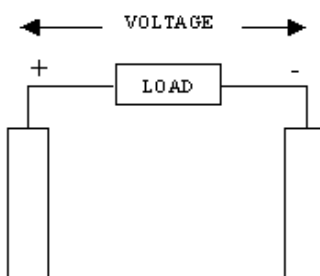


## Components of Cells and Batteries

Cells are comprised of 3 essential components.

- The **Anode** is the negative or reducing electrode that releases **electrons** to the external circuit and oxidizes during an electrochemical reaction.
- The **Cathode** is the positive or oxidizing electrode that acquires electrons from the external circuit and is reduced during the electrochemical reaction.
- The **Electrolyte** is the medium that provides the *ion* transport mechanism between the cathode and anode of a cell. Electrolytes are often thought of as liquids, such as water or other solvents, with dissolved salts, *acids*, or *alkalis* that are required for *ionic conduction*. It should however be noted that many batteries including the conventional (AA/AAA/D) batteries contain solid electrolytes that act as ionic conductors at room temperature.



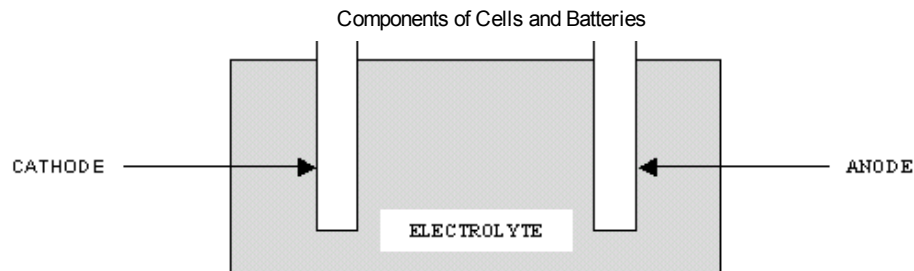


Figure 1: Components of a Cell

### **Considerations in selection of Cathode, Anode and Electrolyte**

Desirable properties for anode, cathode, and electrolyte materials are noted below.

#### **Anode material should exhibit the following properties**

- Efficient reducing agent
- High *coulombic output*
- Good conductivity
- *Stable*
- Ease of fabrication
- Low cost
- Metals such as Zinc and Lithium are often used as anode materials.

#### **Cathode material should exhibit the following properties**

- Efficient oxidizing agent.
- Stable when in contact with electrolyte
- Useful *working voltage*
- Ease of fabrication
- Low cost
- Metallic oxides such as are often used as cathode materials

The most desirable anode-cathode material combinations are those that result in light-weight cells with high voltage and capacity. Such combinations may not always be practical as a result of extenuating factors such as material handling difficulty, reactivity with other cell components, difficulty of fabrication, *polarization* tendencies, and cost

prohibitive materials.

**Electrolytes should exhibit the following properties**

- Strong ionic conductivity
- No electric conductivity
- Non-reactivity with electrode materials
- Properties resistance to temperature fluctuations
- Safeness in handling
- Low cost
- *Aqueous* solutions such as dissolved salts, acids, and alkalis are often used as electrolytes

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