State-of-the-art Recognition and Need Analysis;
HAMK, Finland, Kalle Rajantie

A competence survey about knowledge of chemical accidents and risks was conducted on 9.5.2016 in Hämeenlinna Finland, HAMK premises. Altogether 25 respondents, 2 of whom were female and 23 male. The participants were members of a business seminar and they did the questionnaire beside it. They are mainly representing local medium size companies on the area of infrastructure construction and maintenance. The age of the participants were mainly between 21-50 years. Almost all were from private sector and managerial level. There were 70 questions, but because of limited time, the so called open questions were not answered, dealing with risk analysis (questions 5-12, risk assessment (questions 9-12)risk management (questions 13-20) and prevention (questions 21-23). So 59 questions were handled. It has been taken into account when counting the percentages. Summary of the competence levels (% correct answers) can be seen in the table below. Topic numbers corresponds the numbering in the description below and nrQindicates the number of included questions of each topic.

Topic	1	2	3	4	5	6	7	8	9	10	11	12	13
nrQ	4	0	0	4	2	3	10	5	5	5	5	5	3
%	42	NA	NA	57	68	77	42	22	38	58	80	31	53

The references and partly the structure and content also of the description below are borrowed from the correspondent report elaborated by Dr. SakariHalmemies, LAMK University of applied sciences.

1. **RISK ANALYSIS**

Risk analysis were not very well known by the respondents. It should be important the know and apply the steps and variations of risk analysis. There are a set of useful practical tools for that purposes.

Corrosion-related accidents in petroleum oil refineries
http://www.tukes.fi/Tiedostot/vaaralliset_aineet/ohjeet/mahbbulletin_4.pdf

2. **RISK ASSESSMENT**

These questions were not answered, but it's important to know how to assess risks especially in case of hazardous chemicals

Risk Assessment of Chemicals: An Introduction
https://books.google.fi/books?hl=fi&lr=&id=fUZHAAAAQBAJ&oi=fnd&pg=PR7&dq=risk+analysis+tools+for+chemical+accidents&ots=h898Ix_Ftz&sig=T_Wq9Ic_xu6sG-BFuaEQnxRxYK8&redir_esc=y#v=onepage&q&f=false

3. **RISK MANAGEMENT**

These questions were not answered, but it's important to know how to manage risks especially in case of hazardous chemicals

Dangerous Chemicals in Industry*(including MAPP = Major Accident Prevention Policy)*
http://www.tukes.fi/Tiedostot/englanti/dangerous_goods/brochures/dangerous_chem_brochure.pdf
Seveso directives control major-accident hazards involving dangerous substances, Seveso II Directive
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:1997:010:0013:0033:EN:PDF
Seveso III Directive
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:197:0001:0037:EN:PDF

4. **PREVENTION**

These questions were quite well answered by our respondents**.** Prevention should be considered when dealing with industrial chemical hazards

Chemical Accident Prevention & Preparedness
http://www.tukes.fi/Tiedostot/vaaralliset_aineet/ohjeet/mahb-bulletin-no2.pdf

5. RESPONSE

These two questions were known rather well. This kind of issues should be part of general knowledge concerning people of all sectors.

Emergency Response Guidebook 2012

http://phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/Hazmat/ERG2012.pdf

6. SAFETY RULES

This topic was known very well by our respondents. It is important to manage occupational health issues dealingwithy all handling chemicals

Lab Safety Rules

http://nobel.scas.bcit.ca/debeck_pt/science/safety.htm

Your steps to chemical safety

http://www.hsa.ie/eng/Publications_and_Forms/Publications/Chemical_and_Hazardous_Substances/Your_Steps_to_Chemical_Safety.pdf

7. REGULATIONS

These questions were answered moderately well. These questions are related to chemical legislation like Reach, Seveso (see part 3), ADR. Reach legislation concerns many actors dealing with chemicals, ADR concerns transportation of hazardous chemicals.

Reach legislation

http://echa.europa.eu/regulations/reach/legislation

ADR (European Agreement concerning the International Carriage of Dangerous Goods by Road)

http://www.unece.org/trans/danger/publi/adr/adr_e.html

8. CHEMICAL ACCIDENTS

This topic was very difficult to the respondents. Accident analysis is a crucial element of accident management and knowledge about the analysis tools should be improved.

Under this title could be described chemical accidents happened and lessons learnt from them

List of industrial disasters

https://en.wikipedia.org/wiki/List_of_industrial_disasters

9. HEALTH

Questions concerning healthy issues were quite difficult for the respondents. Health issues should be on top priority when handling chemicals, f.ex. occupational threshold limit values should be followed

Permissible Exposure Limits – Annotated Tables

https://www.osha.gov/dsg/annotated-pels/tablez-1.html

10. ENVIRONMENT

Environmental risks were quite well known, because many of the respondents are working with environment related tasks and have education background dealing with this topic. Even if there are millions of different chemicals, it's only few that causes the most of pollution and they are good to know.

Heavy metals in environment

http://www.icsu.org/future-earth/events/documents/1-3-11-heavy-metals-in-the-environment

Environmental Pollution, Its Sources and Effects

http://www.tropical-rainforest-animals.com/Environmental-Pollution.html

11. CLASSIFICATION

These questions were very well answered by the respondents because in practice they need to apply that knowledge. Classification of chemicals is important, because it helps in identification of hazards. This information can be read also from MSDS.

12. PRECAUTIONS

These questions were not well answered by the respondents. These questions relate to personal safety and interpretation of chemical properties, this data is included in MSDS

Personal Protective Equipment

https://www.osha.gov/Publications/osha3151.html

13. IMPLEMENTATION

The respondents manage quite well this topic because of practical characteristic of it. MSDSs or SDSs include all necessary data on chemicals, including safe storage and handling, first aid and response measures both ecological information. SDSs include also data on transportation of hazardous chemicals on roas (ADR), on rail (RIS), by sea (IMDG) or by air (IATA)

Safety Data Sheet

http://rigzoneegypt.com/site_pdf/23-112367535067.pdf