The Column Model – a practical help to decide about substitutes

T. SMOLA

Berufsgenossenschaftliches Institut für Arbeitsschutz - BIA
D-53754 Sankt Augustin
Germany

The assessment of health hazards caused by the use of dangerous substances is difficult in most cases. Missing chemical knowledge, especially small and medium-sized companies are often not able to make a useful substitute decision.

Therefore, the column model has been developed that enables a fast comparison of pure substances as well as preparations (mixtures) using only limited information. The target groups of this model are managers, safety personnel and other persons with limited knowledge in this field. No calculation is necessary, but the relevant information (e.g. R-sentences) is related to a particular risk level using a simple chart.

A comparative assessment of a product and a potential substitute product will be carried out separately for both products in the five chart columns

- acute and chronic health hazards
- environmental hazards
- fire and explosion hazards
- hazards caused by the exposure potential
- hazards caused by the procedures.

If the potential substitute product rates better in all five columns than the product in use, the substitution problem is solved. If the potential substitute product rates better in some columns, and worse in others, you have to assess which potential hazards – in other words, which columns – play a bigger role in your particular situation. If, for example, sources of combustion cannot be avoided in your production process, then the fire and explosion hazards together with the exposure potential have greater weight in your comparison. If your production methods result in large quantities of waste by-products, then the environmental hazards will be emphasised. The model can be applied to pure substances and to products (substance mixtures).

Risks	Acute health hazards	Chronic health hazards	Environ-mental hazards	Fire and explosion hazards	hazards caused by the exposure potential	hazards caused by the procedu-res
very high	highly toxic	K1, K2, M1, M2	N; water pollution	extremely inflammable	gases, dusts	open
high	toxic, highly corrosive	R1, R2, K3, M3	class: WGK 3	highly inflammable	highly volatile	
medium	harmful, corrosive	R3	WGK 2	inflammable	volatile	closed
low	irritant	chronically affecting	WGK 1	hardly inflammable	low volatile	
negligible	harmless by experience		not water polluting	not inflammable	solids	tightly closed

The graph shows the principle of the column model. The complete column model can be downloaded as a pdf-file from the internet:

www.hvbg.de/d/bia/pra/modell/spalte.htm (German version)

www.hvbg.de/d/bia/pra/modell/spaltee.htm (English version)