



Secretariat

Distr.
GENERAL

ST/SG/AC.10/C.3/2004/12
31 March 2004

ORIGINAL: ENGLISH

**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

Twenty-fifth session, 5-14 July 2004
Item 6 of the provisional agenda

LISTING, CLASSIFICATION AND PACKING

Proposal to add new UN Numbers for Formic Acid (UN 1779) and Propionic Acid (UN 1848)

Transmitted by the expert from Germany

Background

1. During the March 2003 session of the International Maritime Organization (IMO)'s Sub-Committee on Dangerous Goods, Solid Cargoes and Containers (DSC), Germany drew attention to a problem concerning a very well known substance which is called propionic acid (UN 1848).
2. For this substance in column (17) of the Dangerous Goods List (DGL) of the IMDG Code the following information about properties and observations can be found:
Colourless, flammable liquid with a pungent odour. Miscible with water. Corrosive to lead and most other metals. Burns skin. Vapours irritate mucous membranes.
3. Although this substance is described as a flammable liquid there is no subsidiary risk of Class 3 mentioned in column (4) of the DGL of the IMDG Code.
4. Germany were asked to solve that problem by proposing a new UN number to the UN Sub-Committee.
5. During the work on this document the attention of Germany was drawn by the industry to a substance which shows similar properties as propionic acid. This substance is known as formic acid (UN 1779).

6. Germany gathered all necessary data to classify these two substances. These data are given in the data sheets of annexes 1 and 2 and supplementary information in annex 3.
7. To transfer the data of the data sheets and to classify formic acid (UN 1779) and propionic acid (UN 1848) correctly Germany proposes the following amendments to the Dangerous Goods List of the UN Model Regulations:

Proposal

8. UN 1779 FORMIC ACID
Column (2), amend the name and description to read as follows:
FORMIC ACID with more than 85% acid by mass
9. UN 1779 FORMIC ACID
Column (4), add "3"
10. Formic acid
Add a new entry to read as follows:

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
xxxx	FORMIC ACID with not less than 10% but not more than 85 % acid by mass	8		II		1 L	P001 IBC02		T7	TP2
	FORMIC ACID with not less than 5% but less than 10% acid by mass	8		III		5 L	P001 IBC03 LP01		T7	TP2

11. UN 1848 PROPIONIC ACID
Column (2), amend the name and description to read as follows:
PROPIONIC ACID with not less than 10% and less than 90% acid by mass
12. Propionic acid
Add a new entry to read as follows:

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
yyyy	PROPIONIC ACID with not less than 90% acid by mass	8	3	II		1 L	P001 IBC02		T7	TP2

ANNEXES (ENGLISH ONLY)**Annex 1****DATA SHEET TO BE SUBMITTED TO THE UNITED NATIONS
FOR NEW OR AMENDED CLASSIFICATION OF SUBSTANCES**

Submitted by Germany

Date 04-03-29

Supply all relevant information including sources of basic classification data. Data should relate to the product in the form to be transported. State test methods. Answer all questions – if necessary state "not known" or "not applicable" – if data is not available in the form requested, provide what is available with details. Delete inappropriate words.

Section 1. SUBSTANCES IDENTITY

- | | | | | |
|-------|---|------------------------------------|---|---------------------------|
| 1.1 | Chemical name | Formic acid | | |
| 1.2 | Chemical formula | CH₂O₂ | | |
| 1.3 | Other names/synonyms | none | | |
| 1.4.1 | UN Number | 1779 | 1.4.2 | CAS number 64-18-6 |
| 1.5 | Proposed classification for the Recommendations | | | |
| 1.5.1 | proper shipping name (3.1.2) | Formic acid | | |
| 1.5.2 | class/division | 8 | subsidiary risk(s) 3 for C > 85% | |
| | packing group | II | | |
| | class/division | 8 | subsidiary risk(s) no for 10% < C ≤ 85% | |
| | packing group | II | | |
| | class/division | 8 | subsidiary risk(s) no for 5% < C < 10% | |
| | packing group | III | | |
| 1.5.3 | proposed special provisions, if any | none | | |
| 1.5.4 | proposed packing instruction(s) | PG II = P001/IBC02 | | |
| | | PG III = P001/IBC03/LP01 | | |

Section 2. PHYSICAL PROPERTIES

- | | | |
|-------|------------------------|-------------------------------|
| 2.1 | Melting point or range | 8 °C |
| 2.2 | Boiling point or range | 101 °C |
| 2.3 | Relative density at: | |
| 2.3.1 | 15 °C | not known |
| 2.3.2 | 20 °C | 1.220 g/cm³ |
| 2.3.3 | 50 °C | not known |

2.4	Vapour pressure at:	
2.4.1	20 °C	4.2 kPa
	50 °C	17.0 kPa
2.4.2	65 °C	not known
2.5	Viscosity at 20 °C	1.8 mPa*s
2.6	Solubility in water at 20 °C	complete g/100 ml
2.7	Physical state at 20 °C (2.2.1.1)	solid / liquid / gas
2.8	Appearance at normal carriage temperatures, including colour and odour	colourless liquid, pungent odour
2.9	Other relevant physical properties	not known

Section 3. FLAMMABILITY

3.1	Flammable vapour	
3.1.1	Flash point (2.3.3)	see attachment
3.1.2	Is combustion sustained? (2.3.1.2)	yes / no
3.2	Autoignition temperature	480 °C
3.3	Flammability range (LEL/UEL)	12 / 38 % estimated
3.4	Is the substance a flammable solid? (2.4.2)	yes / no
3.4.1	If yes, give details ...	

Section 4. CHEMICAL PROPERTIES

4.1	Does the substance require inhibition/stabilization or other treatment such as nitrogen blanket to prevent hazardous reactivity?	yes / no
	If yes, state	
4.1.1	Inhibitor/stabilizer used ...	
4.1.2	Alternative method ...	
4.1.3	Time effective at 55 °C ...	
4.1.4	Conditions rendering it ineffective ...	
4.2	Is the substance an explosive according to paragraph 2.1.1? (2.1)	yes / no
4.2.1	If yes, give details ...	
4.3	Is the substance a desensitized explosive? (2.4.2.4)	yes / no
4.3.1	If yes, give details ...	
4.4	Is the substance a self-reactive substance? (2.4.1)	yes / no
	If yes, state	
4.4.1	exit box of flow chart	

- What is the self-accelerating decomposition temperature (SADT) for a 50 kg package? ... °C
Is the temperature control required? (2.4.2.3.4) yes / **no**
- 4.4.2 proposed control temperature for a 50 kg package ... °C
- 4.4.3 proposed emergency temperature for a 50 kg package ... °C
- 4.5 Is the substance pyrophoric? (2.4.3) yes / **no**
- 4.5.1 If yes, give details ...
- 4.6 Is the substance liable to self-heating? (2.4.3) yes / **no**
- 4.6.1 If yes, give details ...
- 4.7 Is the substance an organic peroxide (2.5.1) yes / **no**
- If yes state
- 4.7.1 exit box of flow chart
- What is the self-accelerating decomposition temperature (SADT) for a 50 kg package? ... °C
Is the temperature control required? (2.5.3.4.1) yes / no
- 4.7.2 proposed control temperature for a 50 kg package ... °C
- 4.7.3 proposed emergency temperature for a 50 kg package ... °C
- 4.8 Does the substance in contact with water emit flammable gases (2.4.4) yes / **no**
- 4.8.1 If yes, give details ...
- 4.9 Does the substance have oxidizing properties (2.5.1) yes / **no**
- 4.9.1 If yes, give details ...
- 4.10 Corrosivity (2.8) to:
- 4.10.1 mild steel ... **C>5%** **more than 6.25 mm/year at 55 °C**
- 4.10.2 aluminium ... **C>5%** **more than 6.25 mm/year at 55 °C**
- 4.10.3 other packing materials
(specify) **no** ... mm/year at ...
... mm/year at ...
- 4.11 Other relevant chemical properties ...not known...

Section 5. HARMFUL BIOLOGICAL EFFECTS

- 5.1 LD 50, oral (2.6.2.1.1) **730** mg/kg Animal species ...**rat**..
- 5.2 LD 50, dermal (2.6.2.1.2)**x**.. mg/kg Animal species ...
x...not published (Patty's Ind. Hyg. Toxicol. 4, 1994)
- 5.3 LC 50, inhalation (2.6.2.1.3) ...>**14.8**.... mg/litre Exposure time **.1**. hours
or ml/m³ Animal species ...
- 5.4 Saturated vapour concentration at 20 °C (2.6.2.2.4.3) **41.7**. ml/m³

5.5 Skin exposure (2.8) results: **corrosive**

Exposure time ... **x x** hours/minutes

x x...not published (Patty's Ind. Hyg. Toxicol. 3, 1981)

Animal species ... **rabbit**

5.6 Other data ...

5.7 Human experience ...**medical reports of acute exposures of workers show severe skin burns (C>90%) and mild to moderate skin burns (10%<C≤ 90%).**

Section 6. SUPPLEMENTARY INFORMATION

6.1 Recommended emergency action

6.1.1 Fire (include suitable and unsuitable extinguishing agents):

suitable are dry chemical powder, carbon dioxide, water spray and appropriate foam

6.1.2 Spillage:

Absorb on sand or vermiculite and place in closed containers for disposal; ventilate area and wash spill site after material pickup is complete

6.2 Is it proposed to transport the substance in:

6.2.1 Intermediate Bulk Containers (6.5) **yes** / no

6.2.2 Portable tanks (6.7) **yes** / no

If yes, give details in Sections 7. and/or 8.

Section 7. INTERMEDIATE BULK CONTAINERS (IBCs) (only complete if yes in 6.2.1)

7.1 Proposed type(s)

PG II = IBC02

PG III = IBC03

Section 8. MULTIMODAL TANK TRANSPORT(only complete if yes in 6.2.2)

8.1 Description of proposed tank (including IMO tank type if known)

For 8(3), II and 8, II and 8, III

T7

8.2. Minimum test pressure **4.0 bar**

8.3. Minimum shell thickness **see 6.7.2.4.2**

8.4. Details of bottom openings, if any **see 6.7.2.6.3**

8.5. Pressure relief arrangements **normal**

8.6. Degree of filling **TP2**

8.7. Unsuitable construction materials **no**

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Annex 2**DATA SHEET TO BE SUBMITTED TO THE UNITED NATIONS
FOR NEW OR AMENDED CLASSIFICATION OF SUBSTANCES**

Submitted by Germany

Date 04-03-25

Supply all relevant information including sources of basic classification data. Data should relate to the product in the form to be transported. State test methods. Answer all questions – if necessary state "not known" or "not applicable" – if data is not available in the form requested, provide what is available with details. Delete inappropriate words.

Section 1. SUBSTANCES IDENTITY

- | | | |
|-------|---|--|
| 1.1 | Chemical name | Propionic acid |
| 1.2 | Chemical formula | C₃H₆O₂ |
| 1.3 | Other names/synonyms | Propanoic acid |
| 1.4.1 | UN Number | 1848 |
| 1.4.2 | CAS number | 79-09-4 |
| 1.5 | Proposed classification for the Recommendations | |
| 1.5.1 | proper shipping name (3.1.2) | Propionic acid |
| 1.5.2 | class/division | 8 |
| | packing group | II |
| | class/division | 8 |
| | packing group | III |
| | | subsidiary risk(s) 3 for C ≥ 90% |
| | | subsidiary risk(s) no for 10% < C < 90% |
| 1.5.3 | proposed special provisions, if any | none |
| 1.5.4 | proposed packing instruction(s) | PG II = P001/IBC02
PG III = P001/IBC03/LP01 |

Section 2. PHYSICAL PROPERTIES

- | | | |
|-------|---------------------------------|-------------------------------|
| 2.1 | Melting/freezing point or range | -20 °C |
| 2.2 | Boiling point or range | 141 °C |
| 2.3 | Relative density at: | |
| 2.3.1 | 15 °C | not known |
| 2.3.2 | 20 °C | 0.992 g/cm³ |
| 2.3.3 | 50 °C | not known |

2.4	Vapour pressure at:	
2.4.1	20 °C	0.5 kPa
	50 °C	not known
2.4.2	65 °C	not known
2.5	Viscosity at 20 °C	10 mPas
2.6	Solubility in water at 20 °C	complete g/100 ml
2.7	Physical state at 20 °C (2.2.1.1)	solid / liquid / gas
2.9	Appearance at normal carriage temperatures, including colour and odour	colourless liquid, pungent odour
2.9	Other relevant physical properties	not known

Section 3. FLAMMABILITY

3.1	Flammable vapour	
3.1.1	Flash point (2.3.3)	see attachment
3.1.2	Is combustion sustained? (2.3.1.2)	yes / no
3.2	Autoignition temperature	485 °C
3.3	Flammability range (LEL/UEL)	2.0 / 12.0 % estimated
3.4	Is the substance a flammable solid? (2.4.2)	yes / no
3.4.1	If yes, give details ...	

Section 4. CHEMICAL PROPERTIES

4.1	Does the substance require inhibition/stabilization or other treatment such as nitrogen blanket to prevent hazardous reactivity?	yes / no
	If yes, state	
4.1.1	Inhibitor/stabilizer used ...	
4.1.2	Alternative method ...	
4.1.3	Time effective at 55 °C ...	
4.1.4	Conditions rendering it ineffective ...	
4.2	Is the substance an explosive according to paragraph 2.1.1? (2.1)	yes / no
4.2.1	If yes, give details ...	
4.3	Is the substance a desensitized explosive? (2.4.2.4)	yes / no
4.3.1	If yes, give details ...	
4.4	Is the substance a self-reactive substance? (2.4.1)	yes / no
	If yes, state	
4.4.1	exit box of flow chart	

- What is the self-accelerating decomposition temperature (SADT) for a 50 kg package? ... °C
- Is the temperature control required? (2.4.2.3.4) yes / no
- 4.4.2 proposed control temperature for a 50 kg package ... °C
- 4.4.3 proposed emergency temperature for a 50 kg package ... °C
- 4.5 Is the substance pyrophoric? (2.4.3) yes / **no**
- 4.5.1 If yes, give details ...
- 4.6 Is the substance liable to self-heating? (2.4.3) yes / **no**
- 4.6.1 If yes, give details ...
- 4.7 Is the substance an organic peroxide (2.5.1) yes / **no**
- If yes state
- 4.7.1 exit box of flow chart
- What is the self-accelerating decomposition temperature (SADT) for a 50 kg package? ... °C
- Is the temperature control required? (2.5.3.4.1) yes / no
- 4.7.2 proposed control temperature for a 50 kg package ... °C
- 4.7.3 proposed emergency temperature for a 50 kg package ... °C
- 4.8 Does the substance in contact with water emit flammable gases (2.4.4) yes / **no**
- 4.8.1 If yes, give details ...
- 4.9 Does the substance have oxidizing properties (2.5.1) yes / **no**
- 4.9.1 If yes, give details ...
- 4.10 Corrosivity (2.8) to:
- | | | | |
|--------|-------------------------|-----------------|--|
| 4.10.1 | mild steel ... | C>10% | more than 6.25 mm/year at 55 °C |
| 4.10.2 | aluminium ... | C>10% | more than 6.25 mm/year at 55 °C |
| 4.10.3 | other packing materials | | |
- (specify) **no** ... mm/year at ...
- mm/year at ...
- 4.11 Other relevant chemical properties ... not known...

Section 5. HARMFUL BIOLOGICAL EFFECTS

- | | | | | | |
|-----|--|---------------------|-------------------|-----------------------|-----------------|
| 5.1 | LD 50, oral (2.6.2.1.1) | 3500-4200 | mg/kg | Animal species | rat.. |
| 5.2 | LD 50, dermal (2.6.2.1.2) | 500.... | mg/kg | Animal species | rabbit |
| 5.3 | LC 50, inhalation (2.6.2.1.3) | >19.7.... | mg/litre | Exposure time | 1. hours |
| | | or | ml/m ³ | Animal species | rat.. |
| 5.4 | Saturated vapour concentration at 20 °C (2.6.2.2.4.3) 4.96 ml/m³ | | | | |
| 5.5 | Skin exposure (2.8) results: corrosive | | | | |
| | Exposure time ... | 1 + 5 + 15 | | hours/ minutes | |
| | Animal species ... | rabbit | | | |

5.6 Other data ...

5.7 Human experience ... **medical reports of acute exposures of workers show moderate skin burns (C>25%).**

Section 6. SUPPLEMENTARY INFORMATION

6.1 Recommended emergency action

6.1.1 Fire (include suitable and unsuitable extinguishing agents):

suitable are dry chemical powder, carbon dioxide, water spray and appropriate foam

6.1.3 Spillage:

Absorb on sand or vermiculite and place in closed containers for disposal; ventilate area and wash spill site after material pickup is complete

6.2 Is it proposed to transport the substance in:

6.2.1 Intermediate Bulk Containers (6.5) **yes** / no

6.2.2 Portable tanks (6.7) **yes** / no

If yes, give details in Sections 7. and/or 8.

Section 7. INTERMEDIATE BULK CONTAINERS (IBCs) (only complete if yes in 6.2.1)

7.1 Proposed type(s)

PG II = IBC02

PG III = IBC03

Section 8. MULTIMODAL TANK TRANSPORT (only complete if yes in 6.2.2)

8.2 Description of proposed tank (including IMO tank type if known)

	for 8(3), II	for 8, III
	T7	T4
8.2. Minimum test pressure	4.0 bar	2.65 bar
8.3. Minimum shell thickness	see 6.7.2.4.2	see 6.7.2.4.2
8.4. Details of bottom openings, if any	see 6.7.2.6.3	see 6.7.2.6.3
8.5. Pressure relief arrangements	normal	normal
8.6. Degree of filling	TP2	TP1
8.7. Unsuitable construction materials	no	no

* * * * *

Annex 3

UN 1779 Formic acid + UN 1848 Propionic acid

Transport classification as a function of concentration						
Status	UN-No.	Specification	Concentration	PG	Label	Comments
New	1848	Propionic acid CH ₃ -CH ₂ -COOH	≥ 90%	II	8 + 3	for Fp <61°C
Old	1848	Propionic acid	10 to < 90%	III	8	for Fp >61°C including corrosiv to metals

Status	UN-No.	Specification	Concentration	PG	Label	Comments
New	1779	Formic acid CH-OOH	> 85%	II	8 + 3	for Fp <61°C
Old	1779	Formic acid	10 to ≤ 85%	II	8	for Fp >61°C
New	XXXX	Formic acid	5 to < 10%	III	8	corrosiv to metals

For comparison:

Status	UN-No.	Specification	Concentration	PG	Label	Comments
Old	2789	Acetic acid CH ₃ -COOH	> 80%	II	8 + 3	for Fp <61°C
Old	2790	Acetic acid	50 to ≤ 80%	II	8	for Fp >61°C
Old	2790	Acetic acid	> 10 to < 50%	III	8	corrosiv to metals

Old means the existing one.

Labelling hazard information as a function of concentration according the EU directive 67/548/EWG						
Status	No.	Specification	Concentration	PG	Symbol	R-Phrase
EG	200-579-1	Formic acid CH-OOH	≥ 90%	--	C	35
CAS	64-18-6	Formic acid	10 to < 90%	--	C	34
Index	607-001-00-0	Formic acid	2 to < 10%	--	XI	36/38
Status	No.	Specification	Concentration	PG	Symbol	R-Phrase
EG	200-580-7	Acetic acid CH ₃ -COOH	≥ 90%	--	C	35
CAS	64-19-7	Acetic acid	25 to < 90%	--	C	34
Index	607-002-00-6	Acetic acid	10 to < 25%	--	XI	36/38
Status	No.	Specification	Concentration	PG	Symbol	R-Phrase
EG	201-176-3	Propionic acid CH ₃ -CH ₂ -COOH	≥ 25%	--	C	34
CAS	79-09-4	Propionic acid	10 to < 25%	--	XI	36/37/38

Flashpoint as a function of the concentration		
Concentration %	Flashpoint of formic acid (UN 1779)	Flashpoint of propionic acid (UN 1848)
100	48	50
95	51	54
90	57	61
85	65	72
80	82	91

