ELECTROCHEMICAL CELLS & THE NERNST EQUATION

Safety Moment: Chemical Hazards of Metals and Waste Disposal
Real-world example: battery disposal

• We’ve talked about how to *handle* toxic/dangerous chemicals safely in the lab.

• But good safety also extends to how we *dispose* of these chemicals.

  • If a substance is hazardous while you’re working with it, it’s also poses risks to other people and the environment.

• Everyday example: batteries! How do we dispose of these? And Why?
Real-world example: battery disposal

- We’ve talked a lot about how to handle toxic/dangerous chemicals safely in the lab; good safety also extends to how we dispose of these chemicals.
  - If a substance is hazardous while you’re working with it, it’s also poses risks to other people and the environment.

- Everyday example: batteries! Discussion: how do we dispose of these? Why?
  - Contain environmentally toxic metals (lead, cadmium, nickel, mercury, silver, zinc, lithium).

<table>
<thead>
<tr>
<th>Household batteries (not shown: button batteries)</th>
<th>Rechargeable batteries</th>
<th>Lead-based batteries (automotive and others)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Special hazardous waste disposal (Collection places: 1st floor Chemistry building, hardware stores).</td>
<td>Special hazardous waste disposal (Collected at places that accept electronics waste: cell phone &amp; computer stores)</td>
<td>Collected for recycling (automotive stores, local waste agencies)</td>
</tr>
</tbody>
</table>
Our lab activity: electrochemical cells

- Batteries are specialized electrochemical cells; this week, we’re making and studying electrochemical cells.
- We’ll be working with metal salts as shown below. Discussion: what types of hazards do the pictograms warn us about?

\[
\begin{align*}
\text{AgNO}_3 & \quad \text{NH}_4\text{NO}_3 & \quad \text{AgX } X=\text{Cl, Br, I} & \quad \text{M(NO}_3)_2 \quad \text{M=Zn, Cu, Pb}
\end{align*}
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Our lab activity: electrochemical cells

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- We’ll be working with metal salts as shown below. Discussion: what types of hazards do the pictograms warn us about?

- These substances are oxidizers, toxic to humans, corrosive, aquatically/environmentally toxic, irritants (skin & eyes).
- Oxidizer - a substance that can cause or contribute to the combustion of other material.
Our lab activity: electrochemical cells

\[
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\]

- **Assessment:** according to MSDS information, how large is the risk for the amounts and manner in which we are handling these substances?
  - Minimal quantities, dilute solutions. Assessment: risk is low.

- **Minimize:** how do we minimize exposing ourselves and the environment to these substances?
  - Do not dispose of chemicals down the sink; use waste containers in hoods. Use minimum quantities necessary to do experiment properly. Use proper PPE. Wash hands thoroughly when finished.

- **Prepare:** what do we do if there is exposure?
  - Wash hands thoroughly; let TA know if there is a spill.