



MORE QUESTIONS SOLVED

I. Very Short ANswer Type Questions

Question 1. Define electrochemical cell.

Answer: Electrochemical cell is a device in which the redox reaction is carried indirectly and the decrease in free energy appears as electrical energy.

Question 2. What is a redox couple?

Answer: A redox couple consists of oxidised and reduced form of the same substance taking part in the oxidation or reduction half reaction.

Question 3. Define oxidation in terms of electronic concept.

Answer: Oxidation involves loss of one or more electrons by a species during a reaction.

Question 4. What is the source of electrical energy in a galvanic cell?

Answer: In a galvanic cell due to redox reaction released energy gets converted into the electrical energy.

Question 5. What is the oxidation state of Ni in $\text{Ni}(\text{CO})_4$?

Answer: Zero.

Question 6. What is the oxidation number of P in H_3PO_4 ?

Answer:

$\overset{+1}{\text{H}}_3 \overset{x}{\text{P}} \overset{-2}{\text{O}}_4$ let the oxidation no. of P in H_3PO_4 , be x.

Calculate the sum of the oxidation numbers of all the atoms

$$\begin{aligned} 3(+1) + x + 4(-2) &= 0 \\ = 3 + x - 8 &= x - 5 = 0 \\ x &= +5 \end{aligned}$$

Question 7. What is salt bridge?

Answer: It is a U-shaped tube filled with agar-agar containing inert electrolyte like KCl or KNO_3 which does not react with solutions.

Question 8. What is meant by reducing agent? Name the best reducing agent.

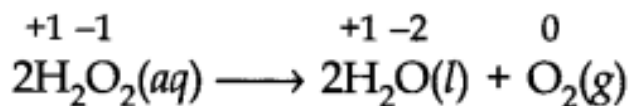
Answer: A species which loses electrons as a result of oxidation is a reducing agent. Li (Lithium).

Question 9. Why is standard hydrogen electrode called reversible electrode?

Answer: A standard hydrogen electrode is called reversible electrode because it can react both as anode as well as cathode in an electrochemical cell.

Question 10. What is a disproportionation reaction? Give one example.

Answer: In a disproportionation reaction an element in one oxidation state is simultaneously oxidised and reduced.
For example,



Here the oxygen of peroxide, which is present in -1 state is converted to zero oxidation state in O_2 and decreases to -2 oxidation state in H_2O .

Question 11. What is a standard hydrogen electrode?

Answer: Standard hydrogen electrode is known as reference electrode. Its electrode potential is taken as 0.000 volt.

Question 12. What is meant by cell potential?

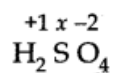
Answer: It is the difference in Standard Reduction Potential (SRP) of cathode and SRP of anode.

$$E^\circ_{\text{cell}} = E^\circ_{\text{cathode (SRP)}} - E^\circ_{\text{anode (SRP)}}$$

Question 13. Calculate the oxidation number of sulphur in H_2SO_4 and Na_2SO_4 .

Answer: Let the oxidation number of S in H_2SO_4 be x.

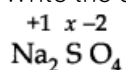
Write the oxidation number of each atom above its symbol.



Calculate the sum of the oxidation numbers of all the atoms. $2(+1) + x + 4(-2) = 0$ $x - 6 = 0$ $x = +6$

In Na_2SO_4

Write the oxidation number of each atom its symbol.



Calculate the sum of the oxidation numbers of all the atoms. $2(+1) + x + 4(-2) = 0$ $2 + x - 8 = 0$ $x = +6$

Question 14. Define Oxidation and Reduction in terms of oxidation number.

Answer: Oxidation involves increase in O.N while reduction involves decrease in O.N.

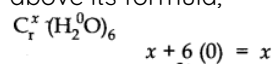
Question 15. Define EMF of cell.

Answer: EMF of a cell is the difference in the electrode potentials of the two electrodes in a cell when no current flows through the cell.

Question 16. Calculate the oxidation number of Cr in $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$ ion.

Answer: H_2O is a neutral molecule O.N of $\text{H}_2\text{O} = 0$

Write the oxidation number of Cr above its symbol and that of H_2O above its formula,



Since $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$ is an ion, the sum of the oxidation numbers must be $x = +3$.

Question 17. How can CuSO_4 solution not be stored in an iron vessel?

Answer:

It is because $E^\circ_{\text{Fe}^{2+}/\text{Fe}} = -0.44 \text{ V}$ which is lower than that of Cu.

$$\begin{aligned} E^\circ_{\text{Cell}} &= E^\circ_{\text{Cu}^{2+}/\text{Cu}} - E^\circ_{\text{Fe}^{2+}/\text{Fe}} \\ &= +0.34 \text{ V} - (-0.44 \text{ V}) \\ &= 0.78 \text{ V} \end{aligned}$$

Since, $E^\circ_{\text{Cell}} = +\text{ve}$, $\Delta G = -\text{ve}$

i.e., reaction will take place, we cannot store CuSO_4 in an iron container.

Question 18. How will you identify cathode and anode in electrochemical cell ?

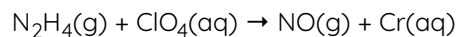
Answer:

At cathode there is gain of electrons.

At anode there is loss of electrons.

In electrochemical cell anode is written on L.H.S while cathode is written on R.H.S.

Question 19. Identify the oxidant and the reductant in the following reaction.



Answer: N_2H_4 is reducing agent i.e., reductant whereas ClO_3^- is oxidising agent i.e., oxidant.

Question 20. What is oxidation number of Fe in $[\text{Fe}(\text{CO})_5]$?

Answer: $x + 5(0) = 0$, $x = 0$

Question 21. In the reaction .



which species is oxidised.

Answer: HCl gets oxidised.

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