



- (b) Forms a blue coloured complex with  $\text{AgNO}_3$   
 (c) Is oxidised to  $\text{Cu}^{2+}$   
 (d) Is reduced to  $\text{Cu}^{2+}$
20. Solution of sodium metal in liquid ammonia is strongly reducing due to the presence of the following in the solution  
 [NCERT 1977; KCET (Med.) 2000]  
 (a) Sodium atoms (b) Solvated electrons  
 (c) Sodium hydride (d) Sodium amide
21. When  $\text{Sn}^{2+}$  changes to  $\text{Sn}^{4+}$  in a reaction [CPMT 1981]  
 (a) It loses two electrons (b) It gains two electrons  
 (c) It loses two protons (d) It gains two protons
22. Oxidation of thiosulphate ( $\text{S}_2\text{O}_3^{2-}$ ) ion by iodine gives  
 [NCERT 1976]  
 (a)  $\text{SO}_3^{2-}$  (b)  $\text{SO}_4^{2-}$   
 (c)  $\text{S}_4\text{O}_6^{2-}$  (d)  $\text{S}_2\text{O}_6^{2-}$
23.  $\text{Zn}^{2+}(\text{aq}) + 2e \rightarrow \text{Zn}(\text{s})$ . This is [CPMT 1985]  
 (a) Oxidation (b) Reduction  
 (c) Redox reaction (d) None of these
24. One gas bleaches the colour of flowers by reduction while the other by oxidation [EAMCET 1980]  
 (a)  $\text{CO}$  and  $\text{Cl}_2$  (b)  $\text{SO}_2$  and  $\text{Cl}_2$   
 (c)  $\text{H}_2\text{S}$  and  $\text{Br}_2$  (d)  $\text{NH}_3$  and  $\text{SO}_2$
25. Reduction involves [NCERT 1972]  
 (a) Loss of electrons  
 (b) Gain of electrons  
 (c) Increase in the valency of positive part  
 (d) Decrease in the valency of negative part
26. In a reaction between zinc and iodine, in which zinc iodide is formed, what is being oxidised [NCERT 19]  
 (a) Zinc ions (b) Iodide ions  
 (c) Zinc atom (d) Iodine
27. Which one of the following reactions does not involve either oxidation or reduction [EAMCET 1982]  
 (a)  $\text{VO}_2^+ \rightarrow \text{V}_2\text{O}_5$  (b)  $\text{Na} \rightarrow \text{Na}^+$   
 (c)  $\text{CrO}_4^{2-} \rightarrow \text{Cr}_2\text{O}_7^{2-}$  (d)  $\text{Zn}^{2+} \rightarrow \text{Zn}$
28. In the following reaction,  

$$3\text{Br}_2 + 6\text{CO}_3^{2-} + 3\text{H}_2\text{O} = 5\text{Br}^- + \text{BrO}_3^- + 6\text{HCO}_3^-$$
  
 [MP PMT 1994, 95]  
 (a) Bromine is oxidised and carbonate is reduced  
 (b) Bromine is reduced and water is oxidised  
 (c) Bromine is neither reduced nor oxidised  
 (d) Bromine is both reduced and oxidised
29. In the following reaction,  

$$4\text{P} + 3\text{KOH} + 3\text{H}_2\text{O} \rightarrow 3\text{KH}_2\text{PO}_2 + \text{PH}_3$$
 [Pb. PMT 2002]  
 (a) P is oxidized as well as reduced  
 (b) P is reduced only

30. In the following reaction



Which element is reduced [CPMT 1976]

- (a) Cr (b) H  
(c) O (d) I

31. The conversion of sugar  $\text{C}_{12}\text{H}_{22}\text{O}_{11} \rightarrow \text{CO}_2$  is

- (a) Oxidation  
(b) Reduction  
(c) Neither oxidation nor reduction  
(d) Both oxidation and reduction

32. Which halide is not oxidised by  $\text{MnO}_2$

[MNR 1985; JIPMER 2000]

- (a) F (b) Cl  
(c) Br (d) I

33. When  $\text{Fe}^{2+}$  changes to  $\text{Fe}^{3+}$  in a reaction

- (a) It loses an electron (b) It gains an electron  
(c) It loses a proton (d) It gains a proton

34. In acid solution, the reaction  $\text{MnO}_4^- \rightarrow \text{Mn}^{2+}$  involves

[MP PMT 1989]

- (a) Oxidation by 3 electrons  
(b) Reduction by 3 electrons  
(c) Oxidation by 5 electrons  
(d) Reduction by 5 electrons

35. When iron or zinc is added to  $\text{CuSO}_4$  solution, copper is precipitated. It is due to [CPMT 1974, 79]

- (a) Oxidation of  $\text{Cu}^{+2}$  (b) Reduction of  $\text{Cu}^{+2}$   
(c) Hydrolysis of  $\text{CuSO}_4$  (d) Ionization of  $\text{CuSO}_4$

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36. In the reaction,  $4\text{Fe} + 3\text{O}_2 \rightarrow 4\text{Fe}^{3+} + 6\text{O}^{2-}$  which of the following statement is incorrect [UPSEAT 2001, 02]

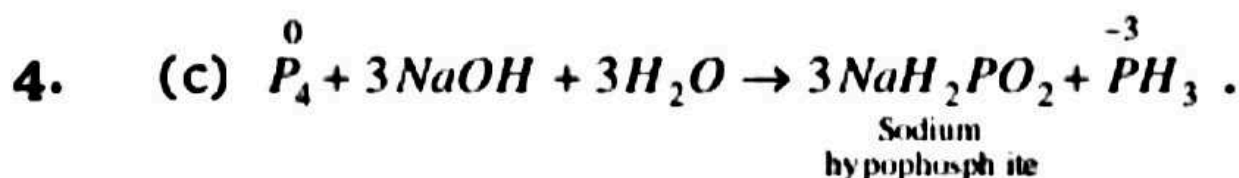
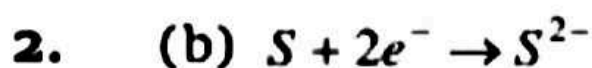
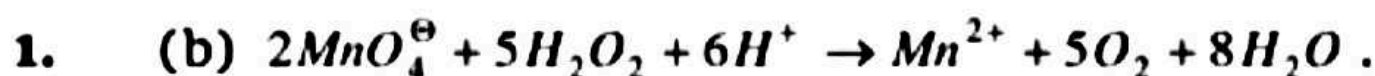
- (a) A Redox reaction  
(b) Metallic iron is a reducing agent  
(c)  $\text{Fe}^{3+}$  is an oxidising agent  
(d) Metallic iron is reduced to  $\text{Fe}^{3+}$

37. Which of the following is redox reaction [CBSE PMT 1997]

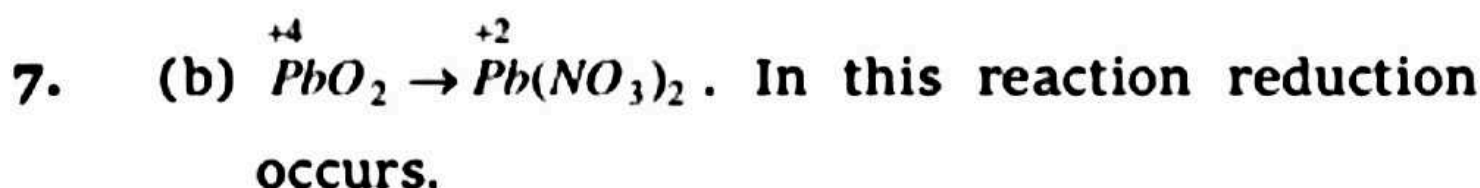
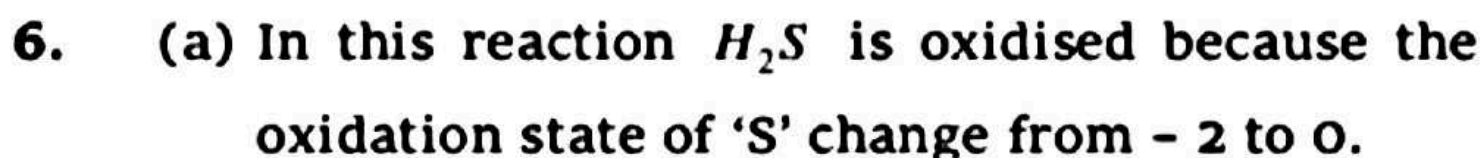
- (a)  $\text{H}_2\text{SO}_4$  with  $\text{NaOH}$   
(b) In atmosphere,  $\text{O}_3$  from  $\text{O}_2$  by lightning  
(c) Evaporation of  $\text{H}_2\text{O}$   
(d) Nitrogen oxides form nitrogen and oxygen by lightning

# AS Answers and Solutions

## Oxidation, Reduction

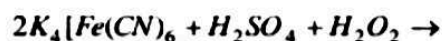


It shows oxidation and reduction (Redox) properties.

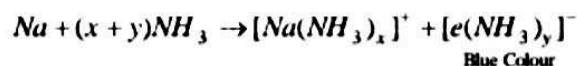


8. (b) Any substance which is capable of oxidising other substances and is capable of accepting/gaining electron during oxidation is called oxidising agent or oxidant.

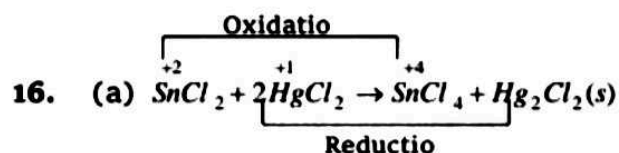
9. (a)  $2\overset{+1}{Cu}I \rightarrow \overset{0}{Cu} + \overset{+2}{Cu}I_2$ . Oxidation and Reduction both occur so the reaction is redox.
10. (c)  $H_2S + X_2(Cl, Br, I = X) \rightarrow 2HX + S$ . Here the halogen are reduced.
11. (b) When  $H_2O_2$  reduces with  $K_4[Fe(CN)_6]$ . It is present in acidic solution.



13. (b) In the given reaction oxidation state of  $Mg$  is changing from 0 to +2 while in nitrogen it is changing from 0 to -3. So oxidation of  $Mg$  and reduction of nitrogen takes place.
14. (b) When sodium metal is dissolved in liquid ammonia to form coloured solution. Dilute solutions are bright blue in colour due to the presence of solvated electrons.

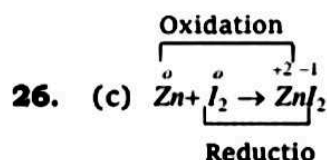


15. (b) The metallic iron is oxidised to  $Fe^{+3}$ .



In this reaction  $HgCl_2$  is reduced in  $Hg$ .

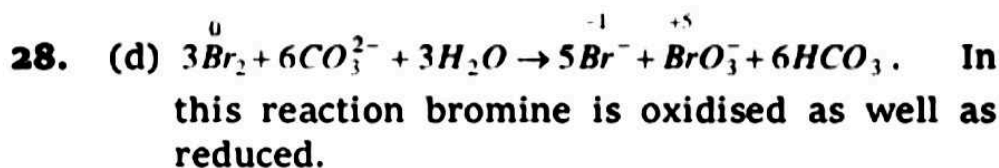
17. (a) It is the process in which electrons are lost (de-electronation).
18. (b)  $4Fe + 3O_2 \rightarrow 4Fe^{3+} + 6O^{2-}$
19. (c)  $Cu$  is above of  $Ag$  in electrochemical series and thus  $Cu + 2Ag^+ \rightarrow Cu^{2+} + 2Ag$  reaction occurs.
21. (a)  $Sn^{2+} \rightarrow Sn^{4+} + 2e^-$ . In this reaction  $Sn^{2+}$  change in  $Sn^{4+}$  it is called an oxidation reaction.
22. (c)  $2S_2O_3^{2-} + I_2 \rightarrow S_4O_6^{2-} + 2I^-$ .
23. (b)  $Zn_{(aq)}^{2+} + 2e^- \rightarrow Zn_{(s)}^0$  reduction.
24. (b)  $SO_2$  bleaches by reduction while chlorine bleaches colour of flowers by oxidation.
25. (b) It is the process in which electrons are gained (electronation).



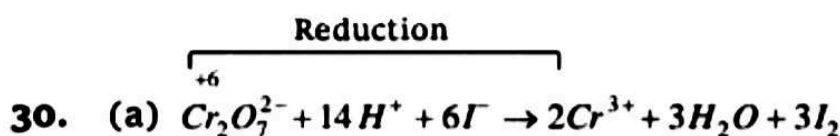
In this reaction Zn atom oxidised to  $Zn^{2+}$  ion and iodine reduced to  $I^-$ .

$$\begin{array}{ll}
 \text{27. (c) } \overset{\cdot}{Cr}O_4^{2-} & \overset{\cdot}{Cr}_2O_7^{2-} \\
 x + [(-2) \times 4] = -2 & 2x + (-2) \times 7 = -2 \\
 x = 8 - 2 = +6 & 2x = 14 - 2 = 12, \\
 & x = \frac{12}{2} = +6
 \end{array}$$

In this reaction oxidation and reduction are not involved because there is no change in oxidation number.



29. (a) P is oxidized as well as reduced (as in option a).

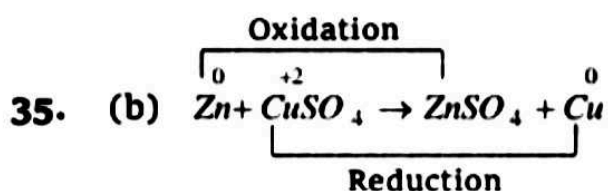


31. (a) In this reaction oxidation occur.

32. (a) Fluorine has highest  $E^\circ$  - value and more reactive than  $MnO_2$ .

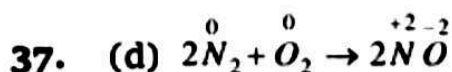
33. (a)  $Fe^{2+} \rightarrow Fe^{3+} + e^-$  oxidation.

34. (d)  $MnO_4^- \rightarrow Mn^{2+}$ . In this reaction  $5e^-$  are needed for the reduction of  $Mn^{2+}$  as:



In this reaction  $Cu^{2+}$  change in  $Cu^0$ , hence it is called as reduction reaction.

36. (d)  $\overset{0}{4}Fe + \overset{0}{3}O_2 \rightarrow \overset{+3}{4}Fe + \overset{-2}{6}O^{2-}$ , in this reaction metallic iron is oxidised to  $Fe^{3+}$ .



Here O.N. of N increases from 0 in  $N_2$  to +2 in  $NO$ , 2- and that of decreased from 0 in  $O_2$  to -2 in O, therefore, it is a redox reaction.