

## Cell constant and Electrochemical Cells

26. (a)  $\frac{K}{C} = \text{Cell Constant}$  .
27. (c) Velocities of both  $K^+$  and  $NO_3^-$  are nearly the same in  $KNO_3$  so it is used to make salt-bridge.
28. (a) In this reaction 4 electrons are needed for the reaction volume.
29. (b) In electrochemical cell  $H_2$  release at anode and  $Cu$  is deposit at the cathode.

30. Answer: (c)  $Ag^+ + e^- \rightarrow Ag$

Explanation:

- **Reduction** is the **gain of electrons**.
- Silver ions ( $Ag^+$ ) gain electrons at the cathode to form solid silver:  
 $Ag^+ + e^- \rightarrow Ag$
- Copper is **oxidized** at the anode:  
 $Cu \rightarrow Cu^{2+} + 2 e^-$

31. (a) Anode has negative polarity.

32. (b)  $\wedge_m^o(CH_3COOH) =$   
 $\wedge^o(CH_3COONa) + \wedge^o(HCl) - \wedge^o(NaCl)$   
 $= 91 + 426.16 - 126.45 = 390.71 \text{ ohm}^{-1} \text{cm}^2 \text{mol}^{-1}$  .

33. Answer: (b) 4 / 3

Explanation:

- Cell constant  $K = \frac{l}{A}$



- where  $l$  distance between electrodes (cm),  $A$  cross sectional area ( $\text{cm}^2$ )
- Here:  $K = \frac{3}{4} \approx 0.75 \text{ cm}^{-1}$

(Check your teacher's convention; sometimes they express it as  $4/3$  depending on units.)

34. Answer: (b)  $\text{Pb(s)} + \text{SO}_4^{2-}(\text{aq}) \rightleftharpoons \text{PbSO}_4(\text{s}) + 2 \text{e}^-$

Explanation:

- At the **anode**, lead is **oxidized** to  $\text{Pb}^{2+}$ , forming  $\text{PbSO}_4$  and releasing electrons.

35. Answer: (d)  $\text{cm}^{-1}$

Explanation:

- Cell constant  $K = \frac{l}{A}$
- with  $l$  in cm and  $A$  in  $\text{cm}^2 \rightarrow$  unit is  $\text{cm}^{-1}$

36. (b) At anode:  $\text{Zn}_{(\text{s})} \rightarrow \text{Zn}^{2+} + 2\text{e}^-$ .

38. (d)  $\text{PbSO}_4 + 2\text{H}_2\text{O} \rightarrow 2\text{PbO}_2 + 4\text{SO}_4^{2-} + 2\text{e}^-$ .

39. (b)  $\text{MnO}_2$  is used in dry batteries cell.

40. (d)  $\text{Pb} + \text{PbO}_2 + 2\text{H}_2\text{SO}_4 \xrightleftharpoons[\text{Recharge}]{\text{Discharge}} 2\text{PbSO}_4 + 2\text{H}_2\text{O}$ .

Sulphuric acid is consumed on discharging.

42. (d) The metal placed below in electrochemical series does not react with that metal salt solution which metal is placed above in series.

43. (c) In the electrochemical cell chemical energy changes into electrical energy.

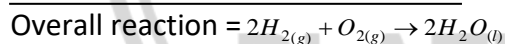
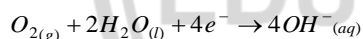
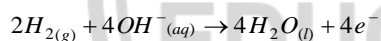


44. (a) In galvanic cell, the salt bridge used to complete the circuit.
45. (d)  $Cu + FeSO_4 \rightarrow$  No reaction Because  $Cu$  has  $E^\circ = 0.34$  volt and  $Fe$  has  $E^\circ = -0.44$  volt.
46. Answer: (a)  $CH_3COOK$

Explanation:

- Salt bridges must contain **electrolytes that do not react** with the solutions in the half-cells.
- $CH_3COOK$  (potassium acetate) is **partially ionized and can react**, making it unsuitable.
- $KCl$ ,  $NH_4NO_3$ , and  $KNO_3$  are **inert salts** commonly used in salt bridges.

47. (d) Calomel electrode as reference electrode is made by using  $Hg_2Cl_2$ .
48. (b) In hydrogen–oxygen fuel cell following reactions take place to create potential difference between two electrodes.



the net reaction is the same as burning (Combustion) of hydrogen to form water.

49. (c)  $ClCH_2COONa + HCl \rightarrow ClCH_2COOH + NaCl$
- $$\lambda_{ClCH_2COONa} + \lambda_{HCl} = \lambda_{ClCH_2COOH} + \lambda_{NaCl}$$

$$224 + 203 = \lambda_{ClCH_2COOH} + 38.2$$

$$\lambda_{ClCH_2COOH} = 427 - 38.2 = 388.8 \text{ ohm}^{-1} \text{ cm}^2 \text{ gmeq}^{-1}.$$

50. (c) In daniel cell copper rod acts as cathode so there cations move towards copper electrode and reduction take place on copper rod.

