Chapter 4: reduction, oxidation

1. Verification of the Nernst equation

**DOCUMENT 1: Principle and tasks**

The Nernst equation expresses how the electrical potential of an electrode in contact with a solution of ions de- pends upon the activities of these ions. The equation may be experimentally verified using an electrochemical cell formed from an inert indictator electrode coupled with a convenient reference electrode. The potential of the in- dicator electrode, and hence the e.m.f. of the cell, are monitored as the ionic composition of the electrolyte solution is changed.

Here a silver - silver chloride electrode is used as reference electrode measuring the potential of a platinum elec- trode in contact with solutions containing different concentrations of iron(II) and iron(III) complex ions.

**Source: http://www.uobabylon.edu.iq/eprints/publication\_11\_2286\_250.pdf**

**DOCUMENT 2: Materials**

Digital potentiometer

Reference electrode, AgCl

Platinum electrode in protective tube

Magnetic stirrer, Mini

Support for two electrodes

Thermometer

Two burettes, 50 ml, lateral stopcock

Glass beaker, 100 ml, tall

Glass beaker, 150 ml, tall

Volumetric flask, 1000 ml

Volumetric pipette, 50 ml

Pipette

Rubber bulbs

Wash bottle, 500 ml

Potassium hexacyanoferrate(II) solution, 0.001M

Potassium hexacyanoferrate(III), 0.001M

Distilled water

**Source: http://www.uobabylon.edu.iq/eprints/publication\_11\_2286\_250.pdf**

**DOCUMENT 3: Set-up**



**Source: http://www.uobabylon.edu.iq/eprints/publication\_11\_2286\_250.pdf**

**DOCUMENT 4: Verification of the Nernst equation for the** $Fe^{3+}/Fe^{2+}$**couple**



**Source: http://www.uobabylon.edu.iq/eprints/publication\_11\_2286\_250.pdf**

### Protocol:

Propose a protocol in order to obtain the graph in document 4 using all other documents.

Activity summary

What you must remember:

- electrode potential

- redox couple

- redox reaction

Skills linked to the curriculum:

|  |  |
| --- | --- |
| **Compétences** | **Capacités à maitriser** |
| * APP
 | Lire des documents scientifiques |
| * ANA
 | Déterminer le potentiel d’un couple donné en utilisant la relation de Nernst, la composition du système étant donnée.  |
| * COM
 | Formuler et argumenter des réponses structurées Formuler et présenter une conclusion  |