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**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-sixth session**

Geneva, 1 – 9 December 2014

Item 7 of the provisional agenda

**New proposals for amendments to the Model Regulations on the Transport of Dangerous Goods****N-Aminoethylpiperazine (UN 2815): subsidiary risk 6.1****Transmitted by the expert from the United States of America<sup>1</sup>****Introduction**

1. In the Dangerous Goods list, N-Aminoethylpiperazine is currently listed under entry UN 2815, Class 8, packing group III.
2. Available data indicates however, that N-Aminoethylpiperazine, currently classified and listed in the Dangerous Goods list as a dermal corrosive, should also be assigned a Division 6.1 subsidiary risk based on dermal toxicity.
3. Toxicity data supporting this assessment is summarized in the International Uniform Chemical Information Database (IUCLID) compiled by the European Union Registration, Evaluation, Authorisation, and restriction of Chemical substances (EU REACH) consortium. The data sheet for N-Aminoethylpiperazine is contained in the Annex 1 to this document. The relevant supporting toxicity testing data included in Annex 2 and indicates the dermal toxicity of N-Aminoethylpiperazine is 866 mg/kg. This toxicity value corresponds to a Dermal Toxic, Packing Group III.
4. Taking into account the dermal toxicity properties outlined above, and following paragraph 2.0.3 of the Model Regulations (Precedence of hazard characteristics), N-Aminoethylpiperazine would remain to be classified under Class 8, with the addition of subsidiary risk 6.1. It is therefore proposed to make appropriate amendments to the Dangerous Goods List as shown below. A review of the guiding principles has

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<sup>1</sup> In accordance with the programme of work of the Sub-Committee for 2013-2014 approved by the Committee at its sixth session (refer to ST/SG/AC.10/C.3/84, para. 86 and ST/SG/AC.10/40, para. 14).

substantiated that no additional amendments other than the addition of the subsidiary risk (i.e. amendments to packing or tank provisions etc.) are necessary.

## Proposal

5. Amend entry 2815 in the Dangerous Goods List to read as follows:

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UN No.	Name and description	Class or division	Subsidiary risk	UN packing group	Special provisions	Limited and excepted quantities		Packagings and IBCs	Portable tanks and bulk containers		
						(7a)	(7b)		Packing instruction	Special provisions	Instruction
(1)	(2)	(3)	(4)	(5)	(6)	(7a)	(7b)	(8)	(9)	(10)	(11)
2815	N-AMINOETHYL PIPERAZINE	8	<u>6.1</u>	III		5 L	E1	P001 IBC03 LP01		T4	TP1

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**Annex 1**

[English only]

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

Submitted by.....United States Date....4 September 2014

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. SUBSTANCE IDENTITY**

- 1.1 Chemical name **N-Aminoethylpiperazine**
- 1.2 Chemical formula  $C_6H_{15}N_3$
- 1.3 Other names/synonyms 2-piperazin-1-ylethanamine
- 1.4.1 UN number **2815** ..... 1.4.2..... CAS number **140-31-8**
- 1.5 Proposed classification for the Recommendations
- 1.5.1 Proper shipping name (3.1.2) **N-AMINOETHYLPIPERAZINE** .....
- 1.5.2 Class/division **8**..... subsidiary risk(s) **6.1** .....  
packing group **III**.....
- 1.5.3 Proposed special provisions, if any **Not Applicable** .....
- 1.5.4 Proposed packing instruction(s) **Not Applicable** .....

**Section 2. PHYSICAL PROPERTIES**

- 2.1 Melting point or range .....**-19 °C**
- 2.2 Boiling point or range .....**220.4 °C**
- 2.3 Relative density at:
- 2.3.1..... 15 °C
- 2.3.2..... 20 °C **0.98 g/cm<sup>3</sup>**
- 2.3.3..... 50 °C
- 2.4 Vapour pressure at:
- 2.4.1..... 50 °C **5.15 Pa @ 20 °C**
- 2.4.2..... 65 °C
- 2.5.. Viscosity at 20 °C .....**14.1 mPa – sec @ 20 °C**
- 2.6 Solubility in water at 20 °C .....~~g/100ml~~ **> 100 g/l**
- 2.7 Physical state at 20°C (2.2.1.1) **liquid**
- 2.8 Appearance at normal transport temperatures, including colour and odour  
**Clear liquid; Amine odor**
- 2.9 Other relevant physical properties

**Section 3. FLAMMABILITY**

- 3.1 Flammable vapour
- 3.1.1 Flash point (2.3.3) **99 °C cc**
- 3.1.2 Is combustion sustained? (2.3.1.3) **no**
- 3.2 Autoignition temperature .....>**300 °C**
- 3.3 Flammability range (LEL/UEL) **1.1 – 9.4 %**
- 3.4 Is the substance a flammable solid? (2.4.2<sup>1</sup>) **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? **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 2.1.1.1? (2.1<sup>1</sup>) **no**
- 4.2.1 If yes, give details .....
- 4.3 Is the substance a desensitized explosive? (2.4.2.4<sup>1</sup>) **no**
- 4.3.1 If yes, give details .....
- 4.4 Is the substance a self-reactive substance? (2.4.1<sup>1</sup>) **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<sup>1</sup>) 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<sup>1</sup>) **no**
- 4.5.1 If yes, give details .....
- 4.6 Is the substance liable to self-heating? (2.4.3<sup>1</sup>) **no**
- 4.6.1 If yes, give details
- 4.7 Is the substance an organic peroxide (2.5.1) **no**
- If yes state:

<sup>2</sup> See definition of "liquid" in 1.2.1 of the Model Regulations on the Transport of Dangerous Goods.

<sup>1</sup> This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.

- 4.7.1 Exit box of flow chart .....  
 What is the self accelerating decomposition temperature (SADT) for a 50 kg package? ..... °C  
 Is temperature control required? (2.5.3.4.1<sup>1</sup>) 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<sup>1</sup>) **no**
- 4.8.1 If yes, give details .....
- 4.9 Does the substance have oxidizing properties (2.5.1<sup>1</sup>) **no**
- 4.9.1 If yes, give details .....
- 4.10 Corrosivity (2.8<sup>1</sup>) to:
- |        |  |                      |    |                 |
|--------|--|----------------------|----|-----------------|
| 4.10.1 | .....mild steel                          | <b>0.005 mm/year</b> |    | <b>at 25 °C</b> |
| 4.10.2 | .....aluminium                           | mm/year              | at | °C              |
| 4.10.3 | .....other packaging materials (specify) |                      |    |                 |
|        |  | mm/year              | at | °C              |
|        |  | mm/year              | at | °C              |
- 4.11 Other relevant chemical properties **None**

## Section 5. HARMFUL BIOLOGICAL EFFECTS

- 5.1 LD<sub>50</sub>, oral (2.6.2.1.1<sup>1</sup>) **2140 mg/kg Rat**
- 5.2 LD<sub>50</sub>, dermal (2.6.2.1.2<sup>1</sup>) **866 mg/kg Rabbit**
- 5.3 LC<sub>50</sub>, inhalation (2.6.2.1.3<sup>1</sup>)...mg/l.....Exposure time hours  
 or..... **6 ml/m<sup>3</sup> Animal species** .....
- 5.4 Saturated vapour concentration at 20 °C (2.6.2.2.4.3<sup>1</sup>) **50 - 75 ppm**
- 5.5 Skin exposure (2.8<sup>1</sup>) results **30 - 60 minutes Rabbit**
- 5.6 Other data **PG III**
- 5.7 Human experience

## Section 6. SUPPLEMENTARY INFORMATION

- 6.1 Recommended emergency action
- 6.1.1 Fire (include suitable and unsuitable extinguishing agents)
- 6.1.2 Spillage

<sup>1</sup> This and similar references are to chapters and paragraphs in the Model Regulations on the transport of Dangerous Goods.

- 6.2 Is it proposed to transport the substance in:
    - 6.2.1 Bulk Containers (6.8<sup>1</sup>) **yes**
    - 6.2.2 Intermediate Bulk Containers (6.5<sup>1</sup>)? **yes**
    - 6.2.3 Portable tanks (6.7<sup>1</sup>)? **yes**
- If yes, give details in Sections 7, 8 and/or 9.

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

- 7.1 Proposed type(s) **Currently Authorized Containers**

**Section 8. INTERMEDIATE BULK CONTAINERS (IBCs) (only complete if yes in 6.2.2)**

- 8.1 Proposed type(s) **Currently Authorized IBCs**

**Section 9. MULTIMODAL TANK TRANSPORT (only complete if yes in 6.2.3)**

- 9.1 Description of proposed tank (including IMO tank type if known) **Currently Authorized Tanks**
- 9.2 Minimum test pressure
- 9.3 Minimum shell thickness
- 9.4 Details of bottom openings, if any
- 9.5 Pressure relief arrangements
- 9.6 Degree of filling .....
- 9.7 Unsuitable construction materials .....

## Annex 2

[English only]

Substance: AMINES: Aminoethyl piperazine / 2-piperazin-1-ylethylamine / 2-pipera... Page 247 of 413

**7.2.3 Acute toxicity: dermal****Endpoint study record: KS\_DOW & Smyth\_1956;1962:****Acute dermal, rat**

UUID IUC5-906da860-5b49-4b7e-97fa-86d8ee4ca8ed

Dossier UUID 0

Author N006097 / (No legal entity)

Date 2010-05-18 18:01:43 EDT

Remarks

**Administrative Data**

EU: REACH

Purpose flag key study; robust study summary

Study result type experimental result Study period Not applicable

Reliability 2 (reliable with restrictions)

Rationale for reliability incl. deficiencies 2e: Meets generally accepted scientific standards, well-documented and acceptable for assessment

**Data source****Reference**

Reference type	Author	Year	Title	Bibliographic source	Testing laboratory	Report no.	Owner company	Company study no.	Report date
publication	Smyth, H.F. et al	1962		Am Ind Hyg Assoc J, vol 23 ; p. 95					
study report	The Dow Chemical Company	1956	N-(2-AMINOETHYL) PIPERAZINE: RANGE FINDING TESTS ON N-(2-AMINOETHYL) PIPERAZINE		Mellon Institute of Industrial Research University of Pittsburgh Pittsburgh, Pmeesylvania USA	19-22	The Dow Chemical Company	K-024280-016	1956-01-30

**Data access**

data published

**Cross-reference to same study**

Not applicable

**Materials and methods****Test type**

standard acute method

**Limit test**

no

file://C:\Documents and Settings\H16797\Local Settings\Temp\notesF8852D\Aminoethyl ... 12/2/2010

**Test guideline**

Qualifier	Guideline	Deviations
no guideline available		

**Principles of method if other than guideline**

Essentially followed the method of Draize et al.

**GLP compliance**

no

**Test materials**

**Identity of test material same as for substance defined in section 1 (if not read-across)**

yes

**Test material identity**

Identifier	Identity
CAS number	140-31-8
EC number	205-411-0
IUPAC name	2-piperazin-1-ylethanamine

**Details on test material**

AEP reported to contain 2.5% diethylenetriamine.

**Confidential details on test material**

Not applicable

**Test animals****Species**

rabbit

**Strain**

New Zealand White

**Sex**

male

**Details on test animals and environmental conditions**

Groups of four male New Zealand white rabbits, 3 to 5 months of age and averaging 2.5 kg were used.

The rabbits were procured locally and maintained on Rockland rabbit ration.

**Administration / exposure****Type of coverage**

occlusive

**Vehicle**

no data

**Details on dermal exposure**



Substance: AMINES: Aminoethyl piperazine / 2-piperazin-1-ylethylamine / 2-pipera... Page 249 of 413

The fur is removed and the test material applied beneath an impervious plastic film

#### Duration of exposure

The test material is in contact for 24 hours after which the plastic film is removed and the rabbits are held for a 14-day observation period.

#### Doses

0.625 or 1.25 ml of test material/kg

#### No. of animals per sex per dose

4 males/dose

#### Control animals

no data

#### Details on study design

Rabbits were immobilized during the 24-hour skin contact period. Thereafter, the "Vinylite" sheeting used to retain the dose in contact with the clipped skin of the trunk was removed and the animals were caged for the remainder of the 14-day observation period.

#### Statistics

Thompson's method of calculating the LD50 was used.

#### Any other information on materials and methods incl. tables

Male albino New Zealand strain rabbits, 3 to 5 months of age and averaging 2.5 kg. in weight were immobilized during the 24-hour skin contact period. Thereafter, the "Vinylite" sheeting used to retain the dose in contact with the clipped skin of the trunk was removed and the animals were caged for the remainder of the 14-day observation period.

### Results and discussions

#### Preliminary study (if fixed dose study)

Not applicable

#### Effect levels

Sex	Endpoint	Effect level	Based on	95% CL	Remarks
male	LD50	866 mg/kg bw			

#### Mortality

One of three male rabbits dosed with 0.625 ml/kg died and two of three male rabbits dosed with 1.25 ml/kg died. All deaths occurred within 2 days.

#### Clinical signs

No additional information available.

#### Body weight

The lone survivor from the high dose group lost 250 grams while the two survivors from the low dose lost 290 gram or gained 30 grams.

#### Gross pathology

Congestion of the lungs, mottling of the livers and pitting or speckling of the kidney surfaces was observed (not stated whether this was in the survivors or animals that died).

**Other findings**

No additional information available.

**Any other information on results incl. tables**

These covered applications produced necrosis of the skin, congestion of the lungs, mottling of the livers and pitting or speckling of the kidney surf aces.

Aminopropyl morpholine has a comparable value of 1.2 ml/kg. and diethylene trimine 1.1 ml/kg.

**Overall remarks, attachments**

**Overall remarks**

0.88 ml/kg corresponds to 866 mg/kg using a density of 0.984g/cm<sup>3</sup> at 20°C.

**Applicant's summary and conclusion**

**Interpretation of results**

Toxicity Category III

**Criteria used for interpretation of results**

OECD GHS

**Conclusions**

The 24 hour dermal LD50 was 0.88 ml/kg (866 mg/kg).

**Executive summary**

By skin penetration on rabbits the LD50 is 0.88 (0.34 to 2.3) ml/kg (866 mg/kg). This is to be expected because of the necrotic action of the mixture on rabbit skin which destroys the skin barrier entirely.

**Cross-reference to other study**

Not applicable