Friday Worksheet   **Name: ………………..**

Electrolysis worksheet 11

1) Producing iron by electrolysis rather than conventional smelting could prevent the emission of a billion tonnes of carbon dioxide into the atmosphere every year. In conventional smelting, iron ore is combined with a coal-derived carbon called coke. The coke reacts with the iron, producing CO_2 and carbon monoxide, leaving pure iron behind.

Electrolysis produces iron a different way. The iron ore (Fe_2O_3) is dissolved in a solvent of silicon dioxide and calcium oxide at 1600°C and an electric current passed through it. Negatively-charged oxygen ions migrate to one electrode producing oxygen gas that is allowed to bubble off. Positively-charged iron ions migrate to the other electrode where they are reduced to elemental iron which collects in a pool at the bottom of the cell and is siphoned off.
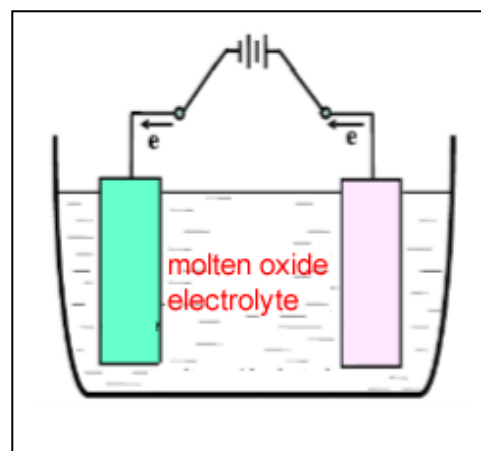
(a) Write the half-equation for the production of liquid iron and state at which electrode this reaction takes place at and the polarity of this electrode.

(b) Write the half-equation for the production of oxygen gas and state at which electrode this reaction takes place at and the polarity of this electrode.

(c) If the iron electrolytic cell operates at 100.0 kA for 0.800 hours, what is the total mass of iron that is deposited?

(d) What volume of oxygen at 0.00 °C and 101.3 kPa pressure (STP), is produced when the amount of iron in (c) above is produced?