

**A GLOBAL APPROACH FOR ASSESSING
AND MANAGING CHEMICAL RISKS
AT THE WORKPLACE**
advantages, limits and perspectives

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***Risk assessment practices
among Belgian enterprises***

Hazard identification → Material Safety Data Sheets

Risk assessment → On the basis of common sense
judgements

No structured approach for risk assessment

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***Our aim: to help SME's
in assessing chemical risks***

Design of the study:

- Development of a strategy for assessing chemical risks using methods adapted to SME's
- Testing this strategical approach in two companies

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***Development of the risk assessment
strategy***

**Risk assessment barriers specific to
SME's**

- lack of time
 - reduced financial means
 - weak expertise
- ⇒ Need for an adapted risk assessment approach

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How to face these barriers ?

Lack of time: we propose a stepwise approach adapted to the different expertise levels available into companies

- The staff members and the workers
- The safety officer
- The occupational physician

Reduced financial means and weak expertise: we proposed methods based on R-phrases for hazard identification and not requiring air monitoring

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Choice of two assessment methods

- The « Potential Risk » method developed by Vincent, Bonthoux and Lamoise (INRS) - France (2000)
- The « UK scheme - COSHH » developed by Russel, Brook and Maidment (HSE) - United Kingdom (1998)

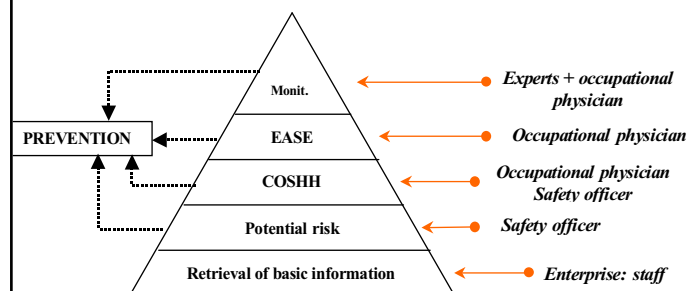
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Summary of information needed for each method

	Ranking of potential risk (INRS)	COSHH
Hazard	R-phrases for health / chemical product (MSDS)	R-phrases for health / chemical substance (MSDS – toxicological databases)
Exposure	- Annual used quantity / product ; - frequency of use / product.	- quantity by operation ; - ability of being absorbed by the respiratory route: the size of dusts (little, medium, large) the volatility for vapours (boiling point and process temperature); - control strategy level.
Results	Classification of products by priority order at the level of the workplace or the enterprise	Risk assessment in reference with OEL's for each work situation according to the worker's health safety. The method gives the control strategy required for assuring health too. The model is validated for an 8 hour exposure and for pure substances.

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Proposed stepwise risk assessment strategy



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Testing the strategy in two companies: a feasibility study

Enterprises	Size	Nature of activities chosen for the study
A	80	Filling
B	950	Painting and coating (removing the fat, preparing metallic surfaces, painting and spraying)

In the enterprise B, the risk assessment was restricted to painting and spray painting operations.

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Feasibility study COSHH application

- COSHH was used to assess the risk for each chemical substance (in each work operation).
- However, most supplied products are mixtures of chemical substances. Therefore, we had to retrieve specific information for each chemical substance of a given product from toxicological databases (R-phrase(s), boiling point, etc)

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Protocol of the feasibility study

Tasks	Who?	A	B
Products inventory	Workers	Not done	Not done
Collecting information on labels	Safety officer	OK	Not done
Retrieving MSDS in MSDS file	Safety officer	OK	OK
Retrieving Quantities used and frequency of use	Safety officer	OK	Not done
Retrieving missing information in the MSDS	Occupational physician	Not done	Not done

The occupational physicians did not take part in collecting data in the workshop for using COSHH method

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Products inventory, yearly quantities and frequency of use: available information

Enterprise	Size	Products inventory	Yearly quantities	Comments
A	80	Yes	Yes	Production process
B	950	No	No	Order book

- The production process requires the products inventory and yearly quantities used for quality control reasons (firm A);
- The information made available from order books didn't correlate with the actual supplied products used during a given year of activity (firm B).

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Accuracy of available MSDS files

- MSDS: missing or inconsistent data;
- some MSDS did not correspond to the products actually used in the workshop;
- a lot of MSDS were not updated;

	A	B
Product	39	58
Missing MSDS	0	13
Missing or inconsistent information	4	13

In firm A, the purchase office informs the safety officer when a new product comes into the company .

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Labelling and MSDS accuracy about R-phrases allocation

	Accurate	Overesti- mated Hazard	Underesti- mated hazard	No conclusion
Firm A				
Label				
N	30	3	6	
%	77%	8%	15%	
MSDS				
N	33	3	3	
%	85%	8%	8%	
Firm B				
MSDS				
N	33	6	11	8
%	57%	10%	19%	14%

The MSDS are accurate or overestimate the hazard respectively in 93% and 67% of the products used in the firm A and B

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INRS « Potential risks » - application to the preparation of the prepolymer mixture

Code	Product	Q. kg	E.U.	R Phrases	Priorité	C.
1906104	catalyseur	5130	2	R 22 R 43	3	5
1905100	agent gonflant	37200	1	R 42	3	5
1909100	additif	10140	3	R 23/25 R 36	3	5
1907100	charge	8000	1	R 40 Care. Cat. 3	2	9
1908100	additif	1410,5	3	R 36/38 R 43	2	9
Z	charge	418348	2		2	17
1902130	plastifiant	272959	3		2	17
1902310	plastifiant	79469	3		2	17
1904200	SiO2 amorphe	3560	1	TLV	1	19
1904213	additif	1950	1	R 36	1	19
1903300	plastifiant	18000	3		1	20
1902312	plastifiant	24472	2		1	20
1910130	pigment	9225	3		1	20
1906100	catalyseur	4400	3		1	20
1902311	plastifiant	10750	2		1	20
1904110	charge	72500	1		1	20
1904214	additif	25	1	R 36/38	1	21
1907410	charge	500	1		1	23
1904100	charge	27500	1		1	23
1908800	additif	1820	3		1	23
1910210	pigment	651	3		1	23
1910320	pigment	2220	3		1	23
1910400	pigment	25	3		1	24
1904210	additif	0,47	1		1	25

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COSHH: nature of the operations in both enterprises

	Workshops	Operations	Physical state
A	Mixture production	Filling	Liquid & dusts
	Weighing	Filling	Liquid & dusts
	Foam production	Filling	Liquid & pellets
B	Paint	Preparation of the paint	Liquid & solid in liquid
		Drying	Liquid & solid in liquid
		Painting	Liquid & solid in liquid
		Stripping	Liquid
		Spray gun washing	Liquid
	Pieces painting	Aerosol	

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Semi-quantitative risk assessment

- The COSHH method was used for all operations except the aerosols for which the risk was assessed with the EASE model. In the firm B, the use of spray gun was carried out in a spray painting booth with global ventilation and an open booth with local exhaust ventilation
- For the interpretation of the results, we took into account the daily time by operation and the OEL when available

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Semi-quantitative risk assessment: results

	<i>Firm A</i>	<i>Firm B</i>
Safe operations	32	41
Operations to be improved (LEV)	11	6
Need for further risk assessment	3	18
Total	46	102

LEV: local exhaust ventilation

Operations requiring further risk assessment in accordance with regulations:

- **Firm A:** operation using MDI (OEL: 5 ppb);
- **Firm B:** all operations carried out in the spray painting booth.

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Risk assessment - comparison of two strategies

- Strategy 1: application of COSHH to all products
- Strategy 2: selection of the products exhibiting the highest « potential risk » (priority levels 2 and 3) and application of COSHH to those products

Risk assessment - comparison of two strategies

The results were similar between strategies 1 and 2 except for one operation in the firm B. However, this operation could have been easily recognized as being unsafe by the safety officer's professional judgement.

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Feasibility study - main observations

- The identification of the basic information depends highly on the nature of activities, the management style and the culture of the company;
- The study protocol was not fully observed by the various staff members probably through lack of time;
- The potential risk method reduces the time spent for semi quantitative risk assessment without modifying the final results (limited study).

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The risk assessment strategy - advantages

- The stepwise approach allows the prevention advisors to identified prevention measures for implementing the prevention policy and provides targeted information for workers's education.
- This approach is exhaustive and easy to use.
- It is suitable for all supplied products (R-phrases) (>< 650 OELs).

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The risk assessment strategy - limits (I)

- The risk potential and COSHH method are not appropriate for gaz, for chemical substances for which no R-phrases is allocated (wood dust, welding fumes, drugs, etc) and for some operations;
- there is a possibility of over-estimating the exposure of a substance in a given mixture (solventmixture, inorganicsolution).

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The risk assessment strategy - limits (II)

- Some substances can be used in several operations. So that, each exposure for a given substance must be summed to evaluate the TWA 8h for a S.E.G. This information is important for futher risk assessment and the medical survey.
- Because of the number of data, a software may be very helpfull to the users. We developed a first version (accessible on our website) with a database for specific data of chemical substances implemented by the users.

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Perspectives

- The semi quantitative risk assement could be improved for taking into account more worksituations and maybe all of them and reducing the over-estimation of exposure;
- The approach could be extended to the risk assessment related to a substance used in several operations;
- In order to achieve the implementation of this strategy in companies, a specific training has to be provided to both workers, supervisors and prevention advisors. With the support of the Belgian Ministry of Labor, a futher study is now being conducted to develop this training program.