

The alignment of parallel OH tools

An IOHA project?

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The 11th International Occupational Hygiene Association (IOHA)
International Scientific Conference
September 22-26, 2018
Washington, DC

IOHA2018



Agenda

- The Occupational Hygiene Toolbox
- Parallel tools
- Alignment initiative
- Roles of NVvA and IOHA

Ann. Occup. Hyg., 2016, 1–13
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BOHS
The Chartered Society for
Worker Health Protection



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AIHA
Protecting Worker Health

IOHA

On the Strength and Validity of Hazard Banding

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OH toolbox exposure assessment in the 70-s



TRGS 900

EH40/2005

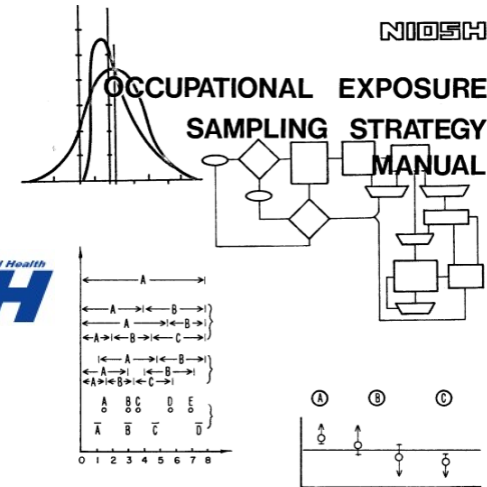


DFG

ACGIH®



- OELV
- Health hazard classification
- Hazard Banding
- CB based Models
- Exposure assessment strategies
- Measurement methods
- Compliance testing
- Handling Mixtures



U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Center for Disease Control
National Institute for Occupational Safety and Health

DOHSBase OELV hierarchy

Legal compliance
limits with technical
and/or economical
feasibility:

- EU BLV,
- UK WEL
- Ge TRGS900
- Fr VLEP
- OSHA PEL

Health based only
SCOEL, DECOS, DFG, ACGIH-
TLV (>1996), NIOSH-REL (≥2013)

Health based, with stakeholder influence
AGS, NIOSH-REL(<2013), EU-IOLV, Corporate,
ECETOC, ORAS/WEEL, ACGIH-TLV(<1996)
WGD/DECOS

Default factor. Prescriptive, process based
DNEL, Dutch Health Council Gr2000-15/OSH

Hazard Banding
Kick-off levels, Control Banding concentration ranges, Generic Exposure Values

Generic
single endpoint MTD & RD50, QSAR, structural activity TTC, read across, expert judgment (Nano)

Epidemiology ->

Data rich ->

<-Data poor

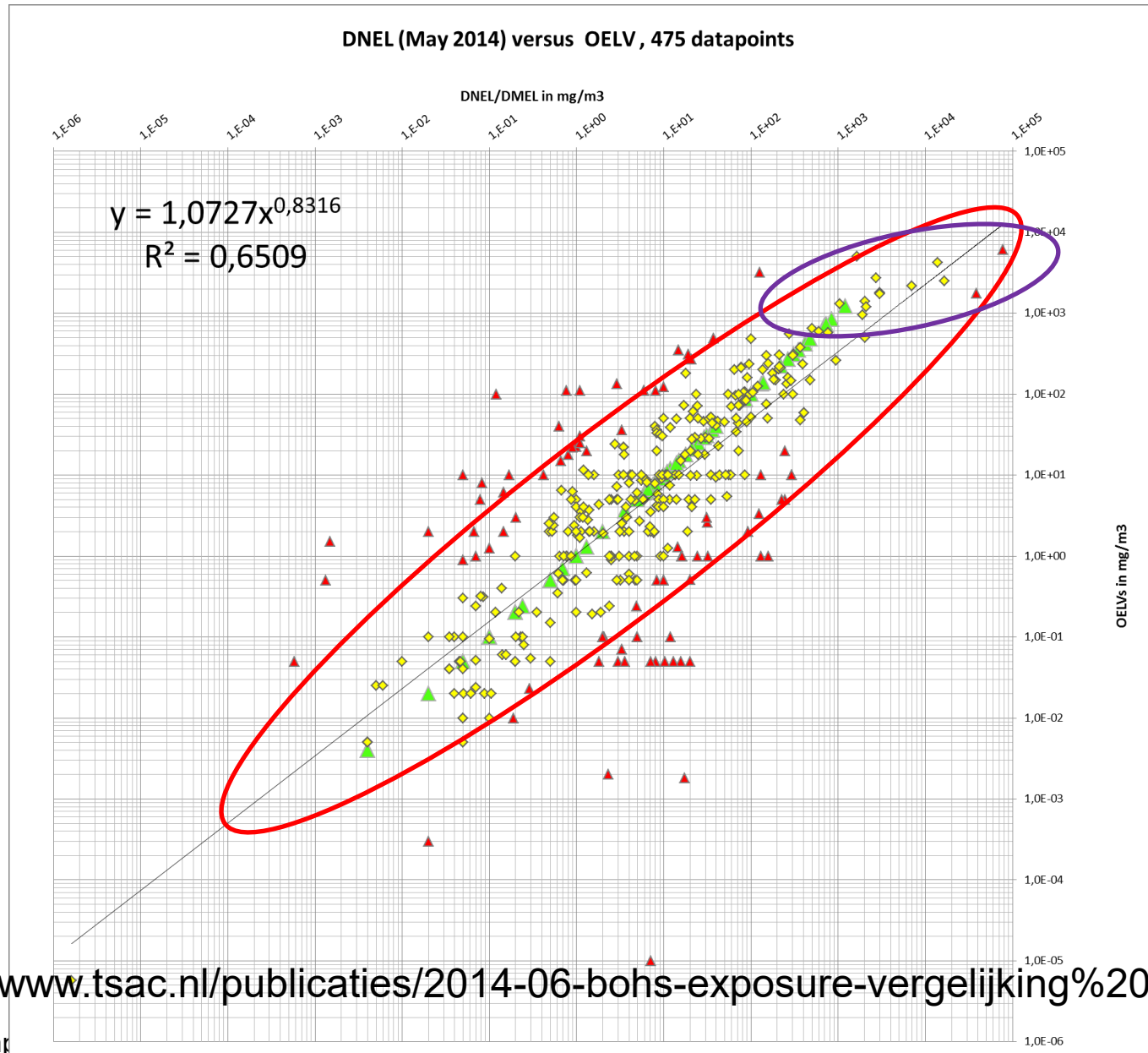
OELV variability (mg/m³)

substance	Gr	UK- WEL	ACGI H TLV	SCOEL	DFG	DNEL	OARS WEEL
Maleic anhydride 108-31-6	No value	3	0,01	-	0,41	0,4	-
Diisobutylene (DIB) 25167-70-8	-	-	-	-	-	14.7	344
Cumene 98-82-8	-	-	246	No data	200	100	-
Ethanol 64-17-5	1300	-	1884	-	960	950	-

OELV 90%-range: 0.001 through 1000 mg/m³

Red: based on socio-economic feasibility

DNEL vs OELV

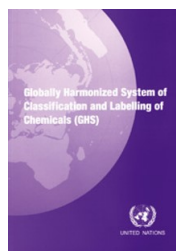


OELV

<http://www.tsac.nl/publicaties/2014-06-bohs-exposure-vergelijking%20oel-dnel.pdf>

Health Hazard classifications

- OELV
- Health hazard
- Hazard Banding
- CB based Models
- Compliance testing
- Handling Mixtures



GHS

EU/C&L

EU/CLP

ACGIH®

International Agency for Research on Cancer

World Health Organization



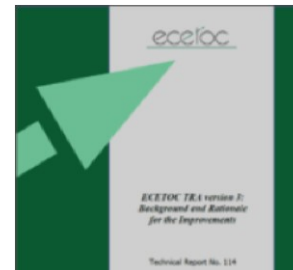
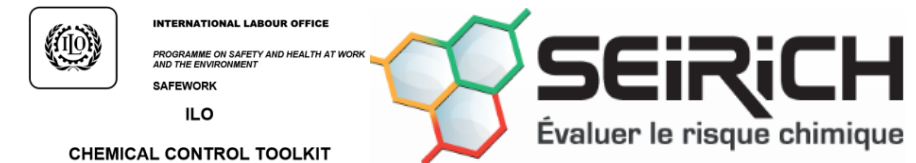
NIOSH



Enterprises SDS

Fancy toys for IH girls & boys

- OELV
- Health hazard
- Hazard Banding
- CB based Models
- Compliance testing
- Handling Mixtures



TREXMO

MEASE v.1.02.01, EMKG-EXPO-TOOL and EASE v.2.0.

The development of a Hazard Band engine



administrative

Tox data

110 GHS/CLP classifications

48 H-codes



Hazard 4/5 Band engine

expert judgement



- H301 - Fatal if swallowed
- H302 - Toxic if swallowed
- H303 - Harmful if swallowed
- H304 - May be harmful if swallowed
- H305 - May be fatal if swallowed and enters airways
- H306 - May be harmful if swallowed and enters airways
- H310 - Fatal in contact with skin
- H311 - Toxic in contact with skin
- H312 - Harmful in contact with skin
- H313 - May be harmful in contact with skin
- H314 - Causes severe skin burns and eye damage
- H315 - Causes skin irritation
- H316 - Causes mild skin irritation
- H317 - May cause an allergic skin reaction
- H318 - Causes serious eye damage
- H319 - Causes serious eye irritation
- H320 - Causes eye irritation
- H330 - Fatal if inhaled
- H331 - Toxic if inhaled
- H332 - Harmful if inhaled
- H333 - May be harmful if inhaled



5 bands HB-engine

hazard band #	GHS/CLP health hazard H/EUH-codes, REACH Annex IV
 E/5	EU070 (Tox) 340, 341, 350(i) (Carc1, Mut1) 334 (S)
D/4	300, 310, 330, 372 (Tox1/2) 351, 360 _{xy} , 361, 362 (Carc2,Repro1) EUH070 (Irritant, Corrosive)
C/3	301, 311, 331, 314, 370, 373 (Tox3) 317, 318, 335, EUH071 (Irritant, Corrosive)
B/2	302, 312, 332, 371 (Tox4)
 A/1	303, 313, 333(Tox5) 315, 319,316,320 (Irritant) 304, 305 (Aspiration hazard) 336 (Tox) , EUH066 (solvent effect) REACH Annex IV non-hazardous

Allocation of H-codes in 4 HB-engines

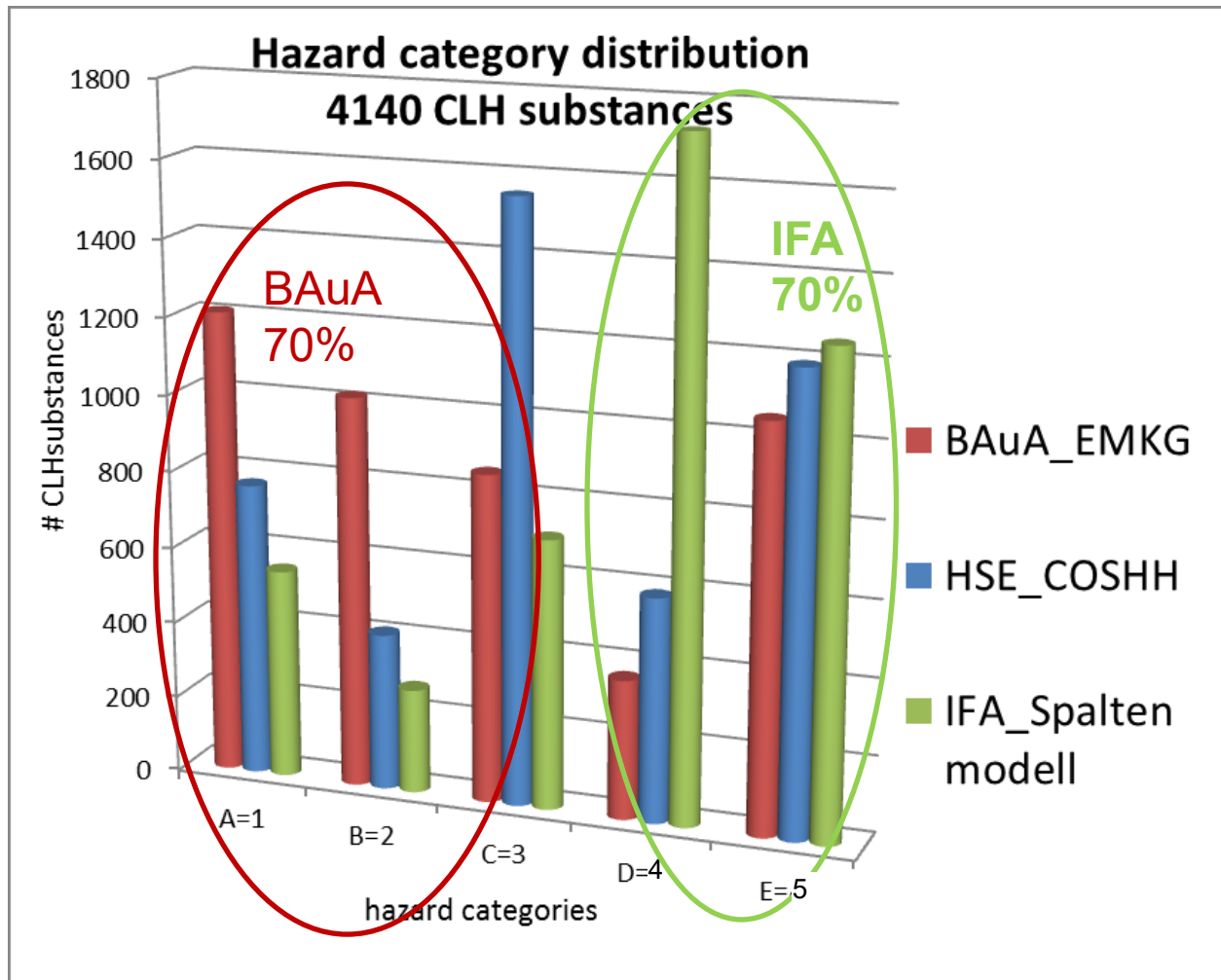
Hazard band	DGUV IFA Spaltenmodell	HSE COSHH	BAUA EMKG (inhalation)*	Solvay OEB
 E/5	300, 310, 330 (Tox) 340, 350, 350i (CM) EU032 (Tox gas release)	340, 341, 350(i) (CM) 334 (S) EU070 (Tox)	340, 350, 350i (CM) 360 _F (R)	372 (Tox) 340, 350 (CM) 334 (ICS)
D/4	301, 311, 331, 370, 372 (Tox) 341, 351, 360 _{xy} (CMR) EUH029, EUH031 (Tox gas release) 317, 334, 318, EUH070 (ICS)	300, 310, 330, 372 (Tox) 351, 360 _{xy} , 361, 362 (CR)	300, 330, 372 (Tox) 360 _D (R) EUH032 (Tox gas release)	300, 310, 330; 370, 373 (Tox) 314 (+ cat A), EUH071 (ICS), 341, 351, 360 _{xy} (CMR)
C/3	302, 312, 332(Tox) 314 (pH ≥ 11,5, pH ≤ 2), 371, EUH071 361 _{f/d} , 373, 362 non-toxic gases which may cause asphyxiation	301, 311, 331, 314, 370, 373 (Tox) 317, 318, 335, EUH071 (IC)	301, 331, 314, 370, 371, 373 (Tox) 334 (S) 341, 351, 361f/d (CMR) EUH031 (Tox gas release)	301, 311, 331; 371 (Tox) 304, EUH070 (lung, eye damage) 314 cat B and C, 317, 318, 335 (ICS) 361, 362 (R & Lact)
B/2	315, 319, 335, ** (I) 304, EUH066, 336 (solvents) ***	302, 312, 332, 371 (Tox)	302, 332 (Tox) 318 (C)	302, 312, 332, 336 (Tox) 315, 319, EUH066 (I)
A/1 	substances which experience shows to be harmless (e.g. water, sugar, paraffin etc.)	303, 313, 333(GHS Tox4) 315, 316, (GHS) 319, 320 (I) 304, 305 (Aspiration) 336, EUH066 (solvents) and all H-numbers not otherwise listed	319, 335 (I) 336 (solvent) 304 (Aspiration) Non health hazard H-statement codes	303, 313, 333 (GHS Tox 4) 305 (ICS) 316 (GHS-> noCLP), 320 (GHS eye irr 2b->CLP 319)

HB-engines variability

Substance	CLH H-codes	Band# per HB-engine		
		IFA	COSHH	EMKG
Maleic anhydride 108-31-6	H302 H314 H334 H317	4	5	3
Diisobutylene (DIB) 25167-70-8	H304 H336	2	1	1
Cumene 98-82-8	H304 H335	2	3	1
Ethanol 64-17-5	(CLH H225) (IARC 1)	-	-	-

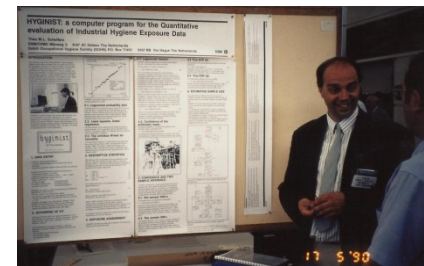
In red: the H-code determining the band #
Band# determines control regime

Comparing 3 Hazard Banding Engines



Compliance testing tools

- OELV
- Health hazard
- Control Banding
- CB based Models
- Compliance testing
- Handling Mixtures



Mixture tools

- OELV
- Health hazard
- Hazard Banding
- CB based Models
- Compliance testing

- Mixtures

miXie
DOHS B SE
(((COMPARE)))

$$\sum_{i=1}^{i=n} \left(\frac{C_i}{OELV_i} \right) \leq 1$$

Lead substance
XLUNIFAC

DPD+ Sum Score

Summary and conclusions

- From poverty (70-s) to wealth
- Parallel tools with different outcome:
 - OELV's of the same hierarchy
 - Hazard banding
 - CB based models
- Confusing and shopping
- Damaging IH effectivity & reputation
- International alignment approach

Alignment recommendations

- Communicate and find support within WHO/OECD/ILO/EU/ECHA...
- Motivate key players/stakeholders to take action
- Bring key players/stakeholders together (IOHA 2018)
- Alignment Award
- Alignment ambassador
- Combine existing inventories of tools

KAHOOT questions

1. Inherent principles of occupational hygiene, or more specific 'intrinsic chemical hazard properties', do differ between countries/cultures
 - Yes/no
2. Safe working with chemicals worldwide is hampered by the large number of tools developed by (inter)national bodies without mutual alignment.
 - Yes/no

KAHOOT questions

3. Victims of the lack of alignment are (>1 tick is possible)
- SME's
 - Workers world wide
 - International operating Industrial hygienist & enterprises
 - All of the above

KAHOOT questions

4. Which organisation(s) should take the initiative to promote the alignment of IH tools?
- Bilbao Institute (for EU)
 - WHO ILO
 - ISSA
 - IOHA

Thanks!
Questions & suggestions?

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