

## Electrochemistry (EN 314) – Spring 2018-19

## Quiz -1

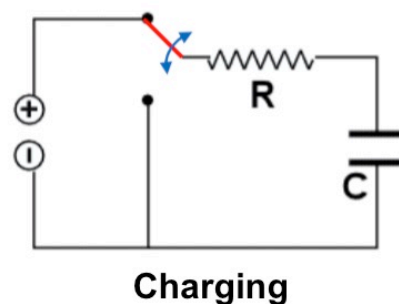
Max. Marks 15

1. Fill in the blanks (marks awarded only if all the correct options are filled.)

[5 x 1=5 Marks]

- $\text{Zn}/\text{Zn}^{2+}, \text{Cl}^-/\text{AgCl}/\text{Ag}$  is the same as  $\text{Zn}/\text{Zn}^{2+}, \text{Cl}^-//\text{AgCl}/\text{Ag}$ . Yes/No/Can't say: NO.
- The Standard Hydrogen Electrode in shorthand notation is  $\text{Pt}/\text{H}_2(a=1)/\text{H}^+(a=1, \text{aqueous})$ .
- The energy of the electrons is (increased/decreased) decreased by imposing more positive potential to the electrode.
- The OCP (in terms of magnitude) of  $\text{Hg}/\text{H}^+, \text{Br}(1\text{M})/\text{AgBr}/\text{Ag}$  is (higher/lower/can't say) can't say than that of  $\text{Pt}/\text{H}_2/\text{H}^+, \text{Br}(1\text{M})/\text{AgBr}/\text{Ag}$ .
- Electrodes at which Faradaic processes occur are sometimes called Charge Transfer electrodes.

- A supercapacitor is represented as equivalent electrical circuit as shown in the figure. Obtain the expression for the voltage from the capacitor during charging. Assume that the voltage generated after charging is  $\epsilon$ . [5 Marks]



Charging!

$$\epsilon - \frac{dq}{dt} - \frac{q}{RC} = 0$$

$$\frac{\epsilon}{R} - \frac{q}{RC} = \frac{dq}{dt}$$

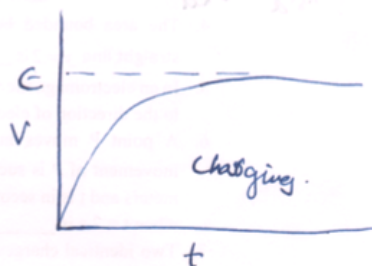
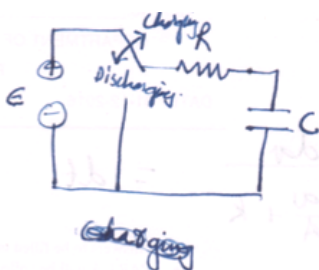
$$\frac{C\epsilon - q}{RC} = \frac{dq}{dt}$$

$$-\frac{1}{RC} (q - C\epsilon) = \frac{dq}{dt}$$

$$\int_0^t -\frac{dt}{RC} = \int_0^q \frac{dq}{q - C\epsilon}$$

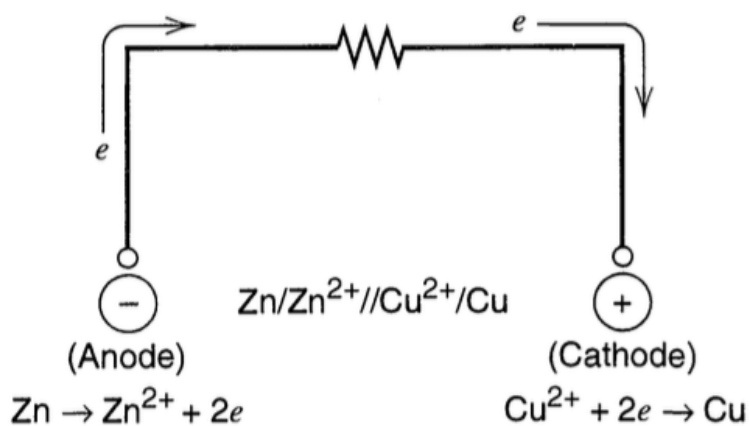
$$q' = C\epsilon (1 - e^{-t/RC})$$

$$V = \frac{q}{C} = \epsilon (1 - e^{-t/RC})$$

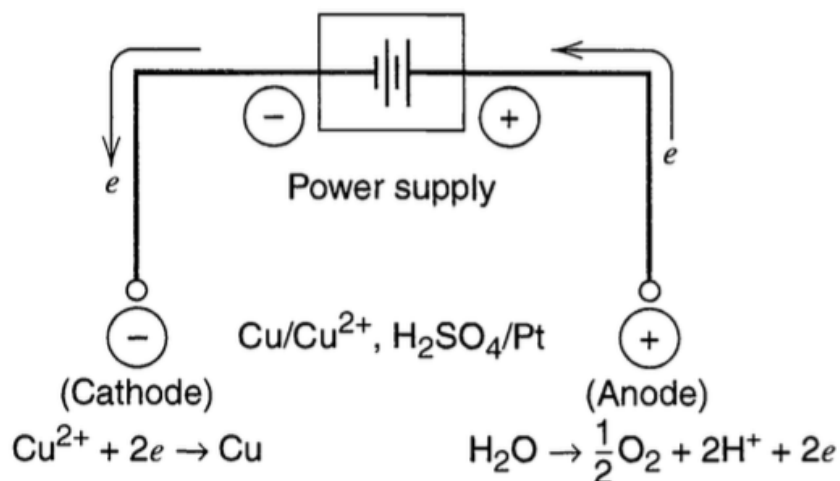


3. Identify (a) “Anode”, “Cathode”; (b) “+” and “-” electrodes; (c) half cell reactions for the following Galvanic and Electrolytic cells. [5 Marks]

(i) Galvanic Cell: Zn, Cu,  $\text{Zn}^{2+}$ ,  $\text{Cu}^{2+}$



(ii) Electrolytic Cell: Cu,  $\text{Cu}^{2+}$ ,  $\text{H}_2\text{SO}_4$ , Pt



Fun Fact: Thoughts are electrochemical reactions.