

Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals

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Sub-Committee of Experts on the Transport of Dangerous Goods

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Item 2 (c) of the provisional agenda

Explosives and related matters: Review of tests in parts I and II of the Manual of Tests and Criteria

Manual of Tests and Criteria Improvement of Series 8(c) Koenen Test Proposal for calibrating the heating rate

Transmitted by the expert from France

Introduction

1. The Series 8(c) Koenen Test is subject to a review – see documents ST/SG/AC.10/C.3/2015/2 and UN/SCETDG/47/INF.3.
2. Dibutyl phthalate (DBP) is used in the test for calibrating the heating rate which should be 3.3 ± 0.3 K/s from 135°C to 285°C.
3. As DBP is considered as a substance of concern as regard health protection and its general use forbidden by the European Commission within the frame of EU REACH 1906/2006 Regulation (DBP is included in annex XIV as toxic for reproduction category 1B) efforts were developed by France for trying to propose a replacement substance for that purpose.

Discussion

4. Based on first results in exploratory trials by INERIS, France a RRT Programme was organized with eighteen laboratories from nine countries with three different vegetable oils as candidates for replacing DBP.

The three oils were Rapeseed oil, Soybean oil and Sunflower oil from local sources.

The main overall conclusions were at that time (2011):

- (i) discrepancies between labs due to possible variations in oils compositions worldwide e.g. nature of triglycerides which may affect their thermal stability in between 135°C and 285°C;
- (ii) no "ideal" vegetable oil for a unique description satisfying the UN Tests format;
- (iii) a few EU participating labs were of the opinion that a local supply of a vegetable oil like the ones tested would be sufficient with a control of oil batches along the time.

5. For the reasons mentioned above and because in addition the Koenen Test is used in France within the frame of the National Code of Labour for explosives plants, a second RRT Programme was initiated later on with the French Ministry of Defense labs, F explosives industry labs and INERIS.

This second RRT Programme was focused on one mineral and one silicone oils instead of vegetable oils.

These oils were as follows:

- pentaerythryl tetraisostearate for the mineral oil – commercial name Radia 7179
- silicone with additives for the silicone oil – commercial name Rhodorsil 47 V 100

The main results are as follows (2014-2015):

- (i) Radia 7179: heating rate 3.28 ± 0.23 K/s
Rhodorsil 47 V 100: heating rate 3.47 ± 0.20 K/s
- (ii) from the above results, a mineral oil or a silicone oil like the ones tested appears satisfying the need for replacing DBP.

Proposal

6. It is proposed to replace in the test description in section 18.6.1.2.2 Apparatus and materials the sentence:

"Calibration involves heating a tube (fitted with a 1.5 mm orifice plate) filled with 27 cm³ of dibutylphthalate".

by the following sentence:

"Calibration involves heating a tube (fitted with a 1.5 mm orifice plate) filled with 27 cm³ of oil, vegetable or mineral or silicone of suitable properties (e.g. low flammability, thermal resistance and stability) for that purpose".

7. The same may apply for Test Series 1(b), Test Series 2(b) and Test Series E.1 in corresponding sections Apparatus and materials.
