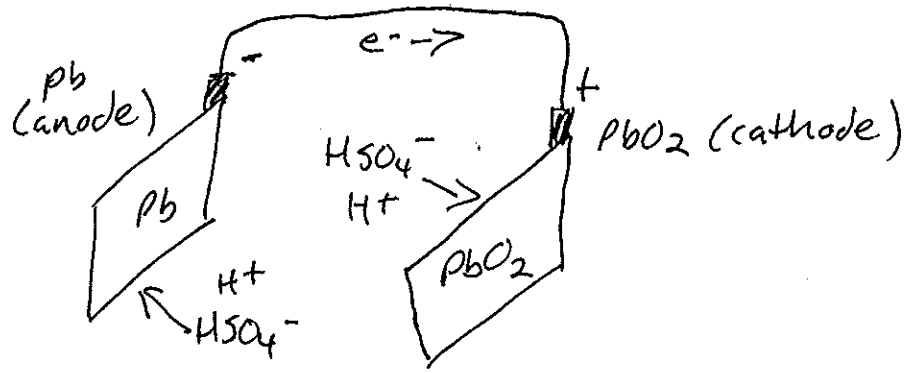
WORKSHEET 10 KEY

① Rust is a hydrated form of iron(III) oxide ($Fe_2O_3 \cdot H_2O$). Rust forms from the oxidation of Fe in the presence of O_2 and H_2O. Rust can be prevented by coating Fe w/ Zn (galvanizing).

②

(a)



(b) Anode: $Pb(s) + HSO_4^-(aq) \rightarrow PbSO_4(s) + H^+(aq) + 2e^-$ $E^\circ = 0.356$ ✓

cathode: $PbO_2(s) + 3H^+(aq) + HSO_4^-(aq) + 2e^- \rightarrow PbSO_4(s) + 2H_2O(l)$ $E^\circ = 1.628$ ✓

overall: $Pb(s) + PbO_2(s) + 2H^+(aq) + 2HSO_4^-(aq) \rightarrow 2PbSO_4(s) + 2H_2O(l)$ $E^\circ = 1.924$ ✓

(c) $E^\circ = \frac{0.0592V}{n} \log K$; $\log K = \frac{nE^\circ}{0.0592V} = \frac{(2)(1.924V)}{0.0592V}$

$= 65$; $K = 1 \times 10^{65}$

(d) When the cell rxn reaches equilibrium the cell voltage = 0.

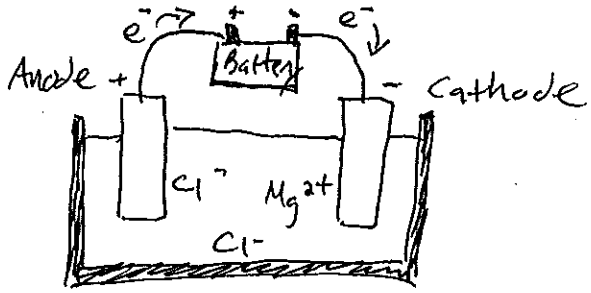
Zn 65.39 amu
HgO 216.59 amu

③ $Zn(s) + HgO(s) \rightarrow ZnO(s) + Hg(l)$

mass HgO $= 2.00g\ Zn \times \frac{1\ mol\ Zn}{65.39\ Zn} \times \frac{1\ mol\ HgO}{1\ mol\ Zn} \times \frac{216.59g\ HgO}{1\ mol\ HgO}$

$= 6.62g\ HgO$

④ (a)



(b) anode : $2Cl^-(l) \rightarrow Cl_2(g) + 2e^-$

cathode: $Mg^{2+}(l) + 2e^- \rightarrow Mg(l)$

overall: $Mg^{2+}(l) + 2Cl^-(l) \rightarrow Mg(l) + Cl_2(g)$

⑤ $Ag^+(aq) + e^- \rightarrow Ag(s)$ $\quad 1\,A = 1\,C/s$

$$\text{mass Ag} = 2.40\,\frac{C}{s} \times 20.0\,\text{min} \times \frac{60\,s}{1\,\text{min}} \times \frac{1\,\text{mole}^-}{96{,}500\,C} \times \frac{1\,\text{mol Ag}}{1\,\text{mole}^-} \times \frac{107.87\,g\,Ag}{1\,\text{mol Ag}}$$

$= 3.22\,g$

⑥ $PbSO_4(s) + H^+(aq) + 2e^- \rightarrow Pb(s) + HSO_4^-(aq)$

$$\text{mass } PbSO_4 = 10.0\,\frac{C}{s} \times 1.50\,h \times \frac{3600\,s}{1\,h} \times \frac{1\,\text{mole}^-}{96{,}500\,C} \times \frac{1\,\text{mol } PbSO_4}{2\,\text{mole}^-} \times \frac{303.3\,g}{1\,\text{mol}}$$

$= 84.9\,g\ PbSO_4$