

Agenda for October 16, 2008

luddite

noun

Etymology: perhaps from Ned *Ludd*, 18th century Leicestershire workman who destroyed machinery

Date: 1811

: one of a group of early 19th century English workmen destroying laborsaving machinery as a protest; *broadly* : one who is opposed to especially technological change

lynch: William Lynch died 1820 American vigilante

Date: 1811

in medias res

ancien regime = the old regime or government

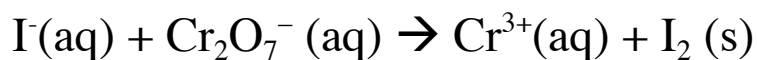
Your questions.

Quiz

Complete redox

Review for exam

In acidic solution



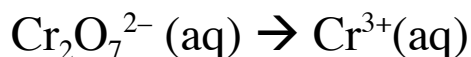
Oxidation half reaction



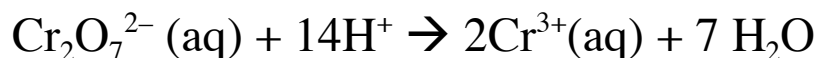
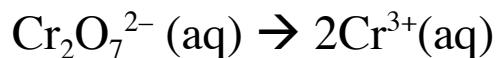
(First balanced mass and then charge).

What is oxidation of Cr? $2x - 14 = -2$; $x = 6+$

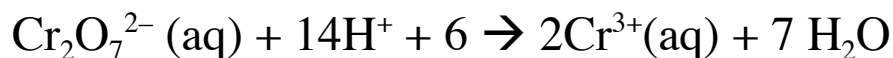
Reduction:



Use H^+ to balance mass after balancing the mass with respect to Cr.



Now balance charge



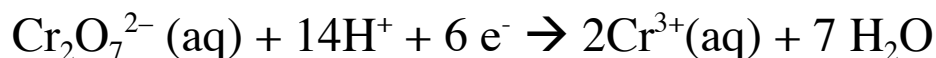
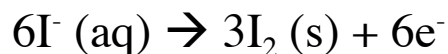
On the left

$$-2 + 14 = 12$$

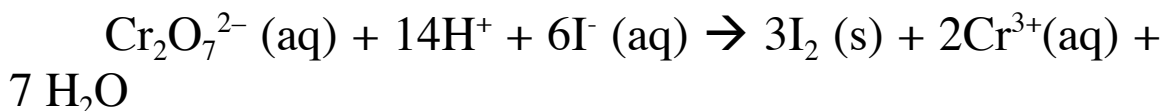
On the right side: $2 \times 3+ = 6$

We need to add 6 electrons to the left side. This makes sense because each of the 2 Cr^{+3} is being reduced from +3 to 0.

Overall:



Net reaction:



Check yourself by checking the mass balance.

Electrochemical Cell: Getting work directly from a chemical reaction (battery)

Voltage (measured in volts) is a measure of how much energy the electron has in a chemical reaction (or circuit— analogous to the high from which water is dropping).

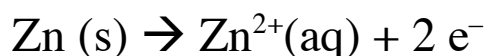
Current (measured in Amps) is a measure of how many electrons are moving through a circuit (so analogous to how much water is falling.)

To obtain current from a redox reaction, the reduction and oxidation reactions must be separated and the electrons transferred via electrodes and wires.

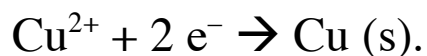
Every REDOX pair has its own voltage that is dependent on the components AND the concentration of the components.

e.g. Zn (s) in when container connected by a wire to an electrode immersed in a solution of $\text{Cu}^{2+}(\text{aq})$. The two solutions are also connected by a ‘salt bridge’ (a gel filled with an *electrolyte*).

Zn is the anode and gives up electrons to the electrode, is oxidized and dissolves:



At the cathode, Cu^{+2} ions are reduced by the electrons coming from the anode:



As it is reduced, the copper “plates out” onto the electrode.

When at least one of the reagents is completely consumed, the battery is “dead”.

Doing chemistry using an electronic current

By putting an electric current through an electrochemical cell that is at equilibrium, it is possible to reverse the reaction. The current must have a voltage at least equal to the voltage of the cell. How fast you recharge the battery depends on the current.

Why use lithium for batteries? Lithium is a nasty metal to work with but it is the lightest per electron it can move through a circuit.

Battery capacity is given in Amp-hours. An Amp = 1 Coulomb per s. A Coulomb is a unit of charge, essentially a whole lot of electrons ($6. \times 10^{18}$). For example, a 7 Amp-hour battery can sustain a current of 7 Amps for one hour, or 1 Amp for 7 hours.

Types of recharges:

“Trickle chargers”. They deliver 100 mA (milliamps). They are like filling the bathtub slowly so it won't overflow too much.

If the recharging current is too high, the battery can get so hot it is damaged.