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ASOCIACIÓN INTERNACIONAL DE LA SEGURIDAD SOCIAL
INTERNATIONALE VEREINIGUNG FÜR SOZIALE SICHERHEIT

Kurfürsten-Anlage 62
D-69115 Heidelberg
Deutschland

T: +49 6221 523460 / 597
F: +49 6221 523 593
E: nschurreit@bgchemie.de

Sektion für Prävention in der chemischen Industrie

www.issa.int/prevention-chemistry



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INTERNATIONALE VEREINIGUNG FÜR SOZIALE SICHERHEIT

Dynamostraße 7-11
D-68165 Mannheim
Deutschland

T: +49 (0)621 - 44 56 - 2213
F: +49 (0)621 - 44 56 - 2190
E: scholl@ivss.org

Sektion für Maschinen- und Systemsicherheit

www.issa.int/prevention-machines

ISSA „Explosion Protection“ Workshop 13 and 14 May 2009 at Frankfurt/Main

**Dr. Elisabeth Brandes,
PTB, Germany**

“Auto ignition temperature – Influences of geometric arrangements”

Introduction

Many chemical processes need elevated temperatures. If explosive mixtures are present or it is not possible to avoid them in case of malfunction, hot surfaces are a potential ignition source.

At ambient pressure the ignition source ‘hot surface’ is characterised by the safety characteristic auto ignition temperature determined according to DIN 51794, IEC 60079-4 or EN 14522. The auto ignition temperature is however dependent on the geometry of the determination apparatus as most of the other safety characteristics.

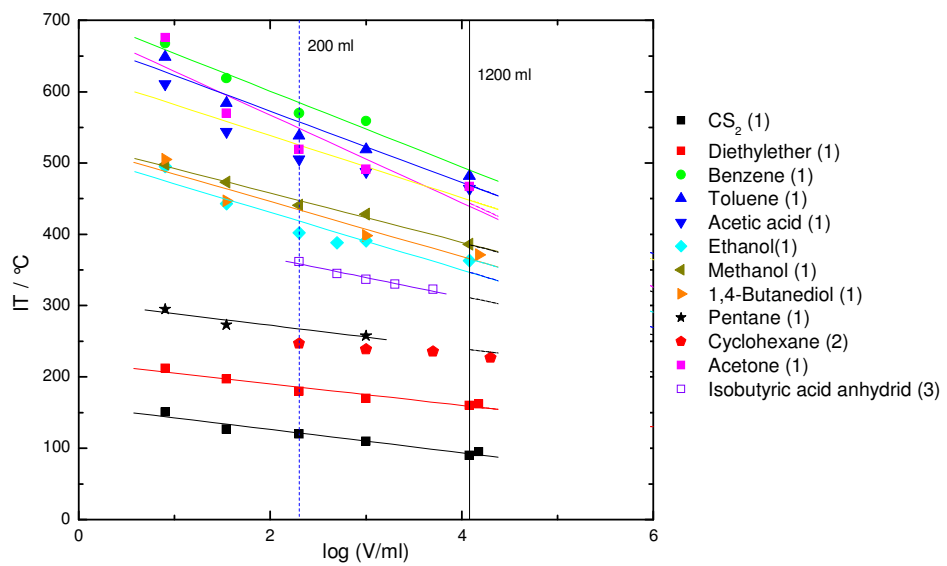
Content

Dependencies of the ignition temperature on the following geometric influences are shown and discussed:

- Volume of the determination vessel
- Size of the hot surface
- Spatial arrangement of the hot surface (hot surface enclosed the explosive mixture ⇔ hot surface is surrounded by the explosive mixture)
- Isobaric (open vessel) and isochoric (closed vessel) conditions.

Results/Conclusions

The mentioned influences based on geometric items may increase or decrease the ignition temperature compared to that one determined according a standard (DIN 51794, IEC 60079-4, EN 14522). The following figure gives the dependence of the ignition temperature on the volume of the test vessel.



Volume dependence of the ignition temperature

- 1 N. Setchkin: J. of Research NBS 53 (1954),
- 2 T.J. Snee, J.F. Griffiths: Comb. Flame 75 (1989)
- 3 R.D. Coffee: 13th Loss Prev. Symp. AIChE (1979)