Myth: Risk assessment is too complicated for me to do!

The reality
Carrying out a risk assessment should be straightforward. It's about focusing on real risks and hazards that cause real harm and, more importantly, taking action to control them.
Risk Assessment of Chemical Hazards

• Process to find chemicals and work routines that could be dangerous for your health
• After the dangers have been identified the probability of exposure is determined and necessary actions can be taken to prevent harm
• The Risk Assessment is always done in written form and stored in the lab
• The process always starts with reading the MSDS
• The are certain tools that can be used in the process
Background

• An inspection was done in Gadolinia some time ago by the authorities (Arbetshälsoinstitutet)

• Requirements:
  o Safe storage of chemicals
  o List of chemicals, labels on bottles
  o MSDS in laboratories where the chemical is used (fi, sw, en?)
  o Risk assessment of chemical hazards before start of work
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<tbody>
<tr>
<td></td>
<td>Irritation, slight temporary illness, redness of skin</td>
<td>Long-time severe effects, permanent minor damage, burns, eczema</td>
<td>Poisoning, cancer, asthma, permanent severe effect, life shortening effect</td>
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<tr>
<td>2. Possible</td>
<td>Insignificant risk No action</td>
<td>Low risk The situation must be observed</td>
<td>Moderate risk Actions required</td>
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<td>Significant risk Action necessary</td>
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<td>3. Probable</td>
<td>Moderate risk Actions required</td>
<td>Significant risk Action necessary</td>
<td>Unacceptable risk Immediate action</td>
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- **R** codes indicate health and safety warnings: R20, R21, R22, etc.
- **EUH** codes provide additional information: EUH066, EUH003, etc.
R-phrases

R20: Harmful by inhalation
R21: Harmful in contact with skin
R22: Harmful if swallowed
R23: Toxic by inhalation
R24: Toxic in contact with skin
R25: Toxic if swallowed
R26: Very toxic by inhalation
R27: Very toxic in contact with skin
R28: Very toxic if swallowed
R33: Danger of cumulative effects
R34: Causes burns
R35: Causes severe burns
R36: Irritating to eyes
R37: Irritating to respiratory system
R38: Irritating to skin
R39: Danger of very serious irreversible effects
R40: Limited evidence of a carcinogenic effect
R41: Risk of serious damage to eyes
R42: May cause sensitisation by inhalation
R43: May cause sensitisation by skin contact
R45: May cause cancer
R46: May cause inheritable genetic damage
R48: Danger of serious damage to health by prolonged exposure
R49: May cause cancer by inhalation
R60: May impair fertility
R61: May cause harm to the unborn child
R62: Possible risk of impaired fertility
R63: Possible risk of harm to the unborn child
R64: May cause harm to breast-fed babies
R65: Harmful: may cause lung damage if swallowed
R66: Repeated exposure may cause skin dryness or cracking
R67: Vapours may cause drowsiness and dizziness
R68: Possible risk of irreversible effects

GHS hazard statements

(Globally Harmonized System of Classification and Labeling of Chemicals)

H300: Fatal if swallowed
H301: Toxic if swallowed
H302: Harmful if swallowed
H303: May be harmful if swallowed
H304: May be fatal if swallowed and enters airways
H305: 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
H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled
H335: May cause respiratory irritation
H336: May cause drowsiness or dizziness
H340: May cause genetic defects
H341: Suspected of causing genetic defects
H350: May cause cancer
H351: Suspected of causing cancer
H360: May damage fertility or the unborn child
H361: Suspected of damaging fertility or the unborn child
H361d: Suspected of damaging the unborn child
H362: May cause harm to breast-fed children
H370: Causes damage to organs
H371: May cause damage to organs
H372: Causes damage to organs through prolonged or repeated exposure
H373: May cause damage to organs through prolonged or repeated exposure
Risk evaluation step by step

• Background information from database, MSDS,…
• Write down the user(s) and for what purpose the chemical is used (sample preparation, cleaning, …)
• Estimate the amount and how often the chemical is used
• Always take the worst case scenario!
• Evaluate the exposure; for example via respiration
  o For solids: is the material pellet-like or building up clouds of dust
  o For liquids: determine the volatility from boiling the point and the process temperature
• Assess the risk according to the 3x3 matrix
• Safety measures
  o what has been done
  o is it enough
  o are there other actions needed
• If additional actions are needed write down the person in charge and the time schedule
Exposure through respiration
(used amount of chemicals / day and person)

1. Improbable exposure
   < 100 ml (medium to high volatility)
   < 100 g (high dusting)
   Chemicals with low dusting and volatility regardless of the amount

2. Possible exposure
   < 10 l (high volatility)
   100 l – 1 m³ (medium volatility)
   < 10 kg (medium and high dusting)

3. Probable exposure
   > 100 l (high volatility)
   > 100 kg (high dusting)
Modest volatility

Low volatility

High volatility

Boiling point

Process temperature

°C
## Exposure via respiration

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<thead>
<tr>
<th>Liquids</th>
<th>Used amount</th>
<th>Volatility</th>
<th>Comment</th>
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<tr>
<td>1. Improbable</td>
<td>Small</td>
<td>Medium/High</td>
<td>ml of liquid</td>
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<td></td>
<td>Medium/Large</td>
<td>Low</td>
<td>L/m³</td>
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<td>2. Possible</td>
<td>Large</td>
<td>Medium</td>
<td>m³</td>
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<tr>
<td></td>
<td>Medium</td>
<td>Medium/High</td>
<td>L</td>
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<tr>
<td>3. Probable</td>
<td>Large</td>
<td>High</td>
<td>m³</td>
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<table>
<thead>
<tr>
<th>Solids</th>
<th>Used amount</th>
<th>Dust formation</th>
<th>Comment</th>
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<tbody>
<tr>
<td>1. Improbable</td>
<td>Small</td>
<td>High</td>
<td>gr</td>
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<tr>
<td></td>
<td>Medium/Large</td>
<td>Low</td>
<td>Kg/ton</td>
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<td>2. Possible</td>
<td>Medium</td>
<td>Medium/High</td>
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<td>3. Probable</td>
<td>Large</td>
<td>Medium/High</td>
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<tr>
<td>Usage/Process</td>
<td>Dangerous chemical used</td>
<td>Harmful or severe effects (grade 2 or 3)</td>
<td>Probability of exposure, dangerous situations</td>
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References:

- Työterveyslaitos TTL, Maj-Len Henriks-Eckerman