

### Construction of Daniel cell and measurement of its voltage with three different concentrations of Cu/Zn solutions:

In the Daniel cell, copper and zinc electrodes are immersed in the equimolar solution of  $\text{CuSO}_4$  and  $\text{ZnSO}_4$  respectively.

At the anode, zinc is oxidized as per the following half-reaction:  $\text{Zn}_{(s)} \rightarrow \text{Zn}^{2+}_{(aq)} + 2e^-$

At the cathode, copper is reduced as per the following reaction:  $\text{Cu}^{2+}_{(aq)} + 2e^- \rightarrow \text{Cu}_{(s)}$

The overall reaction is:  $\text{Zn}_{(s)} + \text{Cu}^{2+}_{(aq)} \rightarrow \text{Zn}^{2+}_{(aq)} + \text{Cu}_{(s)}$

Construct Daniel cell using the following concentrations of Copper and Zinc solutions and record the voltage of the cells in Table 3.

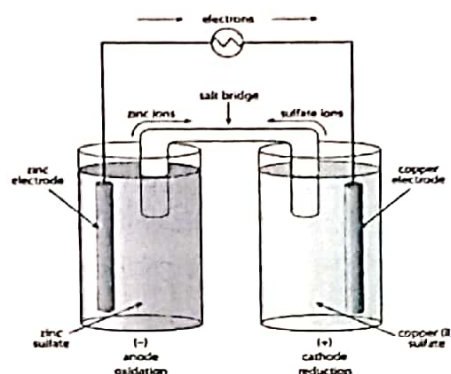


Table 3: EMF of Daniel Cell observed from three different conc. of Zn and Cu solutions

Metal	Concentration (N)	Metal	Concentration (N)	EMF observed ( $E_{\text{cell}} / \text{V}$ )
$\text{Zn}/\text{Zn}^{2+}$	0.01 N	$\text{Cu}/\text{Cu}^{2+}$	0.01 N	+1.000
	0.02 N		0.02 N	+1.085
	0.05 N		0.05 N	+1.086
Average				+1.059

#### Results:

(a). Standard electrode potential of Copper ( $E^\circ$ ) = +0.323 vs. SCE

(b). Standard electrode potential of Zinc ( $E^\circ$ ) = -0.755 vs. SCE

(c). EMF of the constructed Daniel cell = +1.059

#### Evaluation of result:

Sample No.	Experimental Value	Actual Value	Percentage of error	Marks awarded
a) $E^\circ_{\text{Cu}/\text{Cu}^{2+}}$				
b) $E^\circ_{\text{Zn}/\text{Zn}^{2+}}$				
c) EMF of Daniel cell				