

## PREVIOUS HSE QUESTIONS FROM THE CHAPTER "REDOX REACTIONS"

- Balance the following redox equation in acidic medium by half reaction method :  

$$\text{Fe}^{2+} + \text{Cr}_2\text{O}_7^{2-} \longrightarrow \text{Fe}^{3+} + \text{Cr}^{3+} \quad (3)$$
- (i) What are disproportionation reactions ? (1)  
 (ii) Check whether the reaction  $2\text{H}_2\text{O}_2(\text{l}) \longrightarrow 2\text{H}_2\text{O}(\text{l}) + \text{O}_2(\text{g})$  is a disproportionation reaction. Justify your answer. (2) [December 2021]
- (i) Oxidation number of oxygen atom in  $\text{O}_2$  molecule is \_\_\_\_\_. (1)  
 (ii) In a reaction  $2\text{Cu}_2\text{O} + \text{Cu}_2\text{S} \longrightarrow 6\text{Cu} + \text{SO}_2$   
 Identify oxidising agent and reducing agent. (2)
- (i) Represent the following compounds using stock notation :  
 (a)  $\text{MnO}$       (b)  $\text{FeO}$       (1)  
 (ii) What is oxidation and reduction in terms of oxidation number? (2) [September 2021]
- The oxidation number of oxygen in super oxides is:  
 (A) -1      (B) +1      (C)  $-\frac{1}{2}$       (D)  $+\frac{1}{2}$       (1)
- Balance the following Redox reaction by oxidation number method or ion-electron method (Acid medium)  

$$\text{Cl}_2\text{O}_7(\text{g}) + \text{H}_2\text{O}_2(\text{aq}) \longrightarrow \text{ClO}_2^-(\text{aq}) + \text{O}_2(\text{g}) + \text{H}^+ \quad (3) \quad [\text{December 2020}]$$
- The oxidation number of an atom in the elementary form is ..... (1)
- (a) Justify that the following reaction is a redox reaction  

$$\text{H}_2\text{S}(\text{g}) + \text{Cl}_2(\text{g}) \longrightarrow 2\text{HCl}(\text{g}) + \text{S}(\text{s}) \quad (2)$$
  
 (b) Write the Stock notation of  $\text{MnO}_2$ . (1) [March 2020]
- (a) In the reaction:  $\text{Pb}(\text{s}) + \text{PbO}_2(\text{s}) + 2\text{H}_2\text{SO}_4(\text{aq}) \longrightarrow 2\text{PbSO}_4(\text{s}) + 2\text{H}_2\text{O}(\text{l})$ , identify the following.  
 (i) The substance oxidised (ii) The substance reduced (iii) The oxidising agent (iv) The reducing agent (2)  
 (b) What is disproportionation reaction? (1) [July 2019]
- Balance the following Redox process by ion-electron method or oxidation number method :  

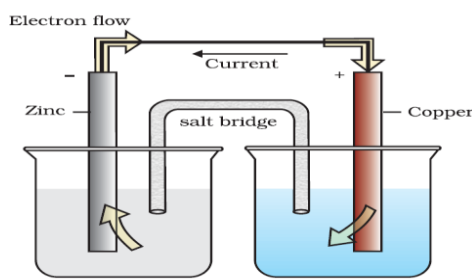
$$\text{P}_4(\text{s}) + \text{OH}^-(\text{aq}) \longrightarrow \text{PH}_3(\text{g}) + \text{HPO}_2^-(\text{aq}) \quad (3) \quad [\text{March 2019}]$$
- Redox reactions are classified into four types. Describe any three of them with suitable examples. (3) [August 2018]
- Balance the following Redox reaction by ion-electron method or oxidation number method (Acid medium)  

$$\text{Cr}_2\text{O}_7^{2-}(\text{aq}) + \text{SO}_3^{2-}(\text{aq}) \longrightarrow \text{Cr}^{3+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \quad (3) \quad [\text{March 2018}]$$
- a) The oxidation number of sulphur in  $\text{SO}_4^{2-}$  is ..... a) 3    b) 4    c) 5    d) 6  
 b) Balance the following equation using oxidation number method.  

$$\text{Cr}_2\text{O}_7^{2-}(\text{aq}) + \text{SO}_3^{2-}(\text{aq}) \longrightarrow \text{Cr}^{3+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \quad [\text{July 2017}]$$
- Permanganate ion reacts with bromide ion in basic medium to give manganese dioxide and bromated ion. Write the balanced equation for the reaction using oxidation number method. Skeletal equation is:  

$$\text{MnO}_4^- + \text{Br}^- \longrightarrow \text{MnO}_2 + \text{BrO}_3^- \quad (3) \quad [\text{March 2017}]$$
- In a redox reaction, reduction and oxidation takes place simultaneously.  
 a) Write the redox reaction in Daniel cell. (1)  
 b) When  $\text{CuSO}_4$  solution stored in iron vessel, the blue colour changes to pale green. Do you agree with it? Justify. (2) [September 2016]
- Redox reactions can be considered as electron transfer reactions. In an experiment a copper rod is dipped in  $\text{AgNO}_3$  solution.  
 a) What happens to the colour of the solution and why? (1)  
 b) Identify the oxidising and reducing agents in this reaction. (1)

- c) Calculate the oxidation number of Cr in  $K_2Cr_2O_7$  and P in  $H_2P_2O_5$ . (1)
17. Identify the oxidant and reductant in the following ionic equation and balance it using oxidation number method.
- $$MnO_4^-(aq) + Br^-(aq) + H^+(aq) \longrightarrow Mn^{2+}(aq) + Br_2(l) + H_2O(l) \quad (3) \quad [\text{Sept. 2015}]$$
18. a) Given the redox reaction:
- $$CuO(s) + H_2(g) \rightarrow Cu(s) + H_2O(g)$$
- i) Identify the species which undergo reduction and which undergo oxidation.
- ii) Identify the reductant and oxidant in the above reaction. (2)
- b) Among the following reactions, identify the one which is NOT a redox reaction. (1)
- I.  $3Mg(s) + N_2(g) \xrightarrow{\Delta} Mg_3N_2(s)$
- II.  $Fe(s) + 2HCl(aq) \longrightarrow FeCl_2(aq) + H_2(g)$
- III.  $CaCO_3(s) \xrightarrow{\Delta} CaO(s) + CO_2(g)$
- IV.  $2NaH(s) \xrightarrow{\Delta} 2Na(s) + H_2(g)$  [March 2015]
19. a) Using Stock notation, represent the following compounds: i)  $HAuCl_4$  ii)  $MnO_2$  (1)
- b) i) Define the electronic concept of oxidation and reduction. (1)
- ii) Find out the oxidiser and reducer in the following reaction on the basis of the electronic concept.
- $$2Na(s) + Cl_2(g) \rightarrow 2NaCl(s) \quad (1) \quad [\text{August 2014}]$$
20. a) Write the formula of the following compounds.
- i) Nickel (II) sulphate
- ii) Tin (IV) oxide (1)
- b) Fluorine reacts with ice as given below:
- $$H_2O(s) + F_2(g) \longrightarrow HF(g) + HOF(g)$$
- Justify that this is a redox reaction. (2) [March 2014]
21. a) Calculate the oxidation number of Cr in  $Cr_2O_3$  and S in  $H_2SO_4$ . (1)
- b) In disproportionation reaction an element in one oxidation state is simultaneously oxidised and reduced. Identify the element undergoing disproportionation in the following reaction:
- $$P_4 + 3OH^- + 3H_2O \longrightarrow PH_3 + 3H_2PO_2^- \quad (2) \quad \{\text{September 2013}\}$$
22. Competitive electron transfer reactions are utilized in the construction of Galvanic cells.
- a) Write the redox reaction involved when metallic cobalt is placed in a nickel sulphate solution. (Note: Only the ionic reaction is required) (1)
- b) In the reaction  $Pb(s) + PbO_2(s) + 2H_2SO_4(aq) \longrightarrow 2PbSO_4(s) + 2H_2O(l)$  Identify the following:
- i) Substance oxidised ii) Substance reduced iii) Oxidising agent iv) Reducing agent (2) [March 2013]
23. a) Using stock notation, represent the following compounds -  $FeO$  and  $MnO_2$ . (1)
- b) Redox reactions are those reactions in which oxidation and reduction takes place simultaneously. Write any two redox reactions. (2) [September 2012]
24. In redox reactions, oxidation and reduction occur simultaneously.
- a) How are oxidation and reduction related to the oxidation number? (1)
- b) During a group discussion, one of your friends argues that thermal decomposition of  $KClO_3$  is a redox reaction while that of  $CaCO_3$  is not a redox reaction. Give your opinion and substantiate. (2) [March 2012]
25. The chemical reactions taking place in electrochemical cells are redox reactions. A Daniel cell is represented below.



- a) As the reaction proceeds in this cell, one of the metal rods gets dissolved in its solution and the other metal gets deposited from the solution to the metal rod. Which metal is getting deposited? (1)
- b) Identify the metal which is acting as the oxidising agent in this reaction. (1)
- c) Write the chemical equation of the reaction taking place at the first compartment. (1) [October 2011]
26. Balance the following equation by the half reaction method.
- $$\text{Fe}^{2+}(\text{aq}) + \text{Cr}_2\text{O}_7^{2-}(\text{aq}) + \text{H}^+(\text{aq}) \longrightarrow \text{Fe}^{3+}(\text{aq}) + \text{Cr}^{3+}(\text{aq}) + \text{H}_2\text{O}(\text{l}) \quad (3) \quad [\text{March 2011}]$$
27. A farmer prepared 1% solution of copper sulphate using iron rod as the stirrer for preparing Bordeaux mixture. Next day he noticed that the blue colour almost disappeared and the iron rod get coated with reddish brown material.
- a) What is the reddish brown material deposited on the iron rod? (1)
- b) Account for the colour change of the solution. (1)
- c) Justify the above phenomenon as a redox reaction. (1) [September 2010]
28. Chemical reactions which involve oxidation and reduction are called redox reactions. The unbalanced equation in the ionic form of a redox reaction is shown below.
- $$\text{Fe}^{2+}(\text{aq}) + \text{Cr}_2\text{O}_7^{2-}(\text{aq}) \xrightarrow{\text{acidic medium}} \text{Fe}^{3+}(\text{aq}) + \text{Cr}^{3+}(\text{aq})$$
- a) Identify the oxidising agent in this reaction. (1)
- b) Name the species getting oxidized in the above reaction. (1)
- c) Balance the above equation by oxidation number method. (3) [March 2010]
29. Fill in the blanks.
- a) The oxidation state of Cl in  $\text{HClO}_4$  is ..... (1)
- b) A reducing agent is a substance which ..... electrons in a chemical reaction. (1)
- c) Among the elements Fluorine and Iodine, ..... exhibit both positive and negative oxidation states. (1) [March 2009]
30. a) Both HCl and NaH contain H, but the oxidation states of H in them are different. What is the oxidation state of H in each compound? (2)
- b) What is the oxidation state of 'S' in  $\text{SO}_4^{2-}$ ? (1) [June 2008]
31. a) A compound is formed between oxygen and fluorine. Do you know whether it is oxygen fluoride or fluorine oxide? Explain. (2)
- b) NO and  $\text{HNO}_3$  are two compounds of nitrogen. In which of them N is more oxidised? (1) [February 2008]
-