

## Chapter 4: reduction, oxidation

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### ACTIVITY 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 depends upon the activities of these ions. The equation may be experimentally verified using an electrochemical cell formed from an inert indicator electrode coupled with a convenient reference electrode. The potential of the indicator 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 electrode 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](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

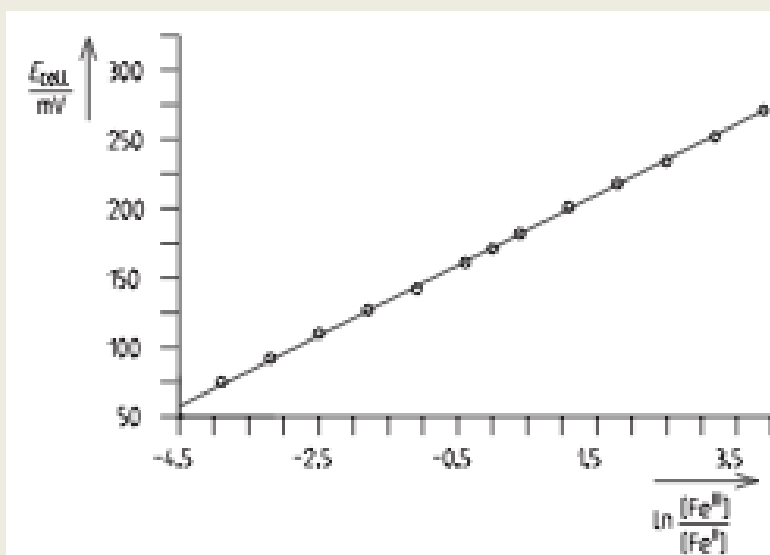
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**DOCUMENT 3: Set-up**



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



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**■ Protocol:**

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

## Activity summary

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What you must remember:

- electrode potential
- redox couple
- redox reaction

Skills linked to the curriculum:

| Compétences | Capacités à maîtriser   |
|-------------|---|
| - 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<br>Formuler et présenter une conclusion                               |