard evaluation procedure (GESAMP Revised Reports and Studies No.64, second edition).

5. The grouping criteria for the oral toxicity (LD₅₀) and dermal toxicity (LD₅₀) are shown in C1 and C2 of the table 1 according to the revised GESAMP Hazard evaluation procedure. And the grouping criteria for toxic substances in the provision 2.6.2.2.4.1 of the Model Regulations are shown in the table 2.

Table 1 Revised GESAMP Hazard evaluation procedure

Columns G and D Human health (toxic effects to mammals)						
Numerical Rating	C Acute Mammalian Toxicity			D Irritation, Corrosion and Long-term health effects		
	G1 Oral Toxicity	G2 Dermal Toxicity	G3 Inhalation Toxicity	D1 Skin irritation and corrosion	D2 Eye irritation and corrosion	D3 Long-term health effects
	LD ₅₀ /ATE (mg/kg)	LD ₅₀ /ATE (mg/kg)	LC ₅₀ /ATE (mg/l)			
0	>2000	>2000	>20	not irritating	not irritating	C – Carcinogenic M – Mutagenic R – Reprotoxic Ss – Sensitizing to skin Sr – Sensitizing to respiratory system A – Aspiration hazard T – Target Organ Toxicity N – Neurotoxic I – Immunotoxic
1	>300 – ≤5	>1000 – ≤2000	>10 – ≤20	mildly irritating	mildly irritating	
2	>50 – ≤300	>200 – ≤1000	>2 – ≤10	irritating	irritating	
3	>5 – ≤50	>50 – ≤200	>0.5 – ≤2	severely irritating or corrosive 3A Corr. (≤4 h) 3B Corr. (≤1 h) 3C Corr. (≤3 min)	severely irritating	
4	≤5	≤50	≤0.5			

Table 2 Grouping criteria for toxic substances of the Model Regulations

Packing Group	Oral toxicity LD ₅₀ (mg/kg)	Dermal toxicity LD ₅₀ (mg/kg)	Inhalation toxicity By dusts and mists LC ₅₀ (mg/L)
I	≤ 5.0	≤ 50	≤ 0.2
II	> 5.0 and ≤ 50	> 50 and ≤ 200	> 0.2 and ≤ 2.0
III	> 50 and ≤ 300	> 200 and ≤ 1000	> 2.0 and ≤ 4.0

6. Along the same lines, the grouping criteria for the skin corrosive substance also could be compared with the GESAMP Hazard evaluation procedure. The grouping criteria of Numerical Rating for the skin irritation and corrosion are also shown in D1 of the table 1. And the grouping criteria for corrosive substance in the provision 2.8.2.5 of the Model Regulations are shown in the table 3.

Table 3 Grouping criteria for corrosive substance of the Model Regulations

Packing Group	Exposure time	Observation period	Effect
I	≤ 3 min	≤ 60 min	Full thickness destruction of intact skin
II	> 3 min ≤ 1 h	≤ 14 d	Full thickness destruction of intact skin
III	> 1 h ≤ 4 h	≤ 14 d	Full thickness destruction of intact skin
III	-	-	Corrosive rate on either steel or aluminium surfaces exceeding 6.25mm a year at a test temperature of 55°C when tested on both materials

7. The EHS Working Group of GESAMP circulates the GESAMP Hazard Profiles (PPR.1/Circ.1) according to the GESAMP Hazard evaluation procedure.

Proposal

8. Following the GESAMP Hazard Profiles (PPR.1/Circ.1, Annex 5), if substances meet 2 and over in the Numerical Rating in column C1 and C2 which are not classified as Division 6.1 in the Model Regulations could be considered as potential toxic substances according to the criteria in provision 2.6.2.2.4.1 of the Model Regulations (refer to table 4).

Table 4 Comparison of the grouping criteria of the toxic substance in GESAMP Hazard evaluation procedure and Model Regulations

UN Model Regulations	Oral toxicity	Dermal toxicity	GESAMP Hazard Profiles
Packing Group	LD50 (mg/kg)	LD50 (mg/kg)	Numerical Rating
I	≤ 5.0	≤ 50	4
II	> 5.0 and ≤ 50	> 50 and ≤ 200	3
III	> 50 and ≤ 300	> 200 and ≤ 1000	2

9. Also following the GESAMP Hazard Profiles (PPR.1/Circ.1, Annex 5), if substances meet 3A, 3B or 3C in the Numerical Rating in column D1 which are not classified as Class 8 in the Model Regulations could be considered as potential corrosive substances according to the criteria in provision 2.8.2.5 of the Model Regulations (refer to table 5).

Table 5 Comparison of the grouping criteria of the skin corrosive substance in GESAMP Hazard evaluation procedure and Model Regulations

UN Model Regulations	Grouping criteria of the skin corrosive substance	GESAMP Hazard Profiles
Packing Group	(Exposure time)	Numerical Rating
I	≤ 3 min	3C
II	> 3 min ≤ 1 h	3B
III	> 1 h ≤ 4 h	3A

10. Among the results, substances that are not classified as Division 6.1 in the Model Regulations while the names of the substances meet the criteria of the Hazard evaluation procedure in the GESAMP Hazard Profiles (PPR.1/Circ.1, Annex 5) are shown in the Table 6.

11. In addition, substances that are not classified as Class 8 in the Model Regulations while the names of the substances meet the criteria of the Hazard evaluation procedure in the GESAMP Hazard Profiles (PPR.1/Circ.1, Annex 5) are shown in the Table 7.

Table 6 Substances lists which could be possible to classified as Division 6.1

UN Model Regulations DGL			GESAMP Hazard Profiles		
UN No	Class	Proper shipping Name	EHS Name	C1	C2
1005	2.3(8)	AMMONIA, ANHYDROUS	Ammonia(anhydrous and aqueous, 28% or less)	1	(2)
1036	2.1	ETHYLAMINE	Ethylamine	2	2
1125	3(8)	n-BUTYLAMINE	Butylamine	2	2
1130	3	CAMPHOR OIL	Camphor oil, white	2	NI
1154	3(8)	DIETHYLAMINE	Diethylamine	1	2
1160	3(8)	DIMETHYLAMINE, AQUEOUS SOLUTION	Dimethylamine(40-50% aq.sol)	2	0
1221	3(8)	ISOPROPYLAMINE	Isopropylamine	2	2
1235	3(8)	METHYLAMINE, AQUEOUS SOLUTION	Methylamine solution 42% or less	2	(2)
1277	3(8)	PROPYLAMINE	Propylamine	2	2
1296	3(8)	TRIETHYLAMINE	Triethylamine	1	2
1431	4.2(8)	SODIUM METHYLATE	Sodium Methylate (21-30% in Methanol)	2	(2)
1604	8(3)	ETHYLENEDIAMINE	Ethylene diamine	1	2
1754	8	CHLOROSULPHONIC ACID	Chlorosulphonic acid	(2)	(3)
1778	8	FLUOROSILICIC ACID	Fluorosilicic acid	2	(2)
1796	8	NITRATING ACID MIXTURE	Acid mixtures(nitrating acid)	3	3
1814	8	POTASSIUM HYDROXIDE SOLUTION	Potassium hydroxide(sol.)	2	(2)
2048	3	DICYCLOPENTADIENE	Dicyclopentadiene(80-90%)/Co-dimers(10-20%), mixtures	2	0
2054	8(3)	MORPHOLINE	Morpholine	1	2
2079	8	DIETHYLENETRIAMINE	Diethylene triamine	1	3
2209	8	FORMALDEHYDE SOLUTION	Formaldehyde (37-50% solution)	2	2
2215	8	MALEIC ANHYDRIDE	Maleic anhydride	1	2
		MALEIC ANHYDRIDE, MOLTEN			
2225	8	BENZENESULPHONYL CHLORIDE	Benzene sulphonyl chloride	1	(2)
2248	8(3)	DI-n-BUTYLAMINE	Di-n-butylamine	2	2
2259	8	TRIETHYLENETETRAMINE	Triethylenetetramine	0	2
2264	8(3)	N,N-DIMETHYL-CYCLOHEXYLAMINE	N,N-Dimethyl cyclohexylamine	1	2

2270	3(8)	ETHYLAMINE, AQUEOUS SOLUTION	Ethylamine solutions (72% or less)	2	2
2320	8	TETRAETHYLENEPENTAMINE	Tetraethylene pentamine	0	2
2357	8(3)	CYCLOHEXYLAMINE	Cyclohexylamine	2	2
2361	3(8)	DIISOBUTYLAMINE	Diisobutylamine	2	(2)
2389	3	FURAN	Furfural	2	(2)
2493	3(8)	HEXAMETHYLENEIMINE	Hexamethyleneimine	3	1
2511	8	2-CHLOROPROPIONIC ACID	2-Chloropropionic acid	1	(3)
2529	3(8)	ISOBUTYRIC ACID	Isobutyric acid	2	2
2815	8	N-AMINOETHYLPIPERAZINE	N-Aminoethylpiperazine	0	2
3320	8	SODIUM BOROHYDRIDE AND SODIUM HYDROXIDE SOLUTION	Sodium borohydride/sodium hydroxide mixture (soln.)	(2)	(1)

Table 7 Substances lists which could be possible to classified as Class 8

UN Model Regulations DGL			GESAMP Hazard Profiles	
UN No	Class	Proper shipping Name	EHS Name	D1
1131	3(6.1)	CARBON DISULPHIDE	Carbon disulphide	3A
2023	6.1(3)	EPICHLOROHYDRIN	Epichlorohydrin	3A
2313	3	PICOLINES	2-Methyl pyridine	3A
			3-Methyl pyridine	3
			4-Methyl pyridine	3

12. The Hazard Profiles can serve as valuable information for industries and shippers in evaluating hazardous substances. Therefore the expert from the Republic of Korea is of the opinion that if the lists of substances contained in table 6 and 7 are considered as potential substances as toxic or corrosive, they also could be identified as toxic substances or corrosive substances in the DGL of the Model Regulations.