ENGINEERING CHEMISTRY

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Energy storage devices - Batteries

Class content:

- ***Lithium Metal batteries***
  - ***Advantages***
  - ***Disadvantages***
  - ***Applications***

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Lithium batteries

- **Lithium is a popular anodic material:**
  - Light weight metal. The electrochemical equivalence of lithium is high (7g of lithium can give 1F of charge)
  - High negative standard reduction potential of -3.05V ; when coupled with other electrodes gives high voltage (about 4V)
- **Aqueous electrolytes cannot be used** as Lithium is very reactive and it reacts vigorously with water . So organic and inorganic electrolytes are used

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Components of Lithium batteries: Lithium is used as anode;

Cathode can be MnO_2, SO_2Cl_2. Electrolyte can be Li salt in organic solvents like acetonitrile, propylene carbonate or inorganic solvents like $SOCl_2$

Types of Lithium batteries :

Primary batteries which are not rechargeable, e.g. Li-MnO_2

Secondary batteries which are rechargeable, e.g. Solid state lithium metal battery

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Advantages of lithium batteries

- High Voltage up to 4V
- High energy density – Lightest metal
- High tolerance to service conditions (-40 ^{o}C to 70 ^{o}C)
- High electricity storage density
- Flat discharge characteristics

Disadvantages of lithium batteries

- Safety concerns due to high reactivity of Lithium metal
- Poor cycle life – due to dendrite formation
- Transportation limit

THANK YOU

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