

Topic 4

Metals: Electrochemical cells

Summary

1

- Simple cells:

- electrically conducting solutions containing ions are known as electrolytes;
- a simple cell can be made by placing two metals in an electrolyte.

2

- Electrochemical cells - metals:

- another type of cell can be made using two half-cells (metals in solutions of their own ions);
- an 'ion bridge' (salt bridge) can be used to link the half-cells;
- ions can move across the bridge to complete an electrical circuit;
- electrons flow in the external circuit from the species higher in the electrochemical series to the one lower in the electrochemical series;
- for an electrochemical cell, ion-electron equations can be written for:
 - the oxidation reaction;
 - the reduction reaction;
 - the overall redox reaction.

3

- Electrochemical cells - non-metals:

- electricity can be produced in cells where at least one of the half-cells does not involve metal atoms/ions;
- a graphite rod can be used as the electrode in such half-cells;
- for an electrochemical cell involving non-metals, ion-electron equations can be written for:
 - the oxidation reaction;
 - the reduction reaction;
 - the overall redox reaction.

4

- Voltage:

- different pairs of metals produce different voltages;
- these voltages can be used to arrange the elements into an electrochemical series;
- the further apart elements are in the electrochemical series, the greater the voltage produced when they are used to make an electrochemical cell;
- electrons flow in the external circuit from the species higher in the electrochemical series to the one lower in the electrochemical series;
- the direction of electron flow can be deduced for electrochemical cells including those involving non-metal electrodes.

