



**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****Fortieth session**

Geneva, 28 November – 7 December 2011

Item 2 (c) of the provisional agenda

Listing, classification and packing: miscellaneous**Classification under UN 2211 and UN 3314****(POLYMERIC BEADS, EXPANDABLE, evolving flammable vapour
and PLASTICS MOULDING COMPOUNDS, in dough, sheet or
extruded rope form evolving flammable vapour).****Transmitted by the International Council of Chemical Association
(ICCA)¹****Introduction**

1. Polymeric beads, expandable and Plastics moulding compounds, evolving flammable vapours have to be classified in class 9, with UN numbers 2211 and 3314. Historically the Proper Shipping Name for UN2211 was Polystyrene beads expandable, but along with the development of new products the Proper Shipping Name was changed to Polymeric beads expandable.

2. Under these UN numbers 2211 and 3314, there is no distinction between those materials that evolve a lot of flammable vapour and those that evolve almost no or few flammable vapours. The risk for formation of an explosive atmosphere is very much depending on the product properties. New products that do not or hardly evolve flammable vapours and that will never reach the Lower Explosive Limit (LEL) in a closed container are being developed. Consequently they should not be classified in class 9, under UN 2211 and UN 3314.

¹ In accordance with the programme of work of the Sub-Committee for 2009-2010 approved by the Committee at its fourth session (refer to ST/SG/AC.10/C.3/68, para. 118 (a) and ST/SG/AC.10/36, para. 14).

Justification

3. To show the great difference between new developed products with other polymers and EPS (Expandable Polystyrene), tests were performed in closed serum bottles to simulate worst case scenario in a loaded container without any ventilation at a temperature of 50 °C. The serum bottles were stored at elevated temperature and after one week the gas phase was analyzed for flammable vapours (the blowing agent). The LEL for the mentioned vapours are:

- Isopentane: 1.32 vol-% (20 °C), 1.27 vol-% (50 °C)
- n-Pentane: 1.40 vol-% (20 °C), 1.37 vol-% (50 °C)

The results of the tests are given in the following table:

Sample	Blowing agent used	Conditions	Concentration in vapour phase
Product 1	Isopentane	50 °C, 1 week	0.0164 vol-%
Product 2(EPS)	n-Pentane	50 °C, 3hour	>2,0 vol-%
		24 °C, 1 week	4,7 vol-%

4. These results show that there are products (product 1 in this case) with extremely slow release of flammable vapours so that practically the LEL level cannot be reached. For these substances no flammable (explosive) atmosphere is formed, even under extreme conditions (i.e. 50 °C and complete closed condition).

5. ICCA is of the opinion that such substances do not pose a risk of vapour explosion and should therefore not be classified under UN numbers 2211 and 3314. Therefore a special provision is proposed in which a simple test method is prescribed for the determination of the evolution of flammable vapours at 50 °C and in case the concentration is 50% lower (i.e. taking a 50% safety margin) than the LEL the product should not be classified under the relevant UN number.

Proposals

6. Based on the above given arguments ICCA proposes to add to special provision SP207, assigned to UN 2211 and UN 3314, the following sentence:

“Substances, where no risk of formation of a flammable (explosive) atmosphere in a container at storage temperature up to 50°C exists, are not subject to these Regulations. The test to confirm this absence of risk consists in storing the substance at 50°C for two weeks in a serum bottle with the same weight/volume relation as is to be expected in a container: the concentration of the flammable vapours shall not exceed 50% of the Lower Explosive Limit (LEL) of the flammable vapour evolved.”.

4 Justification of test conditions

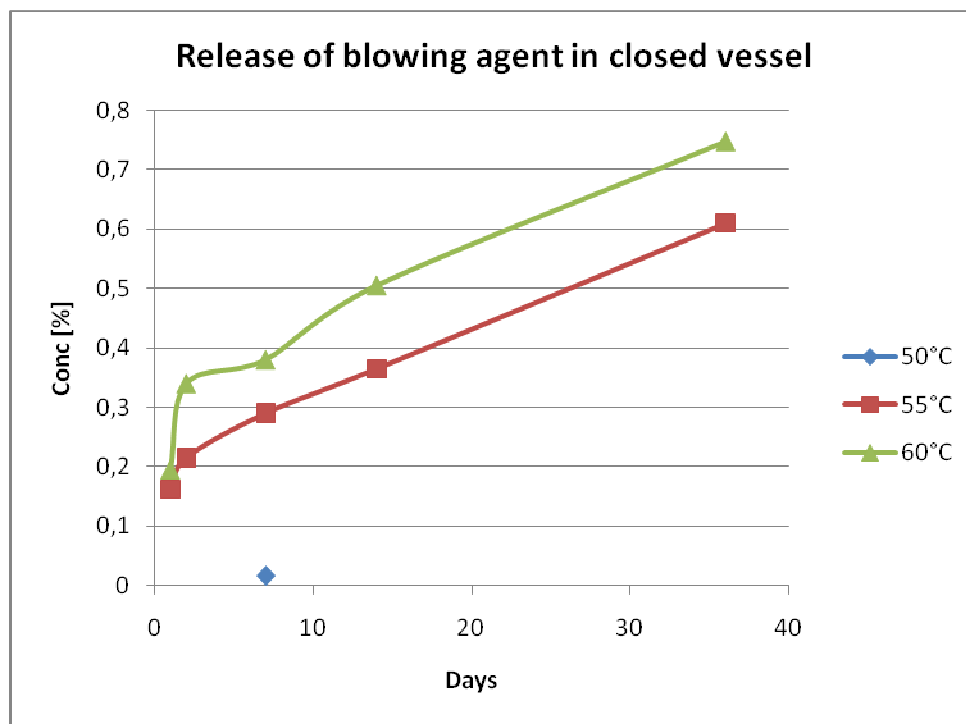
7. To justify the test-conditions, trials have been performed at 55 and 60°C. It should be noted that these conditions are very extreme and will only occur for very short period of times (hours), if at all (see diagram of Temperature in a container transport from Sweden to United States of America). From the figure below it is apparent that the release of flammable vapours is proportional with the temperature i.e. as soon as the temperature is

lowered the release decreases. For this reason it is proposed to test the material very conservatively:

- Under absolutely closed conditions (in Serum flasks)
- Without packaging
- Under a constant very high thermal load (50°C) (in practice the bulk of the material never reaches these high temperatures)
- In small flasks max 100ml.
- For 2 weeks.
- At most reaching max. 50% of LEL is allowed.

8. By adopting all these conservative test conditions, the LEL level will never be reached in practice in a container.

Example of serum bottle test with blowing agent (ppm versus time in days)



Temperature in container transport from Sweden to USA

