CHEMISTRY

BOOKS - CHHAYA CHEMISTRY (BENGALI ENGLISH)

REDOX REACTIONS

Warm Up Exrecise

1. Justify the statements with example : Oxidant and reduction occur simultaneously.

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2. In the following redox reactions, identify the oxidation half -reactions and reduction half -reactions along with the oxidants and and reductants.

$Cl_2(g) + 2I^-(aq) \rightarrow 2Cl^-(aq) + I_2(g)$

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3. In the following redox reactions, identify the oxidation half -reactions and reduction half -reactions along with the oxidants and and reductants.

$Cl_2(g) + 21^-(aq) \rightarrow 2Cl^-(aq) + I_2(g)$

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4. In the following redox reactions, identify the oxidation half -reactions and reduction half -reactions along with the oxidants and and reductants.

$Sn^{2+}(aq) + 2Fe^{3+}(aq) \rightarrow Sn^{4+}(aq) + 2Fe^{2+}(aq)$

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5. In the following redox reactions, identify the oxidation half -reactions and reduction half -reactions along with the oxidants and and reductants.

$2Na_2S_2O_3(aq) + I_2(s) \rightarrow Na_2S_4O_6(aq)_+ 2NaI(aq)$

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6. In the following redox reactions, identify the oxidation half -reactions and reduction half -reactions along with the oxidants and and reductants.

$Fe(s) + 2H^+(aq) \rightarrow Fe^{2+}(aq) + H_2(g)$

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7. In the following redox reactions, identify the oxidation half -reactions and reduction half -reactions along with the oxidants and and reductants.

$H_2S(aq) + Cl_2(g) \rightarrow S(s) + 2HCl(aq)$

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8. In the following redox reactions, identify the oxidation half -reactions and reduction half -reactions along with the oxidants and and reductants.

$2FeCl_2(aq) + Cl_2(g) \rightarrow 2FeCl_3(aq)$

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9. $2Hg^{2}(aq) + Sn^{2} + (aq) \rightarrow Hg_{2}^{2+}(aq) + Sn^{4+}(aq)$

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10. Calculate the oxidattion numer of the atoms marked with (*)Compounds given below:

$\overset{*}{NOClO_4}$

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11. Calculate the oxidattion numer of the atoms marked with (*)Compounds given below:

$\overset{*}{C}_2O_4^{2-}$

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12. Calculate the oxidattion numer of the atoms marked with (*)Compounds given below:

$Mg_2\overset{*}{C}_3$

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13. Calculate the oxidattion numer of the atoms marked with (*)Compounds given below:

$\overset{*}{U}O_2(NO_3)_2$

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14. Calculate the oxidattion numer of the atoms marked with $(\cdot)$ Compounds given below:

$K_2\overset{*}{F}O_4$

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15. Calculate the oxidattion numer of the atoms marked with (*)Compounds given below:

$\overset{*}{N}i(NH_3)_2Cl_2$

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16. Calculate the oxidattion numer of the atoms marked with (*)Compounds given below:

$H_2\left[\overset{*}{P}tCl_6\right]$

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17. Calculate the oxidattion numer of the atoms marked with (*)Compounds given below:

$\overset{*}{C}H_3OH$

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18. Calculate the oxidattion numer of the atoms marked with (*)Compounds given below:

$Fe\overset{*}{S}_2$

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19. Calculate the oxidattion numer of the atoms marked with (*)Compounds given below:

$\overset{*}{C}HCl_3$

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20. Calculate the oxidattion numer of the atoms marked with (*)Compounds given below:

$\overset{*}{C}Cl_4$

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21. Calculate the oxidattion numer of the atoms marked with (*)Compounds given below:

$H\left[\overset{*}{A}uCl_4\right]$

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22. Calculate the oxidattion numer of the atoms marked with (*)Compounds given below:

$(CH_3)_2\overset{*}{S}O$

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23. Calculate the oxidattion numer of the atoms marked with (*)Compounds given below:

$\overset{*}{N}H_2OH$

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24. Calculate the oxidattion numer of the atoms marked with (*)Compounds given below:

$Na\overset{*}{N}_3$

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25. Calculate the oxidattion numer of the atoms marked with (*)Compounds given below:

$Na_2\left[\overset{*}{F}e(CN)_5NO\right]$

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26. Calculate the oxidattion numer of the atoms marked with (*)Compounds given below:

$H\overset{*}{C}N$

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27. Calculate the oxidattion numer of the atoms marked with (*)Compounds given below:

$\overset{*}{C}rO_5$

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28. Calculate the oxidattion numer of the atoms marked with (*)Compounds given below:

$H_2\overset{*}{S}_2O_8$

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29. Calculate the oxidattion numer of the atoms marked with (*)Compounds given below:

$\left[\overset{*}{F}e(H_2O)_5NO\right]SO_4$

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30. Calculate the oxidattion numer of the atoms marked with (*)Compounds given below:

$Ba\left(H_2\overset{*}{P}O_2\right)_2$

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31. Give an example of an oxygen containing compound for each of the following oxdiant states of oxygen :$+1, -\frac{1}{2}, -1$

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32. A compound is composed of three elements A,B and C . The oxidation number of A,B & C in the compound are +1,+5 and -2 ,respectively ,which one of the following formula represent the molecular formula of the compound?

i) A_2BC_4

ii)$A_2(BC_3)_2$

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33. A compound is composed of A,B and C in the composed ae +1,+5 and -2 ,respectively ,which one of the following formula is possible

$A_2(BC_3)_2$

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34. Give two examples of nitrogen -containing compounds ,in one of which ,the oxidation state of N-atoms is +1 , while in the other compounds, N-atoms exits in two different oxidation states.

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35. How will you determine whether a reactions is redox reactions or not ? Explain with example.

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36. Among the reactions given the oxidant and the reductant in each case:

$Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(s) + 3CO_2(g)$

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37. Among the reactions given the oxidant and the reductant in each case:

$2Na_2S_2O_3(aq) + I_2(s) \rightarrow Na_2S_4O_6(aq)_+ 2NaI(aq)$

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38. Among the reactions given the oxidant and the reductant in each case:

$(NH_4)_2S(aq) + Cu(NO_3)_2(aq) \rightarrow CuS(s) + 2NH_4NO_3(aq)$

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39. Among the reactions given the oxidant and the reductant in each case:

$Cu_2S(s) + O_2(g) \rightarrow 2Cu(s) + SO_2(g)$

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40. Among the reactions given the oxidant and the reductant in each case:

$Ca(OH)_2(aq) + H_2SO_4(aq) \rightarrow CaSO_4(s) + 2H_2O(l)$

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41. Among the reactions given the oxidant and the reductant in each case:

$H_2S(g) + HNO_3(aq) \rightarrow H_2SO_4(aq) + NO_2(g)H_2O(l)$

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42. Identify the following half -reactions as oxidantion half-reactions and reduction half -reactions :

$Cr_2O_7^{2-} \rightarrow 2Cr^{3+}$

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43. Identify the following half -reactions as oxidantion half-reactions and reduction half -reactions :

$Cr(OH)_4^- \rightarrow CrO_4^{2-}(aq)$

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44. Identify the following half -reactions as oxidantion half-reactions and reduction half -reactions :

$IO_3^-(aq) \rightarrow IO_4^-(aq)$

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45. Identify the following half -reactions as oxidantion half-reactions and reduction half -reactions :

$ClO^-(aq) \rightarrow Cl^-(aq)$

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46. Identify the following half -reactions as oxidantion half-reactions and reduction half -reactions :

$MnO_4 - (aq) \rightarrow MnO_2(s)$

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47. Give an example of a disproporrtionation reaction ? Calculate the volume of 0.2225(M)$KMnO_4$solution that can completely react with 45mL. Of a 0.125(M) $FeSO_4$solution in an acid meduim .

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48. For an element to undergo disproportionation reactions atleast how many nuumber of oxidant states should the elements exhbit?

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49. An element has three oxidant number,+6,+7and +4 If it exhibits +7 oxidation number in a compound will the compound be able to particloate in disproportional reaction?

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50. An element can show 0,-1 and +5 oxidation states oxidation number of the elements in two compounds -1 and +5 .Is a comproportionations reaction involves these two compounds possible ?

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51. Identify the following reactions at disproportionation a comproportionations reactions-

Ag^{2+}(aq)+Ag(s) $\rightarrow$ 2Ag^(+)(aq)`

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52. Identify the following reactions at disproportionation a comproportionations reactions-

$2H_2O_2(l) \rightarrow 2H_2O(l) + O_2(g)$

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53. Identify the following reactions as disproportionation or comproportionations reactions-

$4KClO_3(s) \rightarrow KCl(s) + 3KClO_4(s)$

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54. Identify the following reactions at disproportionation a comproportionations reactions-

$2MnO_4^4(aq) + 2H_2O(l) \rightarrow 2MNO_4^-(aq) + MnO_2(s) + 4OH^-(aq)$

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55. Identify the following reactions at disproportionation a comproportionations reactions-

$2NH_4NO_3(s) \rightarrow N_2(g) + 4H_2O_g + O_2(g)$

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56. Identify the following reactions as disproportionation or comproportionations reactions-

$IO_3 - (aq) + 5I^-(aq) + 6H^+(aq) \rightarrow 3I_2(s) + 3H_2O(l)$

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57. Determine the equivalent masses of the following underline compounds by both oxidantion number and electrons methods:

underline$(SO_2) + 2H_2O \rightarrow H_2SO_4$

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58. Determine the equivalent masses of the following underline compounds by both oxidation number and electrons methods:

$\underline{HNO_3} \rightarrow NO_2 + H_2O$

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59. Determine the equivalent masses of the following underline compounds by both oxidation number and electrons methods:

underline$(HNO_3) + 3H^+ \rightarrow NO + 2H_2O$

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60. Determine the equivalent masses of the following underline compounds by both oxidantion number and electrons methods:

$(MnO_2) + 4H^+ \rightarrow Mn^{2+} + 2H_2O$

A.

B.

C.

D.

Answer:

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61. Determine the equivalent masses of the following underline compounds by both oxidantion number and electrons methods:

underline

$(KMnO_4) \underline{+} (FeSO_4) + H_2SO_4K_2SO_4 + MnSO_4 + Fe_2(SO_4) + H_2O$

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62. Determine the equivalent mass of the Br_2(l)[Molecular mass =159.82] in the given reaction

$$2MnO^{-}\_(4)(aq) + 8H(aq) + br_2(l) \rightarrow 2Mn^{2+}(aq) + 2BrO^{-}\_(3)(aq)$$

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Question Answer Zone For Board Examination Very Shot Answer Type

1. Identify the redox amoung the following :

$$2CuSO_4 + KI \rightarrow 2CuI + 1_2 + 2K_2SO_4$$

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2. Identify the redox amoung the following :

$$BaCl_2 + Na_2SO_4 \rightarrow BasO_4 + 2NaCl$$

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3. Identify the redox amoung the following :

$2NaBr + Cl_2 \rightarrow 2NaCl + Br_2$

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4. Identify the redox among the following :

$NH_4NO_2 \rightarrow N_2 + 2H_2O$

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5. Identify the redox amoung the following :

$CuSO_4 + 4NH_3 \rightarrow \left[Cu(NH_3)_4\right]SO_4$

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6. Identify the redox amoung the following :

$3I_2 + 6NaOH \rightarrow NaIO_3 + 5NaI + 3H_2O$

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7. Which of the following reaction are disproportiontion reaction and comproportionaton reactions ?

$4KClO_3 \rightarrow KCl + 3KClO_4$

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8. Which of the following reaction are disproportionstion reaction and comproportionaton reactions ?

$3K_2MnO + 4H_2O \rightarrow 2KMnO_4 + MnO_2 + 4KOH$

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9. Which of the following reaction are disproportionstion reaction and comproportionaton reactions ?

$KIO_3 + 5KI + 6HCI \rightarrow 3I_2 + 6KCI + 3H_2O$

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10. Which of the following reaction are disproportionstion reaction and comproportionaton reactions ?

$2C_6H_5CHO + NaOH \rightarrow C_6H_5COONa + C_6H_5CH_2OH$

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11. Which of the following reaction are disproportionstion reaction and comproportionaton reactions ?

$Ag^{2+} Ag \rightarrow 2Ag^{+}$

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12. Identify the redox reaction (s) and also th oxidation and the reductants from the following reaction (s).

$2MnO_4^- + 5SO_2 + H_2O \rightarrow 5SO_4^{2-} + 2Mn^{2+} + 4H_3O^{+}$

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13. Identify the redox reaction (s) and also the oxidants and the reductants from the following reaction (s).

$NH_4^+ + PO_4^{3-} \rightarrow NH_3 + HPO_4^{2-}$

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14. Identify the redox reaction (s) and also th oxidation and the reductants from the following reaction (s).

$HCIO + H_2S \rightarrow H_3O^+ + CI^- + S$

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15. Determine the oxidation number of the marked elements in the following componds

$Na_2\overset{*}{S}_2O_3$

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16. Determine the oxidation number of the marked elements in the following compounds

$H_2\overset{*}{S}O_5$

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17. Determine the oxidation number of the marked elements in the following componds

$Na_2\overset{*}{S}_4O_6$

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18. Determine the oxidation number of the marked elements in the following componds

$H_2\overset{*}{S}_2O_8$

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19. Determine the oxidation number of the marked elements in the following componds

$\overset{*}{K}O_2$

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20. Determine the oxidation number of the marked elements in the following componds

$\overset{*}{F}e_3O_4$

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21. Determine the oxidation number of the marked elements in the following componds

$NO\overset{*}{C}lO_4$

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22. Determine the oxidation number of the marked elements in the following componds

$\overset{*}{N}_3H$

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23. Determine the oxidation number of the marked elements in the following componds

$Na_2\left[\overset{*}{F}e(CN)_5NO\right]$

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24. Determine the oxidation number of the marked elements in the following componds

$\left[\overset{*}{F}e(H_2O)_5(NO)\right]SO_4$

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25. Determine the oxidation number of the marked elements in the following componds

$\overset{*}{C}rO_5$

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26. Determine the oxidation number of the marked elements in the following componds

$Ba\left(H_2\overset{*}{P}O_2\right)_2$

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27. Determine th eequivalent masses of $Na_2S_2O_3.5H_2O$ and $KBrO_3$ in the following reaction.

$2S_2O_3^{2-} + I_2 \rightarrow S_4O_6^{2-} + 2I^-$

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28. Determine th eequivalent masses of $Na_2S_2O_3.5H_2O$ and $KBrO_3$in the following reaction.

$BrO_3^- + 6H^+ + 6e \rightarrow Br^- + 3H_2O$

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29. Determine the equlavent weights of the underlined compounds in the following two reactions:

$FeSO_4 + \underline{KMnO_4} + H_2SO_4 \rightarrow K_2SO_4 + MnSO_4 + Fe_2(SO_4)_3 + H_2O$

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30. Determine the equlavent weights of the underlined compounds in the following two reactions:

$\underline{MnO_2} + HCI \rightarrow MnCI_2 + CI_2 + H_2O[K = 39, Mn = 55, O = 16]$

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31. Balance the following equation with the help of oxidation number method.

$Fe_3O_4 + CO \rightarrow FeO + CO_2$

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32. Balance the following equation with the help of oxidation number method.

$MnO_2 + HCl \rightarrow Mn^{2+} + Cl_2 + H_2O$

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33. In basic medium balance the half-reactions following below:

$Cr(OH)_3 \rightarrow CrO_4^2$

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34. In basic medium balance the half-reactions following below:

$Cl_2O_7 \rightarrow ClO_2^{-2}$

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35. Balance the following reactions in acidic and alkaline medium :

$SO_3^{2-}(aq) \rightarrow SO_4^{2-}(aq)$

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36. Determine the values of x and y in the following balanced equation:

$5H_2O_2 + xClO_2 + 2OH^- \rightarrow xCl^- + yO_2 + 6H_2O$

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37. In the given reaction determine the equivalent weight of of As_2S_3:

[Assume that M.W of $As_2S_3 = M$]

$As_2S_3 + 7ClO_3^- 7OH^- \rightarrow 2AsO_4^{3-} + 7ClO^- + 3SO_4^{2-} + 6H_2O$

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38. Detemine the equivalent mass of Fe_2O_4 in the given reaction : $Fe_2O_4 + KmnO_4 \rightarrow Fe_2O_3 + MnO_2$(Assume that the molecular mass of $Fe_3O_4 = M$]

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39. An oxidising agent $KH(IO_3)_2$in presence of 4.0(N) HCI gives ICI as a product .Determine the equivalnet weight of $KH(IO_3\_(2)$.[K=39,I=12]

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40. Find the oxidation number of carbon in methanal and methanoic acid.

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41. What will be the change in oxidation number of Mn when MnO_2 is melted with solid KNO_3&KOH?

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42. What is the rate of equivalent weights of MNO_4^- in acidic ,basic & neutral medium?

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43. MnO_4reacts with A^{x+} to from AO_3^-, Mn^{2+} and O_2.One mole of MnO_4^- oxidises 1.25 mole of A^{x+} to AO_3^-, what is the value of x?

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44. 20 ml. solution of 0.1 (M) $FesO_4$ was completely oxidised using a suitable oxidising agent .What is the number of the electrons

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Solved Wbchse Scannner

1. What are the oxidation number of the two elements marked with asterisk ? $H_3\overset{*}{P}O_2, \overset{*}{C}_6H_{12}O_6$

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2. Balance the following chemical equation by oxidation number method

$P + NaOH \rightarrow \ + H_2O \rightarrow PH_3 + NaH_2OO_2$

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3. Balance the following equation by ion-electron method :

$K_2Cr_2O_7 + FeSO_4 + H_2SO_4 \rightarrow K_2SO_4 + Cr_3(SO_4)_3 + Fe_2(SO_4)_3 + H$

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4. Balance the following equation by ion-electron method :

$K_2Cr_2O_7 + FeSO_4 + H_2SO_4 \rightarrow K_2SO_4 + Cr_3(SO_4)_3 + Fe_2(SO_4)_3 + H$

Calculate the oxidation number of P in Na_3PO_4.

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5. Balance the following equation by oxidation number method :

$I_2 + HNO_3 \rightarrow HIO_3 + NO_2 + H_2O$

Calculate the oxidation number of CI in $HCIO_4$

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6. Balance by ion -electron method :

$K_3Cr_2O_7 + H_2SO_4 + KI \rightarrow Cr_2(SO_4)_3 + I_2 + H_2O + K_2SO_4$

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7. Balance by oxidation number metod :

$CU + HNO_3 \rightarrow Cu(NO_3)_2 + NO + H_2O$

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8. Balance the following chemical reaction by oxidation number method :

$NaNO_3 + Zn + NaOH \rightarrow NH_3 + Na_2ZnO_2 + H_2O$

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9. Give an example of compound where the constituent element in exhibits fractional oxidation number.

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10. Mention the oxidation number of two chlorine atoms in Ca(OCI)CI molecule.

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11. Balance the following chemical equation by oxidation number method

$P + NaOH + H_2O \rightarrow PH_3 + NaH_2PO_2$

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12. What is the oxidation number of N atom in NaN_3molecule?

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13. Balance the following chemical equation by ion electron method :

$MnO_4^- + (COO)_2^{2-} + H^+ \rightarrow Mn^{2+} + CO_2 + H_2O$

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14. Calculate the oxidation state of sulphur in H_2SO_5

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15. $P_4 + 3NaOH + 3H_2O \rightarrow PH_3 + 3NaH_2PO_2$

What is the equivalent weight of P_4 in the reaction ?

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16. What is the oxidation sate of Cr in CrO_5?

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17. Balance the following equation by electron method :

$MnO_4^{-1} + SO_2 + H_2O \rightarrow Mn^{2+} + SO_4^{2-} + H^+$

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18. What is the oxidation number of Mn in K_2MnO_4?

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19. Balance the following chemical equation by ion electron method:

$Cr_2O_7^{2-} + Fe^{2+} + H^+ \rightarrow Cr^{3+} + H_2O + Fe^{3+}$

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20. What is the oxidation number of S in S_8?

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Solved Ncert Exercise

1. Assign oxidation number to the underline elements in each of the following species:

$NaH_2\underline{p}O_4$

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2. Assign oxidation number to the underline elements in each of the following species:

$NaH\underline{S}O_4$

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3. Assign oxidation number to the underline elements in each of the following species:

$H_4\underline{P}_2O_7$

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4. Assign oxidation number to the underline elements in each of the following species:

$K_2\underline{Mn}O_4$

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5. Assign oxidation number to the underline elements in each of the following species:

$Ca\underline{O}_2$

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6. Assign oxidation number to the underline elements in each of the following species:

$Na\underline{B}H_4$

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7. Assign oxidation number to the underline elements in each of the following species:

$H_2\underline{S}_2O_7$

Watch Video Solution

8. Assign oxidation number to the underline elements in each of the following species:

$KAI\underline{(S)}O_4(2).12H_2O$

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9. What are the oxidation number of the underline elements in each of the following and how do your rationalise your results

$\underline{KI_3}$

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10. What are the oxidation number of the underline elements in each of the following and how do your rationalise your results

$H_2\underline{S}_4$ O_(6)`

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11. What are the oxidation number of the underline elements in each of the following and how do your rationalise your results

$\underline{Fe_3}O_4$

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12. What are the oxidation number of the underline elements in each of the following and how do your rationalise your results

$\underline{(C)H_3}\underline{C}H_2OH$

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13. What are the oxidation number of the underline elements in each of the following and how do your rationalise your results

$\underline{C}H_3\underline{C}OOH$

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14. Justify the following reactions are redox reactions :

$CuO(s) + H_2(g) \rightarrow Cu(s) + H_2O(g)$

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15. Justify the following reactions are redox reactions :

$Fe2O_3(s) + 3CO(g) \rightarrow 2Fe(s) + 3CO_2(g)$

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16. Justify the following reactions are redox reactions :

$4BCI_3(g) + 3LiAIH_4(s) \rightarrow 2B_2H_6(g) + 3LiCI(s) + 3AICI_3(s)$

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17. Justify the following reactions are redox reactions :

$2K(s) + F_2(g) \rightarrow 2K^+F^{-(s)}$

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18. Justify the following reactions are redox reactions :

$4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$

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19. Fluroine reacts with ice and results in the change : $H_2O + F_2(g) \rightarrow HF(g) + HOF(g)$,Justify than this reaction is a redox reaction.

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20. Calculate the oxidation number of sulphur, chromium and nitrogen in H_2SO_5, $Cr_2O_7^{2-}$ & NO_3^- ,Suggest structure of these compounds .

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21. Write fromula for the following compounds:

Mercury (II) chloride

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22. Write fromula for the following compounds:

Nickel (II) sulphate

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23. Write fromula for the following compounds:

Tin(IV) oxide

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24. Write formula for the following compounds:

Thallium(I) sulphate

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25. Write fromula for the following compounds:

Iron (III) sulphate

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26. Write fromula for the following compounds:

Chromium (III) oxide

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27. Suggest a list of the substance where carbon can exhibit oxidation states from -4 to +4 and nitrogen from -3 to +5

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28. While sulphur dioxide and hydrogen peroxide can act as oxidising as well as reducing agents in their reaction ozone and nitric acid act only as oxidatns .Why ?

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29. consider the reactions:

$6CO_2(g) + 6H_2O(l) \rightarrow C_6H_{12}O_6(aq) + 6O_2(g)$

$O_3(g) + H_2O_2(l) \rightarrow H_2O(l) + 2O_2(g)$

Why it is more approporiate to write these reactions as:

$6CO_2(g) + 12H_2O(l) \rightarrow C_6H_{12}O_6(aq) + 6H_2(l) + 6O_2(g)$

$O_3(g) + H_2O_2(l) \rightarrow H_2O(l) + O_2(g) + O_2(g)$

Also suggest a technique to investigate the path of the above 1 and 2 redox reactions.

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30. consider the reactions:

$6CO_2(g) + 6H_2O(l) \rightarrow C_6H_{12}O_6(aq) + 6O_2(g)$

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Also suggest a technique to investigate the path of the above 1 and 2 redox reactions.

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31. consider the reactions:

$6CO_2(g) + 6H_2O(l) \rightarrow C_6H_{12}O_6(aq) + 6O_2(g)$

$O_3(g) + H_2O_2(l) \rightarrow H_2O(l) + 2O_2(g)$

Why it is more approporiate to write these reactions as:

$6CO_2(g) + 12H_2O(l) \rightarrow C_6H_{12}O_6(aq) + 6H_2(l) + 6O_2(g)$

$O_3(g) + H_2O_2(l) \rightarrow H_2O(l) + O_2(g) + O_2(g)$

Also suggest a technique to investigate the path of the above 1 and 2 redox reactions.

View Text Solution

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Also suggest a technique to investigate the path of the above 1 and 2 redox reactions.

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35. The compound AgF_2 is an unstable compound, However ,if formed the compound acts as a very strong oxidising agent .Why?

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36. Whenever a reaction between an oxidising agent and a reducing agent is carried out, a compound of lower oxidation state is formed if the oxidising agent is in excess justify this statement giving three illustrations .

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37. How do you count the following obeservation ?

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38. Through alkaline potassium permanganate and acidic potassiums permanganate both are used as oxidants ,yet in the manufacture of

benzioc acid from toluene we use alcohlic potassium permanganate as an oxidant .Why ? Write a balanced redox equation for the reacitons

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39. When concentrated sulphuric acid is added to an inorganic mixture containing chloride ,we get colourless pungent smelling gas HCI, but if the mixture contains bromide then we get red vapour of bromine .Why?

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40. Idenfity oxidised ,reduced oxidising agent and reducing agent for each of the following reactions

$2AgBr(s) + C_6H_6(aq) \rightarrow 2Ag(s) + 2HBr(aq) + C_6h_4O_2(aq)$

$HCHO(l) + 2\left[Ag(NH_3)_2\right]^+(aq) + 3OH^-(aq) \rightarrow 2Ag(a) + HCOO^-(aq$

$HCIO(l) + 2Cu^{2+}(aq) + 5OH^-(aq) \rightarrow Cu_2O(s) + HCOO^-(aq) + 3H_2$

$N_2H(4)(l) + 2H_2O_2(l) \rightarrow N_2(g) + 4H_2O(l)$

$Pb(s) + PbO_2(s) + 2H_2SO_4(aq) \rightarrow PbSO_4(s) + 2H_2O(l)$

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41. Consider the reactions:

$2S_2O_3^{2-}(aq) + I_2(s) \rightarrow S_4O_6^{2-}(aq) + 2I^-(aq)$

$S_2O_3^{2-}(aq) + 2Br_2(l) + 5H_2O(l) \rightarrow 2SO_4^{2-}(aq) + 4Br^-(aq) + 10H^+(aq$

Why does the same reductant ,thiosulphate react differently with iodine and bromine ?

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42. Justify giving reaction that among halogens, fluorine is the best oxidant and among hydrohalic compounds, hydroiodic acid in the best reductant.

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43. Why does the following reaction occurs?

$XeO_6^{4-}(aq) + 2F^-(aq) + 6H^+(aq) \rightarrow XeO_3(g) + F_2(g) + 3H_2O(l)$

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44. Consider the reactions

$H_3PO_2(aq) + 4AgNO_3(aq) + 2H_2O(l) \rightarrow H_3PO_4(aq) + 4Ag(s) + 4HNO$

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45. Consider the reactions

$H_3PO_2(aq) + 2CuSO_4(aq) + 2H_2O(l) \rightarrow H_3PO_4(aq) + 2Cu(s) + H_2SO$

What interference do you draw about the behaviour of Ag^+ & Cu^{2+} from these reactions?

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46. Consider the reactions

$C_6H_5CHO(l) + 2\left[Ag(NH_3)_2\right]^+(aq) + 3OH^-(aq) \rightarrow C_6H_5COO^-(aq) +$

What interference do you draw about the behaviour of Ag^+ & Cu^{2+} from these reactions?

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47. Consider the reactions

$C_6H_5CHO(l) + 2Cu^2 + (aq) + 5OH^-(aq) \rightarrow$ no change observed

What interference do you draw about the behaviour of Ag^+ & Cu^{2+} from these reactions?

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48. Balance the following redox reactions by ion -electron method:

$MnO_4^-(aq) + I^-(aq) \rightarrow MnO_2(s) + I_2(s)$(in basic medium)

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49. Balance the following redox reactions by ion -electron method:

$MnO_4^-(aq) + SO_2(g) \rightarrow Mn^{2+}(aq) + HSO_4^-(aq)$(in acidic solution)

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50. Balance the following redox reactions by ion -electron method:

$H_2O_2(aq) + Fe^{2+}(aq) \rightarrow Fe^{3+}(aq) + H_2O(l)$(in acidic solution)

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51. Balance the following redox reactions by ion -electron method:

$Cr_2O_7^{2-} + SO_2(g) \rightarrow Cr^{3+}(aq) + SO_4^{2-}(aq)$ (in acidic solution)

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52. Balance the following equation in basic medium by ion-electron method and oxidation number methods & Identify the oxidising agent of & the reducing agent.

$P_4(s) + OH^-(aq) \rightarrow PH_3(g) + H_2PO_2^-(aq)$

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53. Balance the following equation in basic medium by ion-electron method and oxidation number methods & Identify the oxidising agent of & the reducing agent.

$$N_2H_4(l) + CIO_3^-(aq) \rightarrow NO(g) + CI^-(g)$$

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54. Balance the following equation in basic medium by ion-electron method and oxidation number methods & Identify the oxidising agent of & the reducing agent.

$$CI_2O_7(g) + H_2O_2(aq) \rightarrow CIO(2)^-(aq) + O_2(g) + H^+$$

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55. What sorts of information can draw from the following reaction ?

$$(CN)_2(g) + 2OH^-(aq) \rightarrow CN^-(aq) + CNO^-(aq) + H_2O(l)$$

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56. The Mn^{3+} ion is unstable in solution and undergoes disproportionation to give Mn^{2+} , MnO_2, and H^+ ion. Write a balanced inoic equation for the reaction .

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57. Identify the element that exhibits only negative oxidation state .

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58. Identify the element that exhibits only Positive oxidation state .

Watch Video Solution

59. Identify the element that exhibits only Positive and negative oxidation state .

Watch Video Solution

60. Identify the element which exhibits neither the negative nor does the positive oxidation state .

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61. Chlorine is used to purify drinking water. Excess of chlorine is harmful . The excess of chlorine is removed bt treating with sulphur dioxide . Present a balanced equation for this redox change taking place in water.

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62. Select the possible non -metals that can show disproportionation reaction

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63. Select three metals that can show disproportionation reaction .

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64. In Ostwaid's process for the manufacture of nitric acid , the first step involves the oxidation of anmonia gas by oxygen gas to give nitric oxide gas and steam . What is the maximum weight of nitric oxide that can be obtained starting only with 10.00 g of ammonia and 20.00 if oxygen ?

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Higher Order Thinking Skills Hots Questions

1. MnO_4^{2-} undergoes disproportionation reaction in acidic medium but MnO_4^- does not .Give reason.

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2. What amount of $K_2Cr_2O_7$(in mmol) is required to oxidise 24ml 0.05 M Mohr's salt?

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3. Explain with mechanism why the reaction between O_3 and H_2O_2 written as-

$O_3(g) + H_2O_2(l) \rightarrow H_2O(l) + O_2(g) + O_2(g)$

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4. $12.53cm^3 0.051 MseO_2$reacts completely with $25.5cm^3 0.1 MCrSO_4$to produce $Cr_2(SO_4)_3$. What is the change in the oxidation number of Se in this redox reaction ?

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5. 30 mL 0.05 M $KMnO_4$ is required for complete oxidation of 0.5 g oxalate in acidic medium .Calculate the percent amount of oxalate in that salt sample

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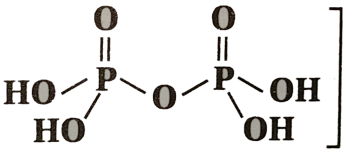
6. What will be the nature of the salt formed when 2 mol NaOH is added to the aqueous solution of 1 mol pyrophosphoric acid ? Give an equation .

[Structure of $H_4P_2O_7$: ]

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7. Find the oxidation state of C-1 and C-2 in CH_3CH_2OH.

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8. 1 mol N_2H_4 loses 10 mol of electrons with th electrons with the formation of I mol of a new compound y. of the new compound contains same number of N- atoms then what will be the oxidation number of nitrogen in the new compound ? (Assume that the oxidation number of H -atom does not change)

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9. Oxidation number of the elements A, B and C +2,+5 and -2 respectively .Which one will the formula of the compound containing these three elements $A_2(BC_2)_2$, $A_3(B_2C)_3$, $A_2(BC_3)(3)$

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10. In acidic medium .for the reduction of each NO_3^- ion in the given reaction ,how many electrons will be required $NO_3^- \rightarrow NH_2OH$

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11. CO_3O_4 is an oxide of Ca (III) and Cu (II) .If its formula is $CO_x(II)CO_y(II)O_4$, then what is the value of x and y ?

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12. How many electrons should A_2H_3liberate so that in the new compound .A shows oxidation number of $-\frac{1}{2}$?

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Entrance Question

1. The equivalent weight of $K_2Cr_2O_7$ in acidic medium is expressed in terms of its molecular weight (M) as-

A. $\frac{M}{3}$

B. $\frac{M}{4}$

C. $\frac{M}{6}$

D. $\frac{M}{12}$

Answer: C

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2. If Cl_2 is passed through hot aqueous hot NaOH, the products formed have Cl in different oxidation states . These are indicated are

A. $-1\& +1$

B. $-1\& +5$

C. $+1 \text{ and } \&5$

D. $-17\& +3$

Answer: B

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3. In aqueous alkaline solution, two electron reduction of HO_2^- gives

A. HO^-

B. H_2O

C. O_2

D. O_2^-

Answer: A

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4. Consider the following reaction

$$XMNO_4^- + yC2O_4^{2-} + zH^+ \rightarrow xMn^{2+} + 2yCO_2 + \frac{z}{2}H_2O$$

The values of x,y and x in the reaction are, respectively -

A. 5,2 and 8

B. 5,2 and 16

C. 2,5 and 8

D. 2,5 and 16

Answer: D

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5. In which of the following reactions, H_2O_2 acts as a reducing agent-

(I) $H_2O_2 + 2H^+ + 2e \rightarrow 2H_2O$

(II) $H_2O_2 - 2e \rightarrow O_2 + 2H^+$

(III) $H_2O_2 + 2e \rightarrow 2OH^-$

(IV) $H_2O_2 + 2OH^- - 2e \rightarrow O_2 + 2H_2O$

A. (II).(IV)

B. (I),(II)

C. (III),(IV)

D. (I),(III)

Answer: A

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6. The pair in which phosphorus atoms have a formal oxidation state of +3 is

A. orthophosphorus and pyrophosphorus acid

B. pyrophosphorus and hypophosphoric acid

C. orthophosphorus and hypophosphoric acid

D. pyrophosphorus and pyrophosphoric acid

Answer: A

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7. Which of the following reactions is an example of a redox reaction -

A. $XeF_6 + H_2O \rightarrow XeOF_4 + 2HF$

B. $XeF_6 + 2H_2O \rightarrow XeO_2F_2 + 4HF$

C. $XeF_4 + O_2F_4 \rightarrow XeF_6 + O_2$

D. $XeF_2 + PF_5 \rightarrow [XeF]^+[PF_6]^-$

Answer: C

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8. The oxidation states of Cr in $[Cr(H_2O)_6]CI_3$ $[Cr(C_6H_6)_2]$ and $K_2[Cr(CN_2)(O)_2(O_2)(NH_3)]$ respectively are -

A. $+3,\ +4$ and $+6$

B. $+3,\ +2$ and $+4$

C. $+3, 0$ and $+6$

D. $+3, 0$ and $+4$

Answer: C

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9. A mixture of potassium chlorate ,oxalic acid and sulphuric acid is heated. During the reaction which element undergoes maximum change in the oxidation number -

A. S

B. H

C. Cl

D. C

Answer: C

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10. In which of the following compounds ,nitrogen exhibits highest oxidation state -

A. N_2H_4

B. NH_3

C. N_3H

D. NH_2OH

Answer: C

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11. In acidic medium H_2O_2 changes $Cr_2\_(7)^{2-}$ toCrO_5which has two (-O-O) bonds oxidation state of Cr in $CrO_5$is -

A. $+5$

B. $+3$

C. $+6$

D. -10

Answer: C

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12. (I) $H_2O_2 + O_3 \rightarrow H_2O + 2O_2$

(II) $H_2O_2 + Ag_2O \rightarrow 2Ag + H_2O + O_2$

Bole or hydrogen peroxide in the above reaction is respectively-

A. oxidising in (i) and reducing in (II)

B. reducing in (I) and oxidising in (II)

C. reducing in (I) and (II)

D. oxidising in (I) and (II)

Answer: C

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13. Assuming complete inoisation ,same moles of which of the following compounds will require the least amount of acidified $KMnO_4$ for complete oxidation-

A. $FeSO_4$

B. $FeSO_3$

C. FeC_2O_4

D. $Fe(NO_2)_2$

Answer: A

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14. Hot concentrated sulphuric acid a is a moderately strong oxidising agent. Which of the following reactions does not show oxidising behavior-

A. $Cu + 2H_2SO_4 \rightarrow CuSO_4 + SO_2 + 2H_2O$

B. $S + 2H_2SO_3 \rightarrow 3SO_2 + 2H_2O$

C. $C + 2H_2SO_4 \rightarrow CO_2 + 2SO_2 + 2H_2O$

D. $CaF_2 + H_2SO \rightarrow CaSO_4 + 2HF$

Answer: D

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15. For the redox reaction -

$$MnO_4^- + C_2O_4^{2-} + H^+ \rightarrow Mn^{2+} + CO_2 + H_2O$$

The correct coefficients of the reactants for the balanced equation are

A.

MnO_4^-	$C_2O_4^{2-}$	H^+
16	5	2

B.

MnO_4^-	$C_2O_4^{2-}$	H^+
2	5	16

C.

MnO_4^-	$C_2O_4^{2-}$	H^+
2	16	5

D.

MnO_4^-	$C_2O_4^{2-}$	H^+
5	16	2

Answer: B

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16. When $KMnO_4$ reacts with KBr in alkaline medium and gives bromate ion, then oxidation state of Mn changes from +7 to-

A. $+6$

B. $+4$

C. $+3$

D. $+2$

Answer: B

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17. $K_2Cr_2O_7$ in acidic medium coverts into-

A. Cr^{2+}

B. Cr^{3+}

C. Cr^{4+}

D. Cr^{5+}

Answer: B

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18. Oxidation state of iron in haemoglobin is-

A. 0

B. $+2$

C. -2

D. $+3$

Answer: B

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19. What is the oxidation number of Br in $KBrO_4$

A. $+6$

B. $+7$

C. $+5$

D. $+8$

Answer: B

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20. Substances that are oxidised and reduced in the following reaction are respectively -

$N_2H_4(l) + 2H_2O_2(l) \rightarrow N_2(g) + 4H_2O(l)$

A. $N_2H_4.\ H_2O$

B. $N_2H_4.\ H_2O_2$

C. $N_2.\ H_2O_2$

D. $H_2O.\ N_2$

Answer: B

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Mcq Hotspot Single Correct Type

1. Oxidation number of S in peroxomonosulphuric and peroxodisulphric acids respectively

A. $+3\& +3$

B. $+4\& +6$

C. $+6\& +6$

D. $+8\& +7$

Answer: C

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2. Oxidation number of P in Pyrophosphoric acid is -

A. $+1$

B. $+3$

C. $+4$

D. $+5$

Answer: D

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3. When SO_2gas is passed through an acidic solution of $K_2Cr_2O_7$ the oxidation number of S changes by

A. 2 unit

B. 3 unit

C. 4 unit

D. 6 unit

Answer: A

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4. When manganous salt is fused with KNO_3 and solid NaOH, the oxidation number of Mn changes from-

A. $+2 \rightarrow +3$

B. $+2 \rightarrow +4$

C. $+2 \rightarrow +6$

D. $+2 \rightarrow +7$

Answer: C

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5. Which of the following reactions due to the reaction gives -

A. $2CuSO_4 \rightarrow 4K \rightarrow Cu_2I_2 + 2K_2SO_4 + I_2$

B. $SO_2 + H_2O \rightarrow H_2SO_3$

C. $CuSO_4 + 4NH_3 \rightarrow \left[Cu(NH)_3)_4\right]SO_4$

D. $4KCIO_3 \rightarrow 3KCIO_4 + KCI$

Answer: C

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6. Which of the following reactions does the rection, $Ag^{2+} + Ag \rightarrow Ag^{+}$,belong to-

A. reduction

B. oxidation

C. comproportionation

D. disproportionation

Answer: C

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7. In the following oxidation half- reaction gives -

$2KMnO_4 + 5H_2C_2O_4 + 3H_2SO_4 \rightarrow K_2SO_4 + 2MnSO_4 + 10CO_2 + 8H_2$

A. $MnSO_4$

B. CO_2

C. K_2SO_4

D. H_2O

Answer: B

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8. The amount of electrons required in reduce 1 mol of nitrate ions to hydrazine is

A. 7 mol

B. 6 mol

C. 5 mol

D. 4 mol

Answer: A

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9. The reaction of ClO_2 with H_2O_2 in an alkaline medium results in O_2 and Cl^- ions. In this reaction .ClO_2 acts are an oxidant . The number of mol H_2O_2 oxidised by 1 mol of $ClO_2$is -

A. 1.0

B. 1.2

C. 2.5

D. 2.6

Answer: C

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10. In the balanced equation of the reaction $Zn + NO_3^- + OH^- \rightarrow ZnO_2^{2-} + NH_3$, the coefficient of Zn, NO_3^- and OH^- respectively are-

A. 1,4&8

B. 8,3&2

C. 4,1&7

D. 5,2&8

Answer: C

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11. The amount of iodine that liberates in the reaction of 0.1 mol $K_2Cr_2O_7$ with excess of KI in an acidic solution is -

A. 0.1mol

B. 0.2mol

C. 0.3mol

D. 0.4mol

Answer: C

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12. In a strong alkaline solution, the equivalent mass of $KMnO_4$ (molecular mass =M) is-

A. $\frac{M}{5}$

B. $\frac{M}{3}$

C. $\frac{M}{2}$

D. M

Answer: D

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13. In the balanced equation of the reaction $aKMnO_4 + bNH_3 \rightarrow KNO_3 + MnO_2 + KOH + H_2O$, the value of a and b respetively are-

A. 3 and 7

B. 8 and 3

C. 5 and 2

D. 6 and 8

Answer: B

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14. In the reaction of $KMnO_4$ with ferrous ion in an acidic medium $KMnO_4$ oxidised ferrous ion to ferric ion and itself gets reduced to manganous salt.The amount of ferrous ions oxidised 100 mL of 0.2 (N) $KMnO_4$ solution

A. 1.117 g

B. 1.562 g

C. 2.173 g

D. 1.934 g

Answer: A

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15. The oxidation number of B in $NaBH_4$ is

A. -3

B. $+3$

C. $+2$

D. -4

Answer: B

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16. The equivalent mass of the oxidant in the reaction ,

$3CI_2 + 6NaOH \rightarrow 5NaCl + NaClO_3 + 3H_2O$ is -

A. 71

B. 14.2

C. 7.1

D. 35.5

Answer: D

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17. $Cr(OH)_3 + 10_3^- + OH^- \rightarrow CrO_{4-}^{2-} + H_2O + I_2$: In the balanced equation of this reaction ,coefficent of H_2O is-

A. 2

B. 3

C. 4

D. 5

Answer: D

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18. In the balanced equation for the reaction

$$As_2S_2 + aClO_3^- + bOH^- \rightarrow xAsO_4^{3-} + yClO^- + zSO_4^{2-} + 6H_2O$$

A. x+y+z=a

B. a+x+z=b

C. a-x-z-=y

D. b-a=y-z

Answer: B

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19. In the reaction ,$Fe_3O_4 + KMnO_4 \rightarrow Fe_2O_3 + MnO_2$,the equivalent mass of Fe_3O_4 is -

A. 116

B. 232

C. 77.3

D. 154.6

Answer: B

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20. Which of the following reactions requires an oxidant -

A. $Cu^{2-} \rightarrow Cu$

B. $Cu_3P_2 \rightarrow 2PH_3$

C. $2S_2O_3^{2-}$

D. $SO_3 \rightarrow SO_4^{2-}$

Answer: C

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21. In presence of HCI(aq), $K_2CR_2O_7$ oxidises tin (Sn) inot SN^{4+} ion. The amount of tin that will be oxidised by 1 mol $K_2Cr_2O_7$

A. 1.0mol

B. 1.5mol

C. 2.0mol

D. 2.5mol

Answer: B

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22. The amount of $Na_2S_2O_3$ to required for reducing iodine produced by the reaction of 1 mol of KI with H_2O_2 in acid medium is-

A. 0.5

B. 1mol

C. 2 mol

D. 2.5 mol

Answer: C

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23. The ratio of equivalent masses of $KMnO_4$ in acidic ,strong alkaline and netural solution is -

A. $3:5:15$

B. $3:15:5$

C. $5:5:3$

D. $3:3:5$

Answer: B

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24. The amount of H_2O_2 required for decolourising 1 mol of $KMnO_4$ it an acid solution is-

A. 1.5mol

B. 2.0mol

C. 2.5mol

D. 3.0mol

Answer: C

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25. Fe has the lowest oxidation in

A. $FeSO_4(NH_4)_2SO_4.6H_2O$

B. $K_4\left[Fe(CN)_6\right]$

C. $Fe(CO)_5$

D. $Fe_{0.94}O$

Answer: C

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26. A compound of Xe and F is forme d to have 53.5% Xe .What is the oxidation number of Xe in this compound

A. -4

B. 0

C. $+4$

D. $+6$

Answer: D

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27. Disproportionation reaction is not possible for-

A. AsH_2

B. SF_2

C. H_5IO_6

D. PCI_3

Answer: C

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28. When 1 mol of $KCIO_3$ accepts 4 mol of electrons the expected product is -

A. CIO_2^-

B. CIO_4^-

C. OCI^-

D. CI^-

Answer: C

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29. $M^{x+} + MNO_4^- \rightarrow MO_3^- + Mn^{2+} \frac{1}{2} O_2$: If the 1 mol of MnO_4^- oxidised 2.5 mol of M^{x+} ,then the value of x is -

A. 5

B. 3

C. 4

D. 1

Answer: B

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30. During the reaction between $KClO_3$ and $(COOH)_2$ im acidic medium ,the element which undergoes maximum change in the oxidation

number is -

A. K

B. O

C. Cl

D. C

Answer: C

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31. If the oxidation number of Cr in $CrO_5, K_2CrO_4, K_2Cr_2O_7$ and $\left[Cr(NH_3)_4Cl_2\right]Cl$are +a.+b, +c and +d respectively then

A. $a > c > b > d$

B. $a = c > b > d$

C. $a = b > c > d$

D. $a = b = c > d$

Answer: D

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32. The oxidation number of Pt in $[Pt(C_2H_4)Cl_3]^-$ is-

A. $+3$

B. $+4$

C. $+2$

D. O

Answer: C

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33. In the balanced equation for the reaction $IO_3^- + al^- + bH^+ \rightarrow CH_2O + dl_2$, the values of a,b,c and d respectively are-

A. 5,6,6,3

B. 5,3,6,3

C. 3,5,3,6,

D. 5,6,5,5

Answer: A

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34. For the reaction : $H_2O_2 + xClO_2 \rightarrow xCl^- + yO_2 + H_2O$ the value of y/x is -

A. 2.0

B. 2.5

C. 1.0

D. 1.5

Answer: B

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35. The oxidation number of P in $Ba(H_2PO_2)_2$is-

A. $+3$

B. $+2$

C. $+1$

D. -1

Answer: C

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36. $Mn^{2+} + bBiO_3^- + cH^+ \rightarrow aMnO_4^- + bBi^{3+} + dH_2O$: For the balanced chemical equation ,which one is correct -

A. a=3

B. b=5

C. c=10

D. d=6

Answer: B

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37. The mixture of NaOH solution and white P on heating produces PH_3 gas and $Na_2H_2PO_2$ The above reaction is an example of -

A. Oxidation reaction

B. Reduction reaction

C. Comproportionation reaction

D. Disproportionation reaction

Answer: D

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38. For the reaction :

$Zn(s) + HNO_3(aq) \rightarrow Zn(NO_3)_2(aq) + NH_4NO_3(aq) + H_2O(l)$

the change in oxidation number for per mole HNO_2 is -

A. increases by 6 unit

B. decreases by 4 unit

C. decreases by 8 unit

D. decreases by 6 unit

Answer: C

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39. To balance the chemical equation :

$Cl_2O_7(g) + H_2O(l) + xe^- \rightarrow ClO_2^-(aq) + OH^-(aq)$

the value of x should be-

A. 8

B. 6

C. 5

D. 4

Answer: A

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40. Find the equivalnet mass $Na_2S_2O_3$for the reaction, $2Na_2S_2O_3(aq) + I_2(s) \rightarrow Na_2S_4O_6(aq) + Na(aq)$

[Assume that the molecular mass of $Na_2S_2O_3$M]-

A. M/6

B. M

C. M/2

D. M/4

Answer: B

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Mcq Hotspot More Than One Correct Type

1. Which of the following substances undergo diporportionation reaction in basic medium -

A. F_2

B. P_4

C. S_8

D. Br_2

Answer: B::C::D

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2. In which of the following compounds oxidation number of oxygen is fractional

A. B_4O_{10}

B. CO_2

C. CsO_2

D. KO_3

Answer: A::C::D

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3. When CI_2 is passed through NaOH in cold ,the oxidation number of CI changes from-

A. 0 to-1

B. 0 to +2

C. 0 to -2

D. 0 to +1

Answer: A::D

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4. In which of the following cases equivalent mass of a reductant is equal to its molecular mass-

A. $Cr_2O_7^{2-} + 6I^- 14H^+ \rightarrow 2Cr^{3+} + 3I_2 + 7H_2O$

B. $MnO_4^- + 5Fe^{2+} 8H^+ \rightarrow 5F^{3+} + Mn^{2+} + 4H_2O$

C. $2Na_2S_2O_3 + I_2 \rightarrow Na_2S_4O_6 + 2NaI$

D. $MnO_4^- 5C_2O_4^{2-} + 16H^+ \rightarrow Mn^{2+} + 10CO_2 + 8H_2O$

Answer: B::C

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5. Identify the redox reaction (s) and also th oxidation and the reductants from the following reaction (s).

A. $2CusO_4 + 4KI \rightarrow 2CuI + I_2 2H_2SO_4$

B. $BaCI_2 + Na_2SO_4 tp BaSO_4 + 2NaCI$

C. $3I_2 + 6NaOH \rightarrow NaIO_3 + 5NaI + 3H_2O$

D. $CuSO_4 + 4NH_3 \rightarrow [Cu(NH_3)4]SO_4$

Answer: A::C

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6. When ammonium nitrate is heated , the oxidation numbers of the N-atoms present in it change from-

A. $-3 to +1$

B. $-3 to 0$

C. $-2 to +4$

D. $+5 to 0$

Answer: A

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7. For the reaction , $2S_2O_4^{2-} + 1_2 \rightarrow S_4O_6^{2-} + 2I^-$ -

A. $S_2O_3^{2-}$ gets oxidised to $S_4O_6^{-2}$

B. $S_2O_3^{2-}$ gets reduced to $S_4O_6^{-2}$

C. I_2gets oxidised to I^-

D. I_2 gets reduced to I^-

Answer: A::D

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8. Which of the following statements about the following reaction are wrong

$2Cu_2O + Cu_2S \rightarrow 6Cu + SO_2$

A. both Cu_2O and $Cu_2S$are reduced

B. only Cu_2S is reduced

C. Cu_2 S is the oxidant

D. only $Cu_2O$is reduced

Answer: B::C::D

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9. Which of the following orders represent the correct desending order of oxidation numbers-

A. $HNO_3 > NO > NH_4CI > N_2$

B. $HNO_3 > NO > \ > N_2NH_4CI$

C. $H_2S_2O_7 > Na_2S_2O_3 > Na_2S_4O_6 > S_6$

D. $H_2SO_5 > H_2SO_3 > SCI_2 > H_2S$

Answer: B::D

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10. Which of the following reactions are not redox reactions -

A. $SO_2(g) + H_2O(l) \rightarrow H_2SO_3(aq)$

B. $Ca(s) + H_2(g) \rightarrow CaH_2(g)(s)$

C. $2H_2S(aq) + SO_2(g) \rightarrow 2H_2O(l) + 3S(s)$

D.

$$2PCI_5(g) + H_2SO_4(Aq) \rightarrow 3POCI_3(aq) + 2HCI(aq) + SO_2CI_2(g)$$

Answer: A::D

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11. In which compounds does Cr exists in +6 oxidation state-

A. CrO_2CI_2

B. $Na_3\left[Cr(CN)_6\right]$

C. CrO_5

D. $K_2Cr_2O_7$

Answer: A::C::D

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12. When ammonium nitrite (NH_4NO_2) is heated

A. oxidation of nitrogen takes place

B. reduction of nitrogen takes place

C. the overall reaction is a disproportionation reaction

D. the overall reaction is a double decompostion reaction

Answer: A::B::C

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13. In which compounds does an atom exist in two oxidation sates

A. H_2SO_5

B. NH_4NO_3

C. Fe_2O_3

D. H_2O_2

Answer: A::B

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14. In the balanced equation for the reaction

$$H_2SO_4 + xHI \rightarrow H_2S + yl_2 + zH_2O$$

A. x=y

B. y=z

C. x=2y

D. z=2x

Answer: B::C

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15. In the reaction,

$KMnO_4 + Na_2S_2O_3 + H_2O \rightarrow MnO_2 + SO_4^{2-} + OH^-$ - (assume formula masses of $KMnO_4$ and $Na_2S_2O_2$ are M_1 and M_2 respectively) -

A. the equivalent mass of $KMnO_4 = M_1/(3)$

B. the equivalent mass of $Na_2S_2O_3 = M_2$

C. the equivalent mass of $KMnO_4 = M_1/S)$

D. the equivalent mass of $Na_2S_2O_3 = M_2/B$

Answer: A::D

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16. In the balanced equation for the reaction

$UO^{2+} + Cr_2O_7^{2-} + H^+ \rightarrow UO_2^{2+} + Cr^{3+} + H_2O$

the cofficent of -

A. UO^{2+} is 4

B. UO_2^{2+} is 3

C. $Cr_2O_7^{2-}$ is 1

D. H_2O is 7

Answer: B::C

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17. The disproprotionation of 1 mol of $MnO_{4\_}^{2-}$ ions is a neutral aqueous solution results in-

A. 1/3 mol of MnO_4^-

B. 2/3 mol of MnO_2

C. $\frac{2}{3} mol of MnO_4^-$

D. 1/3 mol of MnO_2

Answer: C::D

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18. In the reation ,

$$2C_6H_5\overset{*}{C}HO + NaOH \rightarrow C_6H_6\overset{*}{C}OONa + C_6H_5\overset{*}{C}H_2OH$$

A. increase by 2 units

B. increase by 1 units

C. decrease by 2 units

D. decrease by 3 units

Answer: A::C

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19. For the reaction : $SO_2 + 2H_2S \rightarrow 3S + 2H_2O$-

A. equivalent mass of oxidant is 64

B. equivalent mass of oxidant is 16

C. number of electrons lost by accepted by oxidant is 4

D. number of electrons lost by reductant is 6

Answer: B::C

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20. The species that cannot be reducing agents are -

A. SO_3

B. SO_3^{2-}

C. H_2SO_4

D. S^{2-}

Answer: A::C

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21. Which are conserved in all redox reactions-

A. charge

B. mass

C. either charge of mass

D. neither charge of mass

Answer: A::B

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Exercise Very Shot Answer Type Questions

1. Give an example of a compound in which the same elements exists in two different oxidation states.

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2. Give an exampel of a compound in which oxidation number of N = +1.

Watch Video Solution

3. Give an example of a compound in which oxidation number of O = +2.

Watch Video Solution

4. What is the oxidation number of Fe in Fe (CO)s?

Watch Video Solution

5. What is the oxidation number of sodium in sodium amalgam ?

Watch Video Solution

6. Give an example of compound in which the oxidation number and valency of an element in the compound are the same .

Watch Video Solution

7. What are the oxidation number of three C -atoms in C_3O_2?

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8. What is the oxidation of carbon in CH_3COCH_3?

Watch Video Solution

9. What tupe of redox reaction does the given reaction belong to?

$2H_2S + SO_2 \rightarrow 2H_2O + 3S$

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10. Which of the following is unable to participate in disproportionation reaction ? ClO^-, ClO_2^-, ClO_3^-, ClO_4^-

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11. In which of the following ion does Fe exist in the same oxidation state ?

$[Fe(CN)_6]^{4-}, [Fe(CN)_6]^{3-}, [Fe(CN)_5NO]^{2-}$

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12. What is the equivalent mass of $CuSO_4$ in the given reaction

$2CUsO_4 + KI \rightarrow Cu_2I_2 + I_2 + K_2SO_4$

[Mol,mass$(CuSO_4)$=M

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13. What is the average oxidation number of Fe in $Fe_4[Fe(CN)_6]_3$?

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14. Which is the oxidising agent in the given reaction:

$AsO_2^- + Sn^{2+} \rightarrow As + Sn^{4+} + H_2O$

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15. Which element is oxidised and which element is reductant in the reaction , $4KClO_3(g) \rightarrow 3KClO_4(g) + KCl(g)$?

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Exercise Fill In The Blanks

1. Oxidation number of N in Mg_3N_2 is ___.

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2. An element can exists in +1 , 0, +5 oxidation states. In a compound if the element exists in _____ state ,then the compound can participate

diproportionation reaction .

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3. The oxidation number of S in $(CH_3)_2SO$ 0's ____.

Watch Video Solution

4. Number of electrons (s) in involved in the reaction $IO_3^- \rightarrow I^-$ in basic medium is _____.

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5. The equivalnet mass of SO_2 in the reaction , $SO_2SO_4^{2-}$ in acidic medium is ____.

Watch Video Solution

6. `CrO_(4-)^(2-)+xH_(2)O+yeto[Cr(OH)_(x)]^(-)+xOH^- where y=____.

View Text Solution

7. The oxidation number of Mn

$\left[Mo_2O_4(C_2H_4)_2(H_2O_2)\right]^{2+}$ is ____.

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Exercise Short Answe Type Question

1. Define oxidant and reductant in the light of electronic concept.

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2. Explain oxidation reduction on the light of electron concept.

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3. What is oxidation number ? Oxidation number may be zero- explain with suitable example .

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4. What is the auto oxidation -reduction half -reactions ? Explain it with a suitable example.

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5. What are oxidation and reduction half reactions?

Watch Video Solution

6. Identify whether the following half- reactions are oxidation

$O_2(g) \rightarrow O^{2-}(aq)$

Watch Video Solution

7. Identify whether the following half- reactions are oxidation

$ClO_2^-(aq) \rightarrow ClO^-(aq)$

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8. Identify whether the following half- reactions are oxidation

$S_2O_3^{2-}(aq) \rightarrow S_4O_6^{2-}(aq)$

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9. Define the following with example :

Disproportionation reaction

Watch Video Solution

10. Define the following with example :

Comproportionation reaction

Watch Video Solution

11. Identify whether the following reactions are redox reactions or not :

$Pb(NO_3)_2(aq) + K_2CrO_4(aq) \rightarrow PbCrO_4(s) + 2KNO_3(aq)$

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12. Identify whether the following reactions are redox reactions or not :

$NH_4NO_2(s) \rightarrow N_2(g) + 2H_2O(g)$

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13. Identify whether the following reactions are redox reactions or not :

$2HgO(s) \rightarrow 2Hg(l) + O_2(g)$

Watch Video Solution

14. Identify whether the following reactions are redox reactions or not :

$2HNO_3(aq) + 2P_2O_5(s) \rightarrow N_2O_5(g) + 2HPO_3(aq)$

Watch Video Solution

15. Identify whether the following reactions are redox reactions or not :

$3CuSO_4(aq) + 2PH_3(g) \rightarrow Cu_3P_2(s) + 3H_2SO_4(aq)$

Watch Video Solution

16. Identify the oxidant and reductant in the following reactions

$N_3H_4(l) + CIO_3^-(aq) \rightarrow NO(g) + CI^-(aq)$

Watch Video Solution

17. Identify the oxidant and reductant in the following reactions

$Cl_2(g) + 2NaOH(aq) \rightarrow NaCl(aq) + NaOCl(aq) + H_2O(l)$

Watch Video Solution

18. Identify the oxidant and reductant in the following reactions

$Cu_2S(s) + 2Cu_2O(s) \rightarrow 6Cu(s) + SO_2(g)$

Watch Video Solution

19. Identify the oxidant and reductant in the following reactions

$2HgCI_2(aq) + SnCI_2(aq) \rightarrow HgCI_2(aq) + SnCI_4(aq)$

Watch Video Solution

20. Identify the oxidant and reductant in the following reactions

$HOCI(aq) + H_2S(aq) \rightarrow S(s) + H_3O^+(aq) + CI^-(aq)$

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21. Identify the oxidant and reductant in the following reactions

$3K_2MnO_4(aq) + 2H_2O(l) \rightarrow 2KMnO_4(Aq) + MnO_2(s) + 4KOH(aq)$

Watch Video Solution

22. Identify the oxidant and reductant in the following reactions

$KIO_3(aq) + 5KI(aq) + 6HCI(aq) \rightarrow 3I_2(s) + 6KCI(aq) + 3H_2O(l)$

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23. Which are oxidised in the following reactions ? Give reasons .

$2Na + H_2 \rightarrow 2NaH$

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24. Which are oxidised in the following reactions ? Give reasons .

$H_2O_2 + O_3 \rightarrow H_2O + O_2$

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25. Which of the following two reactions does HNO_3 not acts as an oxidising agent ? Give an example

$2HNO_3 + P_2O_5 \rightarrow 2HPO_3 + N_2O_5$

View Text Solution

26. Which one of the following two reactions is redox reactions ?

$Zn + 2K\left[Ag(CN)_2\right] \rightarrow 2Ag + K_2\left[Zn(CN)_4\right]$

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27. Arrange the following compounds is increasing order of the oxidation number of S. .

$Na_2S_4O_6$, $H_2S_2O_7$, H_2SO_3, $Na_2S_2O_3$

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28. Oxidation state of nitrogen is corectly given for

	Compound	Oxidation state
(a)	Mg_3N_2	-3
(b)	NH_2OH	$+1$
(c)	$(N_2H_5)_2SO_4$	$+2$
(d)	$[Co((NH_3)_5Cl]Cl_2$	0

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29. What are values of a and b in the given redox reaction?

$aKMnO_4 + NH_3 \rightarrow bKNO_3 + MnO_2 + KOH + H_2O$

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30. Write the half reactions of the given redox reaction .

$UO^{2+} + Cr_2O_7^{2-} + H^+ \rightarrow UO_2^{2+} + Cr^{3+} + H_2O$

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31. How many moles of electrons will be required to reduce 1 mol NO_3^- ion to hydrazine in acidic medium?

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32. In alkaline medium ,CIO_2 oxidised by H_2O_2 to O_2 and itself reduces to CI^- ion .How many moles of H_2O_2 will be oxidised by 1 mol of CIO_2 ?

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33. In basic medium KNO_2 is oxidised by $KMnO_4$ forming KNO_3 .How many moles of $KMnO_4$ are required to oxiside 1 mol of KNO_2?

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34. Calculate

(i) the number of mol $KMnO_4$ required to oxiside 1 mol of ferrous oxalate in acidic medium.

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35. Calculate

(ii) The number of mol $KMnO_4$ required to oxiside 1 mol of ferrous oxalate in acidic medium.

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36. Calculate th equivalent mass of the underline compounds

$\underline{3KClO_3} + 3H_2SO_4 \rightarrow 3KHSO_4 + HClO_4 + 2ClO_2 + H_2O$

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37. Calculate th equivalent mass of the underline compounds

$$4Fe^{3+} + \underline{2NH_2OH} \rightarrow 4Fe^{2+} + N_2O + 4H^+ + H_2O$$

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38. Iodine reacts with sodium thiosoulfate in a neutral medium .Write the balanced equation of this reaction . Calculate equivalent mass of sodium thlosulfate in this reaction . (Assume molecule mass of sodium thiosulfate=M).

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Exercise Additional Question

1. Balance the reaction by oxidation number method

$$AI + NaOH + H_2O \rightarrow NaAIO_2 + H_2$$

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2. Balance the reaction by oxidation number method

$CuO + NH_3 \rightarrow Cu + N_2 + H_2O$

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3. Balance the reaction by oxidation number method

$P_4 + NaOH + H_2O \rightarrow PH_3 + NaH_2PO_2$

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4. Balance the reaction by oxidation number method

$Cu + HNO_3 \rightarrow Cu(NO_3)_2 + NO_2 + H_2O$

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5. Balance the reaction by ion-electrons mehod :

$MnO_4^- SO_2^{2-} + H_2O \rightarrow Mn^{2+} H^+ SO_4^{2-}$

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6. Balance the reaction by ion-electrons mehod :

$Cr_2O_7^{2-} + C_2O_4^{2-} H^+ \rightarrow Cr^{3+} + CO_2 H_2O$

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7. Balance the reaction by ion-electrons mehod :

$NaCIO_3 + KI + HCI \rightarrow NaCI + I_2 KCI + H_2O$

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8. Balance the reaction by ion-electrons mehod :

$I_2 + KOH \rightarrow KIO_3 + KI + H_2O$

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9. Balance the reaction by ion-electrons mehod :

$$Cr_2O_7^{2-} + I^- H^+ \rightarrow Cr^{3+} I_2 + H_2O$$

Watch Video Solution

10. Calculate equivalent masses of the marked compounds.

$$2\overset{*}{C}uSO_4 + 4KI \rightarrow Cu_sI_2 + I_2 + 2K_2SO_4$$

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11. Calculate equivalent masses of the marked compounds.

$$\overset{*}{K}IO_3 + 5KI + 6HCI \rightarrow 3I_2 + 3H_2O + 6KCI$$

Watch Video Solution

12. Calculate equivalent masses of the marked compounds.

$$3S_2O_3^{2-} + 8\overset{*}{M}nO_4 + H_2O \rightarrow 6SO_4^{2-} + 8MnO_2 + 2OH^-$$

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13. Calculate equivalent masses of the marked compounds.

$$3AsCI_3 + K\overset{*}{B}rO_3 + 9H_2O \rightarrow 3H_3AsO_4 + KBr + 9HCI$$

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Exercise Numerical Problems

1. The reaction $M^{n+}MnO_4^- \rightarrow MO_3^- + Mn^{2+} +$ occurs in and acid medium . In the reaction , If 1 mol of MnO_4^{-1} oxidised 1.67 mol M^{n+} ,then calculate the value of n.

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2. In presence of $H_2SO_4$25mL of 0.1 M $K_2Cr_2O_7$ solution is required to oxisideFe^{2+} ions in 25mL. Of a solution of ferrous salt. Estimate the amount of iron present per lite of the solution of ferrous salt.

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3. What volume of 0.5M $KMnO_4$ solution is required to oxiside 2.0g of $FeSO_4$to acid medium ?

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4. In a solution acidified with HCI, $K_2Cr_2O_7$ oxidises metallic tin (sin) to stannic chloride $(SnCI_4)$. What volume of a decinormal $K_2Cr_2O_7$ solution is required to oxidise 0.1 g of tin ?

Watch Video Solution

5. 20mL of 0.1 $Na_2S_2O_3$solution is required to reduce I_2 liberated when Ki in excess is added to 25mL of H_2O_2solution .Calculate persent concentration (x/v) of H_2O_2

$= \frac{0.034}{25} \times 100 = 0.136\,\%$

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Practice Set

1. (a) Find the oxidation numbr of C-1 and C-2 in CH_3CH_2OH.(b) What is the oxidation number of Mn whenMNO_2 is melted with solid KNO_3 and NaOH?

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2. (a) An element can show 0, -1 and +5 oxidation states . The oxidation number of the elements in two compounds are-1 and +5 is a

comproportionation reaction involving these two compounds possible.

(b) Give an example of a compound where the constitument element exhibits fractional oxidation number.

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3. What are the oxidation number of the two elements marked with asterisk ? $H_3\overset{*}{P}O_2, \overset{*}{C}_6H_{12}O_6$

Determine the values of x and y in the following balanced equation :

$5H_2O_2 + xClO_2 + 2OH^- \rightarrow xCl^- + yO_2 + 5H_2O$

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4. Oxidation number of the elements A, B and C are +2, +5 and -2 respectively .Which one will be the formula of the compound containing these three elements $A_2(BC_2)_2, A_3(B_2C)_2, A_3(BC_4)_2$

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