Electrochemistry—the study of the interchange of chemical and electrical energy OIL RIG – oxidation is loss, reduction is gain (of electrons)

Oxidation - the loss of electrons, increase in charge

Reduction - the gain of electrons, reduction of charge

Oxidation number - the assigned charge on an atom

Oxidizing agent (OA) - the species that is reduced and thus causes oxidation

Reducing agent (RA) - the species that is oxidized and thus causes reduction

ELECTROCHEMISTRY INVOLVES TWO MAIN TYPES OF PROCESSES:

- A. Galvanic (voltaic) cells which are spontaneous chemical reactions (battery)
- B. Electrolytic cells which are non-spontaneous and require external e source (DC power source)
- C. BOTH of these fit into the category entitled Electrochemical cells

GALVANIC CELLS

Parts of the voltaic or galvanic cell:

- Anode--the electrode where oxidation occurs. After a period of time, the anode may appear to become smaller as it falls into solution.
- <u>Cathode</u>— the anode where reduction occurs. After a period of time it may appear larger, due to ions from solution plating onto it.
- inert electrodes—used when a gas is involved OR ion to ion involved such as Fe^{3*} being reduced to Fe^{3*} rather than Fe⁰. Made of Pt or graphite.
- Salt bridge a device used to maintain electrical neutrality in a galvanic cell. This may be filled with agar which contains a neutral salt or it may be replaced with a porous cup.
- <u>Electron flow</u> always from anode to cathode. (through the wire)
- Standard cell notation (line notation) anode/solution// cathode solution/ cathode Ex. Zn/Zn²⁺ (1.0 M) // Cu²⁺ (1.0 M) / Cu
- <u>Voltmeter</u> measures the cell potential (emf). Usually is measured in volts.

Balance this re-dox reaction:

 MnO_4 + Fe^{2+} \rightarrow Mn^{2+} + Fe^{3+} [acidic]

RED: OA:

OX:

Overall rxn:

Laying The Foundation Ap Chemistry Electrochemistry

JR Anderson

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