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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

Fifty-eighth session
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Item 3 of the provisional agenda
Listing, classification and packing

Classification of UN 1010, mixtures of Butadienes and Hydrocarbons

Submitted by the European Chemical Industry Council (Cefic)*

Executive Summary:	The concentration of butadiene in butadienes/hydrocarbon-mixtures produced in Europe usually varies between 20% and 45%, which poses a practical problem to use UN 1010 for these substances
Action to be taken:	Paragraph 10
Related documents:	ECE/TRANS/WP.15/AC.1/2019/16 - (Spain) UN No. 1010 Butadienes, stabilized ECE/TRANS/WP.15/AC.1/INF.36 (CEFIC)

Introduction

1. Following document “ECE/TRANS/WP.15/AC.1/2019/16" from Spain, the Joint Meeting at their session of March 2019 adopted the following amendment.

> For the purpose of harmonization of RID, ADR and ADN with the UN Model Regulations, the description of butadienes/hydrocarbon-mixtures (UN 1010) was amended as follows:
>
> From “***BUTADIENES AND HYDROCARBON MIXTURE, STABILIZED having a vapour pressure at 70 °C not exceeding 1.1 MPa (11 bar) and a density at 50 °C not lower than 0.525 kg/l***” to “***BUTADIENES AND HYDROCARBON MIXTURE, STABILIZED containing more than 40 % butadienes***” with entry into force on 1 January 2021

* A/75/6 (Sect.20), para. 20.51

2. Cefic would like to draw the attention on this issue, as it recently came to our awareness that these changes have substantial implications for the chemical industry in Europe. The producers of butadienes/hydrocarbon-mixtures within the European chemical industries have been looking at the sales specifications and typical analytical values of these products and have found that:

(a) sales specifications have a percentage of Butadiene of at least 20 %;

(b) the typical values are, in about half of the cases, lower than 40 %;

(c) these mixtures all have a vapour pressure at 70 °C not exceeding 1.1 MPa (11 bar) and a density at 50 °C not lower than 0.525 kg/l.

3. This has the following consequences:

(a) For each shipment, and even each package (truckload, rail tank car, ISO-container), the percentage of butadiene must be determined as higher or lower than 40 %.

(b) If the butadiene content is below 40 %, UN 1010 should not be used but a different UN-number, most likely UN 1965 or UN 3161. *Note*: In Europe UN 1965 is used for LPG instead of UN 1075.

(c) The transport conditions would not differ though, so from a technical point of safety, this change of UN number does not result in stricter nor safer transport conditions.

(d) IT-systems must be adapted, so it would introduce a risk for human error, leading to administrative mistakes. Therefore, there is both a safety risk due to mistakes and an increase of administrative costs at all parties concerned such as producers, carriers and customers.

(e) Having the same product with two UN numbers implies potential issues with local permits.

(f) Also, in case of an incident, emergency responders could be confused. UN 1010 clearly reflects the specific danger of butadiene (e.g. carcinogenic), whereas UN 3161 is a n.o.s.-entry, and emergency responders need access to the transport document before realizing butadiene is involved. In Europe UN 1965 is ordinarily referred to as LPG, in which butadiene is not present, and normally referred to as Mixture A - C, not identifying butadiene as a component at all.

(g) Neither UN 1965 nor UN 3161 have a description that accommodates ‘stabilized’, so that specific aspects will not be addressed in the transport document. In fact, unlike UN 1010, UN 1965 does not contain a remark, which requires to have provisions to stabilize the product during transport and extra information on the transport document.

4. It can be concluded that the use of UN 1010 reflects the risks of butadiene mixtures better than UN 1965 or UN 3161. Therefore, the use is in line with the general classification rule that a substance should be transported under the most specific entry that covers its properties (see sub-section 2.0.0.2).

Historical background

5. All of these consequences above are the downstream consequences of the choice of the current limit of 40 %, and all producers in Europe have an issue with it. This concentration limit has been adopted at the UN in the beginning of this century.

6. In 2001, the United States of America requested to change the entry for UN 1010 in a way that mixtures of hydrocarbons and butadienes could be transported under this UN number according to the UN Recommendations (now: UN Model Regulations). The proposal stated:

"(a) A mixture of 1,3-butadiene (in concentrations greater than 40 %), butane, acetylene, propylene, and 1,2-butadiene is produced as a by-product of the process of synthesizing ethylene. This mixture of liquefied petroleum gases is transported to various facilities where the 1,3-butadiene is separated for further use. The mixture has characteristics similar to butadienes transported under UN 1010 for which stabilization is required to prevent it from polymerizing violently when exposed to high temperatures. The proper shipping name (PSN) "Mixtures of 1,3-Butadiene and hydrocarbons, stabilized" is currently included in ADR for UN 1010 but is not listed as an alternative PSN in the Model Regulations. ……

(b) To more adequately describe this mixture, the expert from the United States of America proposes to introduce an alternative PSN for the entry UN 1010 as follows:

In column 2 of the Dangerous Goods List add the words "or BUTADIENES AND HYDROCARBON MIXTURE, STABILIZED, containing more than 40 % butadienes" after "BUTADIENES, STABILIZED"."

(see https://unece.org/DAM/trans/doc/2001/ac10c3/ST-SG-AC10-C3-2001-32e.pdf)

7. The actual text was adopted in the July 2001 session of the Sub-Committee.

(see https://unece.org/DAM/trans/doc/2001/ac10c3/ST-SG-AC10-C3-38e.pdf)

8. Although the proposal by the United States of America referred to ADR, the Joint Meeting did not take over at its September 2003 session the 40 % concentration limit. After a lengthy discussion, the Joint Meeting agreed not to amend the existing description of these mixtures which appeared as a lower-case addition to the proper shipping name, while accepting the new name in upper-case.

(see https://unece.org/DAM/trans/doc/2003/wp15ac1/TRANS-WP15-AC1-94e.pdf)

9. More background information can be found in informal document INF.4 (tabled by the International Union of Railways (UIC)) during the September 2003 session of the Joint Meeting:

"(a) The 40 % concentration limit value was proposed by the USA because this mixture is produced as a by-product of the process of synthesizing ethylene, and because, according to the expert from the USA, in RID/ADR there has been always such a limit value for the concentration of butadiene. According to our recollection, however, there has never been such a concentration limit in RID/ADR. The RID/ADR, however, specifies limit values for the vapor pressure of the mixtures at 70 °C and density at 50 °C. These values are used to establish test pressure and maximum permissible mass of contents per liter of capacity for pressure receptacles and tanks and they are the basis for the markings of the receptacles and the tanks.

(b) According to experts from the petrochemical industries mixtures with a concentration less than 40% butadienes should also be stabilized for safety reasons.

(c) If the 40% limit value is adopted, mixtures with less than 40% butadienes cannot be classified under UN 1010, and will have to be classified under UN 1965, mixtures A to C or even under UN 3161. This is definitely a misleading situation for emergency response.

Because these mixtures are transported on a very large scale between oil refineries and petrochemical industries in Europe in rail tank wagons and other tanks, the UIC/IUR urgently asks the Joint RID/ADR-meeting not to adopt the amendments in the form proposed by the secretariat.

The UN-Sub-Committee in its July 2003 session unfortunately did not discuss this matter to an end, but there seemed to be enough sympathy with the experts to delete at least the 40% limit value."

(see: https://unece.org/DAM/trans/doc/2003/wp15ac1/TRANS-WP15-AC1-2003-GE-inf04e.pdf)

Proposal

10. Cefic proposes the following amendment for consideration by the Sub-Committee:

In 3.2 replace "UN 1010 BUTADIENES AND HYDROCARBON MIXTURE, STABILIZED containing more than 40 % butadienes" by *"UN 1010 BUTADIENES AND HYDROCARBON MIXTURE, STABILIZED containing more than 20 % butadienes"*.

11. Consequential amendment:

RID/ADR Table 2.2.2.3 "Liquefied gases, classification code 2F" shall be amended accordingly.