CMK comments to the ECHA consultation on the 6th priority list of substances for inclusion in Annex XIV

Comments for *Diboron Trioxide*

CAS Number: 1303-86-2

EC Number: 215-125-8

CMK company profile

CMK is Slovakian company which was originally founded in the 70's and has served as a research institution in the field of *Gallium (Ga)* and *Gallium Arsenide (GaAs)* producing and processing. Eventually the company developed the unique technology of recapturing of *GaAs* and/or *Ga* scraps or sludge.

The company produced *Diboron Trioxide* (B_2O_3) for many years for its captive consumption.

By improving the technology and gaining the product with better quality, it was offered also to our customers. *Diboron Trioxide* is produced from high pure *Boric Acid* and is used in growing process of *GaAs* crystals.

CMK Company employs the professionals in the branch and cooperates with universities and Slovak Academy of Sciences. The activities accord with the care and improvement the health and safety protection in production and are in respect with the environment.

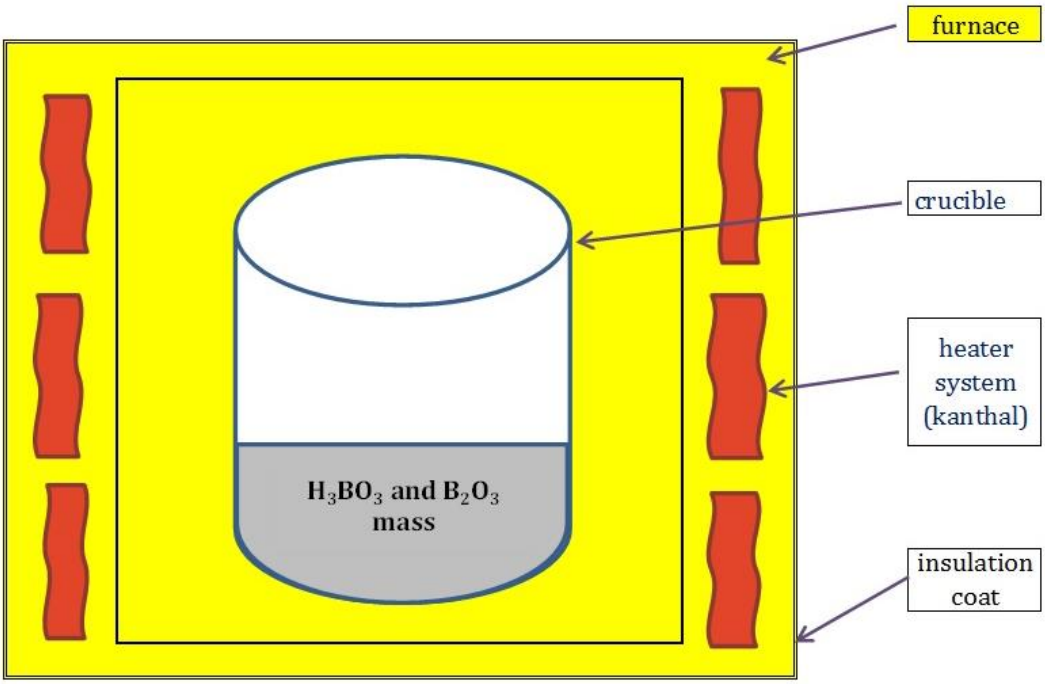
Arguments and Rationale

<u>Improbability of reproductive and developmental effects in humans caused by borates</u>

Although reproductive and developmental effects have been demonstrated in laboratory animals exposed to abnormally high doses of boric acid, similar effects have not been observed in highly exposed human populations or workers. The absence of adverse reproductive effects in extensive investigations of borate workers in the United States, Turkey and China chronically exposed to high levels of borates and in populations living in high boron areas demonstrate that the actual health risk from exposure to borates is small. Workers in boron mining and processing industries

represent the maximum possible human exposure. Based on the total weight of evidence that includes worker exposure data, epidemiological studies and mechanistic data, the data show that it is improbable that boric acid will cause reproductive or developmental effects in humans.

Production and use of *Diboron Trioxide* at CMK



Diboron Trioxide is produced from high pure *Boric Acid*. *Boric Acid* is melted down in a crucible using high temperature furnace.

The melted *Diboron Trioxide* mass is moulded into stainless form to produce both shape of pellets, cylinder and tapered with the diameter of 50 – 225 mm. All produced pellets are standard kept in special foil under vacuum.

Such pellets are used in the *GaAs* production, where it covers *Gallium* and *Arsenic* to avoid the evaporating of *Arsenic* during synthesis process. This chemical reaction needs high temperature and pressure in a closed system (pulling machine).

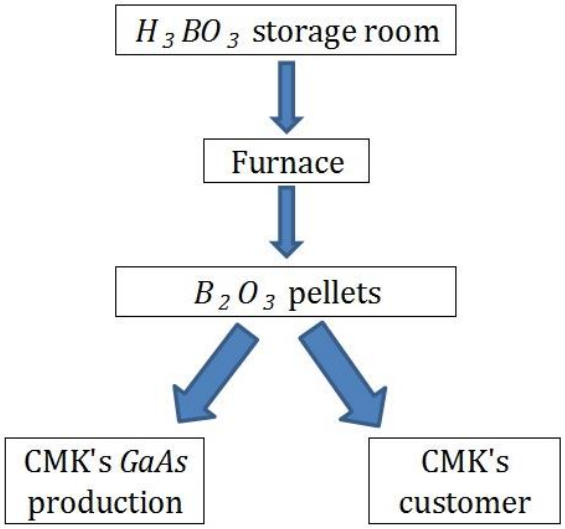
During this process of *GaAs* crystal growing the solid pellet of *Diboron Trioxide* is melted and after finishing of *GaAs* pulling process the mass of *Diboron Trioxide* is manually removed from the pulling machine.

Such used *Diboron Trioxide* mass is collected.

Risk related to *Diboron Trioxide* and workers protection + volumes

The workers employed in the division of B_2O_3 production have to apply adequate PPE (Personal Protective Equipment) in order to protect themselves against high temperature in process of putting in and out the *Diboron Trioxide* mass. There is very high requirement on purity of *Diboron Trioxide* pellets that all handling with this substance must be done in gloves.

At this time CMK produces 500 kg of *Diboron Trioxide* per month. 40 kg of this substance is used in *GaAs* production of the company.



Statement on possible alternatives

CMK has information, that there is no suitable alternative to *Diboron Trioxide* for this particular use, what is pulling process of GaAs crystals using LEC and VGF method. The substitution of this substance in the crystal growing process is not available because of very specific characteristic of *Boron* as an element.

Finding and validation of some new substance which could be used as an alternative to *Diboron Trioxide* will take minimum 20 years because of technology, which was created long years. *Gallium Arsenide* as an article produced using some other

substance than *Diboron Trioxide* must be proved and evaluated because of strictly and precise requirement for its purity. *Gallium Arsenide* is a very important part of semiconductor industry, used in lasers, diodes, LEDs, photovoltaic panels, smartphones, GPS, …

The delivery of *Diboron Trioxide* from the countries and companies outside EU is unstable and with high risk almost according to the purity of the substance.

Proportionality and effectiveness of regulatory instruments

The authorisation should be a proportional procedure. Therefore the scoring system for prioritization was established and gives a ranking for the substances to be regulated. As long as the authorities did not decide exclusively on the 5th list for prioritization the regulation of the substances on the 6th list does not seem being proportional as the substances on the 5th list have presumably a higher scoring.

For the use of mixtures containing *Diboron Trioxide* a Specific Concentration Limit of c ≥ 3.1% (w/w) is applied. Therefore also for the use of *Diboron Trioxide* as flux for a melt in the semiconductor industry a similar Specific Concentration Limit (SCL) seems to be the appropriate measure due to the following facts:

- a very special industrial use of solid *Diboron Trioxide* only, no professional use, no available for public, only for industrial use related to *GaAs* production,
- any possible exposure might occur only to a certain very low number of workers within the entire EU, only two companies are dealing with this substance in EU area and also only limited number of workers, who are very good trained and skilled,
- the limited risk is already now adequately and professionally controlled,
- low quantity of cca 6 tonnes compared to very hazardous substances with tonnages > 1000 t/y e.g. Hydrofluoric acid

Assessing these issues and expressed in a scoring table the result for *Diboron Trioxide* is summarized as shown in table:

Inherent Properties	**Volume**	**Wide dispersive use**
Classified reprotox. cat. 1b (article 57(b) REACh)	1 – 10 t/y	Industrial use only, no content in articles
Score: 1	**Score: 3**	**Score: 5**

Total score = 1+3+5 = 9

For the use in semiconductor industry used for *GaAs* production only, this score is much lower than ECHA's scoring in the background document published in September 1st, 2014 (total score 22).

Conclusively the score of 9 gives not enough justification to apply an authorization procedure for further regulation in this use.

Conclusion

For the handling of *Diboron Trioxide* used in semiconductor industry as described above already now appropriate risk management measures are in place and effective based on the actual legislation. Therefore an authorization would not bring additional value or more protection to the safety and health of humans and environment.

The Personal Protective Equipment is not really needed for safety reasons for the workers but much more to ensure the quality of our products.

For European market only our company manufactures and supplies 6 t/year of such high quality *Diboron Trioxide* pellets for using it in semiconductors industry. Total consumption in EU can soaring to 12 t/year.

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