

IB2 HL Chemistry

4. Oxidation and Reduction

Read: Zumdahl² Chapter 17: Section 1, 2 (line notation not required), 4 (841-842), 5, 7 (855-859 **except** Electrolysis of mixture of ions, page 862).

Presumed knowledge (from GCSE)

- oxidation, reduction, oxidation number (state), oxidizing agent, reducing agent, half-equation

Concepts to be mastered:

To master a concept, you must be able to do three things:

Define the concept, explain the concept, and give an example of the concept.

- electrochemical cell, Galvanic cell, Voltaic cell, electrode, anode, cathode, half-cell, half-reaction, salt bridge, porous disk,
- inert electrode, active electrode, platinum electrode, graphite electrode, cell potential, standard cell potential, reduction potential, oxidation potential, standard hydrogen electrode, electron potential energy, electromotive force (emf), reactivity, activity (electrochemical) series,
- electrochemistry, spontaneous reaction, nonspontaneous reaction, electrolysis, electrolytic cell, electroplating, charge, coulomb, current,
- Faraday's Law, Faraday's constant, battery, voltmeter, Down's Cell, lead storage battery, zinc-carbon battery (LeLanche), mercury battery (alkaline), (concentration cell).

Skills to be mastered:

To master a skill, you must be able to

Recognize when the skill is needed, recognize what information is needed to execute the skill, execute the skill, and assess whether the skill has been executed correctly.

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| • Given two of the cell potential for a galvanic cell, the reduction potential of one half cell, and the reduction potential for the other, under standard conditions, determine the third. | Zumdahl ²
problems
43-48 |
| • Discuss what happens to the cell potential for a Galvanic cell as the cell discharges. | |
| • Given two of mass of desired electrolysis product, time for electrolysis, and amperage, determine the third. | 73-80, 83-84, |
| • Construct an operational standard Galvanic cell. | 25-30, 33-37 |
| • Construct an operational electrolytic cell | |
| • Describe the need for and the operation of a Down's cell | |
| • Determine the spontaneity of a redox reaction based upon reduction and oxidation potentials. | |
| • Construct an activity series based upon observational information. | 43-46 |
| • Use an activity series to determine if a redox reaction will occur | 45, 47 |
| • Describe the operation of a lead storage battery as both an electrolytic cell and as an galvanic cell | |
| • (Discuss the operation of a concentration cell and compare and contrast this cell with simple diffusion) | 51, 52 |

Additional Problems: 13-20