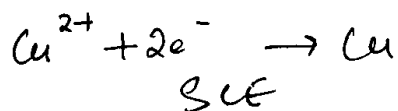
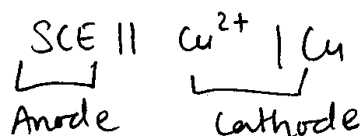


# Homework 12

①

## Answer Key

Q. 1. (a)



$$E^\circ = 0.34 \text{ V}$$

$$E^\circ = +0.241 \text{ V}$$

$$E_{\text{cell}} = E^\circ_{\text{cathode}} - \frac{0.059}{2} \log \frac{1}{[\text{Cu}^{2+}]} - 0.241$$

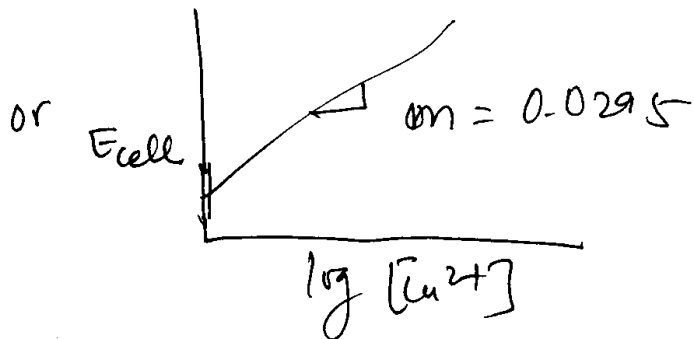
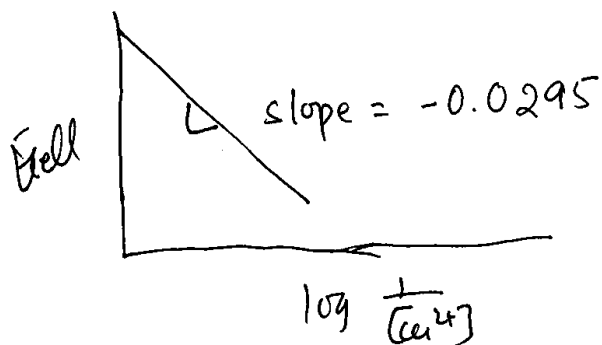
$$= 0.34 - \frac{0.059}{2} \log \frac{1}{1 \times 10^{-3}} - 0.241$$

$$E_{\text{cell}} = 0.0105 \text{ V}$$

(b)

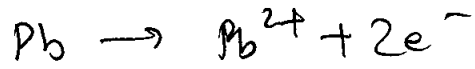
$$E_{\text{cell}} = E^\circ_{\text{cathode}} - \frac{0.059}{2} \log \frac{1}{[\text{Cu}^{2+}]} - E^\circ_{\text{SCE}}$$

$$E_{\text{cell}} = \underbrace{-\frac{0.059}{2}}_y \log \underbrace{\frac{1}{[\text{Cu}^{2+}]}}_x + \underbrace{(E^\circ_{\text{cathode}} - E^\circ_{\text{SCE}})}_b$$



2

Q.20F)



$$10^3 \text{ g Pb} \left| \frac{1 \text{ mol Pb}}{207 \text{ g}} \right| \frac{2 e^{-}}{1 \text{ mol of Pb}} = 9.65 e^{-}$$

$$\begin{aligned} \text{Total charge (Q)} &= nF \\ &= 9.65 \times 96500 \\ &= 931225 \text{ C} = It = \text{Amp. s} \end{aligned}$$

$$\begin{aligned} 931225 \text{ C} &= 931225 \text{ Amp. s} \left| \frac{1 \text{ hr}}{3600 \text{ s}} \right. \\ &= 259 \text{ Amp. hours.} \end{aligned}$$

b).

~~Amp. hrs.~~ = Power (W) = EI.

$$\frac{\text{J}}{\text{s}} = V \times \text{Amp.}$$

$$\frac{\text{J}}{\text{V}} = \text{Amp. s.}$$

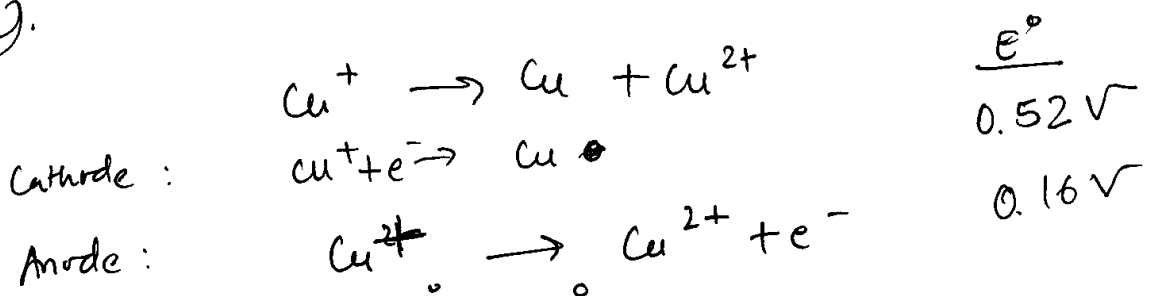
$$\frac{\text{J}}{\text{V} \times 3600} = \text{Amp} \frac{\text{s}}{3600}$$

Assume 12 V

$$\frac{\text{J}}{12 \times 3600} = \text{Amp. hr}$$

$$\therefore \text{Amp. hr} = 2.315 \times 10^{-5} \text{ J.}$$

Q.3. (a)



$$\begin{aligned} \therefore E^\circ_{\text{cell}} &= E^\circ_{\text{cat}} - E^\circ_{\text{an}} \\ &= 0.52 - 0.16 \\ &= 0.36 \text{ V} \end{aligned}$$

yes!!

+ve  $E^\circ_{\text{cell}} \Rightarrow -\Delta G$

(b) At equilibrium

$$E_{\text{cell}} = E^\circ_{\text{cell}} - \frac{0.059}{n} \log \frac{[\text{Cu}^{2+}]}{[\text{Cu}^+]}$$

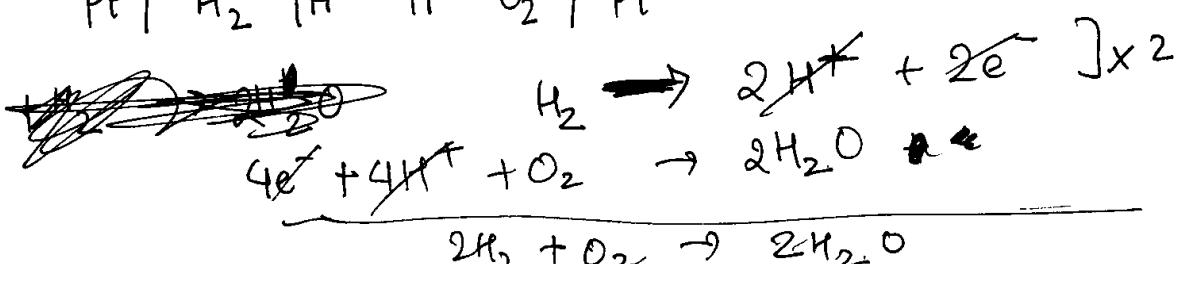
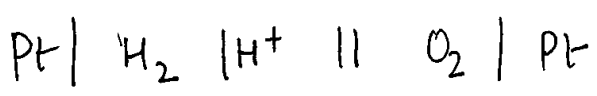
$$0 = 0.36 \text{ V} - 0.059 \log \frac{[\text{Cu}^{2+}]}{[\text{Cu}^+]}$$

$$\frac{[\text{Cu}^{2+}]}{[\text{Cu}^+]} = 1.2 \times 10^6$$

Q.4  $\Rightarrow$  gases produced in discharge, and the reactions involved are irreversible.

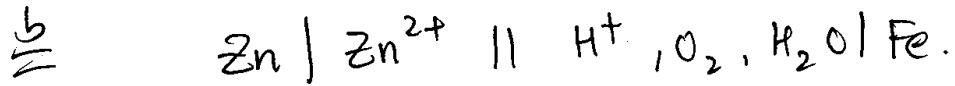
Q.5  $\Rightarrow$   $\text{H}_2/\text{O}_2$  fuel cell.

$\text{H}_2$  is oxidized and  $\text{O}_2$  is reduced.

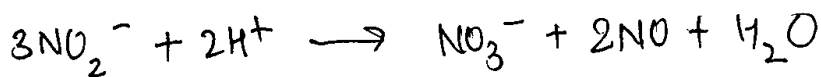
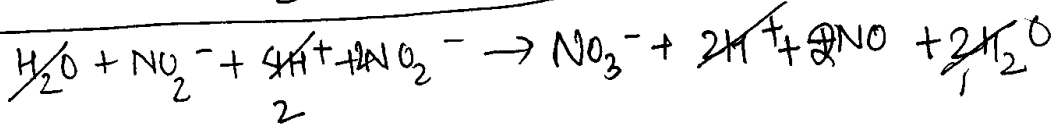
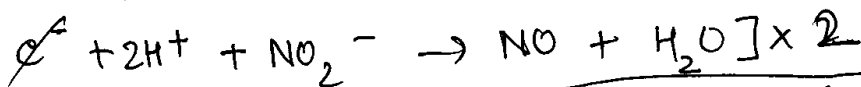
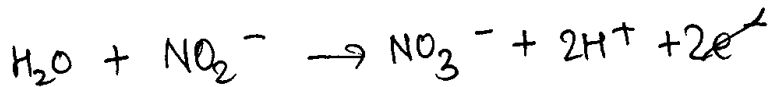
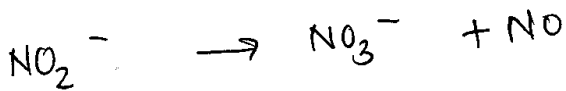
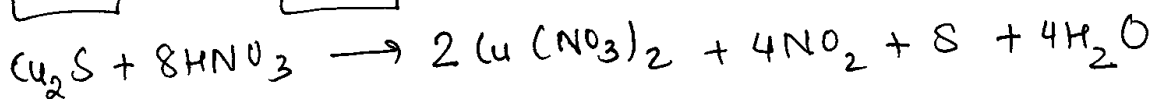
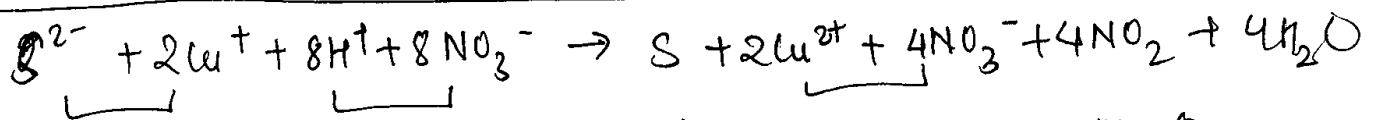
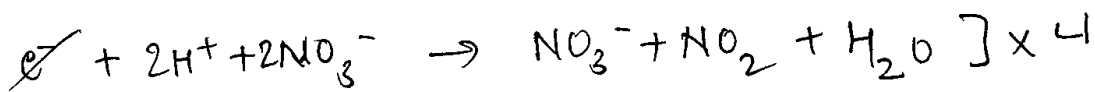
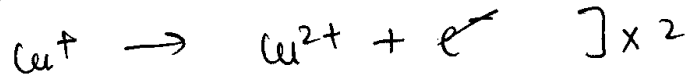
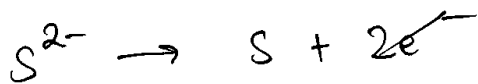
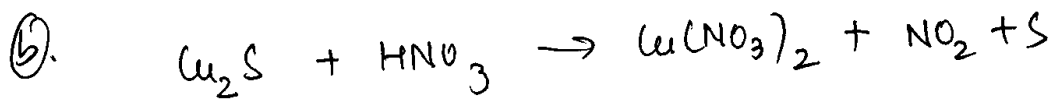
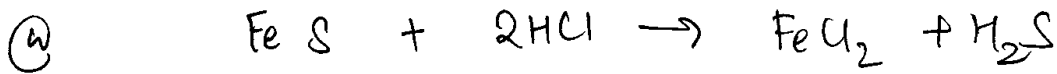


Q. 6

a b/c Zn reduces more easily than iron.



Q. 7.



8

