Gas Absorption

Safety Guidelines

1.

<table>
<thead>
<tr>
<th>Chemical(s) used</th>
<th>Hazard Class</th>
<th>Health Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon dioxide (CO₂), gas</td>
<td>Compressed gas, reactive</td>
<td>Inhalation: asphyxiation, respiratory stress, headache.</td>
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<tr>
<td></td>
<td></td>
<td>No hazards to eyes, skin or from ingestion.</td>
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<td></td>
<td></td>
<td>Overexposure: result in circulatory insufficiency and may lead to coma or death.</td>
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<tr>
<td>Air</td>
<td>Compressed gas</td>
<td>Mixture with less than 19.5% oxygen act as asphyxiant and may cause headache, dizziness, or loss of consciousness. Otherwise, non-toxic.</td>
</tr>
<tr>
<td>Water</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

2. Personal Protective Equipments required for this activity:
   - Hardhat
   - Safety glasses or goggles
   - Close-toed shoes
   - Long pants

3. Safety Precautions
   Sensors:
   1. Do not leave water in the column without air flow. It can damage the CO₂ sensors if water backs up in the air line.
   2. Do not leave the valves on the CO₂ sensor by-pass line on the feed stream open after shutdown. These needle valves are shown in Figure 1.
   3. Watch your step when you go behind the experimental setup to close the valves on the CO₂ sensor by-pass line.

   CO₂ heater:
   1. Do not touch the heater on the CO₂ cylinder while it is on.
2. Do not keep the CO\textsubscript{2} heater on when there is no CO\textsubscript{2} flow as this might burn and damage the heater.

**Gas pressure:**

1. **Gas pressure in the air and CO\textsubscript{2} cylinders is very high. Handle the cylinders with care!** If you need to replace an empty cylinder, ask a TA or the lab manager for assistance.

2. Do not change the pressure regulator settings on the gas cylinders. The pressure of the gases is set to 15 psi and it is essential to keep the pressure settings unchanged since CO\textsubscript{2} sensors are sensitive to pressure and are calibrated for these settings.

3. Release the pressure in the air and CO\textsubscript{2} lines after shutdown.

![Image of needle valves](image1.png)

Figure 1: Needle valves to protect the feed CO\textsubscript{2} sensor in the Gas Absorption experiment