Summary: redox reactions and electrode potentials

Making a cell from two half-cells

A connection is needed between the two solutions, but the solutions should not mix together. A strip of filter paper soaked in saturated potassium nitrate(V) solution can be used as a junction, or **salt bridge**, between the half-fells. The potassium and nitrate(V) ions carry the current in the salt bridge so that there is electrical contact between the solutions, but no mixing. The complete set up is shown in Figure 8.

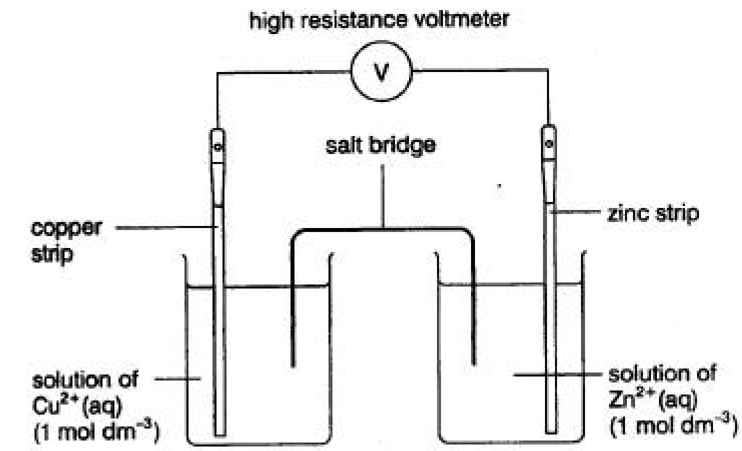

Figure 8 A copper-zinc cell

The circuit is completed by a metal wire connecting the cupper and zinc strips. A high resistance voltmeter can be included in the circuit to measure the maximum voltage, E_{cell}, produced by the cell.

What potential difference would you expect between the electrodes of the copper and zinc half-cells? Using Figure 9. we can predict it will be 1.10V, The value we actually get when we measure the voltage is indeed 1.10V.

It would help to sort things out if we select one reference half-cell and measure all the others against it. We would then have a common reference point, and we could construct a list of electrode potentials relative to it. A **standard hydrogen half-cell** is chosen as the reference (Figure 10). The half-reaction in this half-cell is:

$2H^+(aq) + 2e^- \rightarrow H_2(g)$

> An **electrochemical cell** consists of two half-cells, connected by a salt bridge. We measure the maximum potential difference between the two electrodes of the half-cells with a high resistance voltmeter, so that negligible current flows.

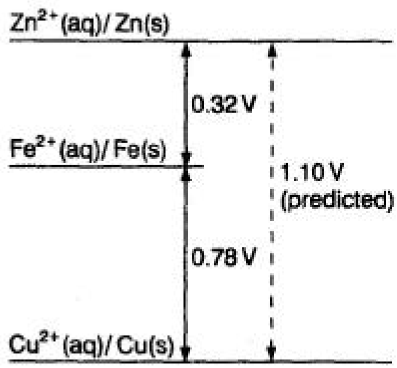

Figure 9 A chart showing the potential differences between three half-cells