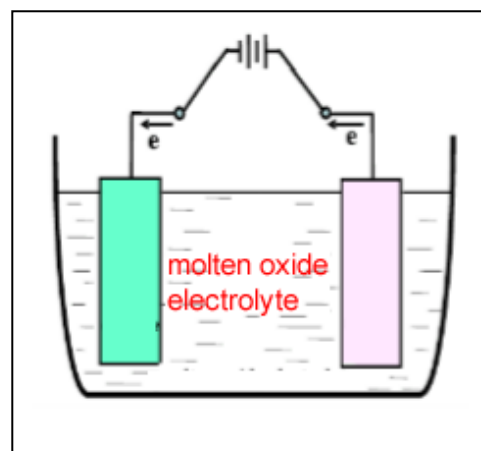


Electrolysis worksheet 11

- 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 1.00 atm pressure is produced when the amount of iron in (c) above is produced?