

06.09 The Nernst equation



What you can learn about

- Electrode potentials and their concentration dependence
- Redox electrodes
- Electrochemical cells

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.

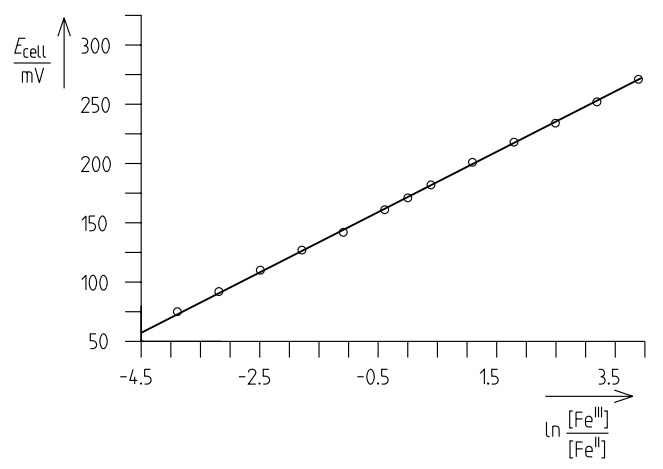
Here a silver - silver chloride electrode is used as reference electrode measuring the potential of a platinum electrode in contact with solutions containing different concentrations of iron(II) and iron(III) complex ions.

What you need:

Digital pH-meter	13702.93	1
Reference electrode, AgCl	18475.00	1
Platinum electrode in protective tube	45206.00	1
Connecting cord, $l = 500$ mm, black	07361.05	1
Temperature probe Pt1000	13702.01	1
Magnetic stirrer, Mini	47334.93	1
Magnetic stirrer bar, $l = 30$ mm	46299.02	1
Retort stand, $h = 750$ mm	37694.00	2
Right angle clamp	37697.00	2
Universal clamp	37715.00	1
Support for two electrodes	45284.01	1
Spring balance holder	03065.20	2
Burette clamp, roller mounting	37720.00	1
Burette, 50 ml, lateral stopcock	36517.01	2
Analytical balance with data output, 120 g	48802.93	1
Weighing dishes, $80 \times 50 \times 14$ mm	45019.05	1
Glass beaker, 100 ml, tall	36002.00	2
Glass beaker, 150 ml, tall	36003.00	4
Volumetric flask, 1000 ml	36552.00	4
Volumetric pipette, 50 ml	36581.00	2
Pipettor	36592.00	1
Pipette dish	36589.00	1
Funnel, glass, $d_o = 55$ mm	34457.00	2
Funnel, glass, $d_o = 80$ mm	34459.00	2
Spoon	33398.00	1
Pasteur pipettes	36590.00	1
Rubber bulbs	39275.03	1
Wash bottle, 500 ml	33931.00	1
Potassium hexacyanoferrate(II), 250 g	30101.25	1
Potassium hexacyanoferrate(III), 100 g	30100.10	1
Water, distilled, 5 l	31246.81	1

The Nernst equation

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Verification of the Nernst equation for the $\text{Fe}(\text{CN})_6^{4-}$, $\text{Fe}(\text{CN})_6^{3-}$ | Pt redox electrode.