CHEMISTRY

BOOKS - S DINESH & CO CHEMISTRY (HINGLISH)

REDOX REACTIONS

Example

1. The oxidation number of Cr in $K_2Cr_2O_7$ is

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2. Determine the oxidation number (O.N) of Fe in $\left[Fe(CN)_6\right]^{4-}$

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3. Find out the oxidation number (O.N.) of S in (a) H_2S (b) SO_2 (c) SO_3 (d) SO_3^{2-}.

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4. Balance the following redox reaction :

$Cu + NO_3^- \rightarrow NO_2 + Cu^{2+}$ (Acidic medium).

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5. Balance the following redox equaiton by both methods.

$\left[Cr(OH)_4\right]^{\ominus} + H_2O_2 \rightarrow CrO_4^{2-} + H_2O$(basic medium)

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6. Balance the following by ion electron method is basic medium.

$NO_3^{\ominus} + Zn \rightarrow Zn^{2+} + NH_4^{\oplus}$.

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Mcqs

1. Oxidation is a process of

A. loss of electrons

B. gain of electrons

C. increase in the negative valency

D. decrease in positive valency

Answer: A

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2. When zinc is added to $CuSO_4$ solution, copper is precipitated. It is because of

A. Reduction of Zn

B. Reduction of Cu^{2+}

C. Hydrolysis of $CuSO_4$

D. Reduction of SO_4^{2-}

Answer: B

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3. The process in which oxidation number increase, is

A. Reduction

B. Hydrolysis

C. Oxidation

D. decomposition

Answer: C

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4. When zinc metal is added to dilute H_2SO_4 solution, hydrogen is evolved. In this zinc undergoes

A. Reduction

B. Oxidation

C. Dissolution

D. None of the above

Answer: B

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5. In which of the following, oxidation number of chloride is $+5$?

A. Cl_2O_7

B. ClO_3^-

C. ClO^-

D. ClO_4^-

Answer: B

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6. Carbon has zero oxidation number in

A. CH_4

B. CH_3Cl

C. CCl_4

D. CH_2Cl_2

Answer: D

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7. The oxidation number of C in sucrose $(C_{12}H_{22}O_{11})$ is

A. 0

B. $+22$

C. $+6$

D. -6

Answer: A

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8. In the reaction

$$3Br_2 + 6CO_3^{2-} + 3H_2O \rightarrow 5Br^{\ominus} + BrO_3^{\ominus} + 6HCO_3^{\ominus}$$

A. Bromine is oxidised and carbonate is reduced

B. Bromine is reduced and carbonate is oxidised

C. Bromine is neither reduced nor oxidised

D. Bromine is reduced and oxidised.

Answer: D

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9. The oxidation number, of C in $CH_4. CH_3CI, CH_2CI_2, CHCl_3$ and CCl_4 are respectively:

A. $-4, \ -2, 0, \ +2, \ +4$

B. $+2, 4, 0, \ -2, \ -4$

C. $4, 2, 0, \ -2, \ -4$

D. $0, 2, \ -2, 4, 4$

Answer: A

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10. Chlorine is in $+3$ oxidation state in

A. HCl

B. $HClO_4$

C. ICl

D. ClF_3

Answer: D

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11. Oxidation number of Mn in K_2MnO_4 is

A. 2

B. 4

C. 6

D. 7

Answer: C

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12. A student states that burning of lime in air is an oxidation process. The reason he gives is that an oxide of the metal is produced on burning. Which one is correct ?

A. The statement and reason are true, the reason is correct explanation

B. The statement and reason are true, the explanation is not correct

C. The statement is true but the reason is false

D. The statement in false but the reason is true

Answer: D

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13. For the following reaction in the acidic solution $MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$ which of the following gives the true oxidation numbers of the manganese on each side of the equation ?

A. $+7$ to $+6$

B. $+7$ to $+2$

C. $+4$ to $+2$

D. -1 to $+2$

Answer: B

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14. In which of the following compounds iron has lowest oxidation state?

A. $Fe(CO)_5$

B. Fe_2O_3

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

D. $FeSO_4(NH_4)_2SO_46H_2O$

Answer: A

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15. The oxidation number and covalency of sulphur in the sulphur molecule (S_8) are respectively:

A. 0 and 2

B. $+6 \text{ and } 8$

C. 0 and 8

D. $+6 \text{ and } 2$

Answer: A

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16. The most common oxidation state of an element is -2. The number of electrons present in the outermost shell is

A. 2

B. 4

C. 6

D. 8

Answer: C

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17. In which of the following oxidation number of chlorine is $+5$?

A. Cl^-

B. ClO^-

C. ClO_2^-

D. ClO_3^-

Answer: D

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18. The oxidation nunber of P in $HP_2O_7^-$ ion is

A. $+5$

B. $+6$

C. $+7$

D. $+3$

Answer: B

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19. The oxidation number of Fe in $\left[Fe(CN)_6\right]^{3-}$ ion is

A. $+2$

B. $+3$

C. -2

D. -3

Answer: B

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20. The oxidation number of Mn is $+7$ in

A. manganese dioxide

B. manganese chloride

C. manganese sulphate

D. potassium permanganate

Answer: D

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21. A compound contains atoms X, Y and Z. The oxidation number of X is $+3$, Y is $+5$ and Z is -2. The possible formula of the compound is

A. XYZ_2

B. $Y_2(XZ_3)_2$

C. $X_3(YZ_4)_3$

D. $X_3(Y_4Z)_2$

Answer: C

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22. The oxidation state of Cr in CrO_5 is :

A. $+3$

B. $+5$

C. $+6$

D. 0

Answer: C

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23. Oxidation number of Fe in Fe_3O_4 are:

A. $+2$ and $+3$

B. $+1$ and $+2$

C. $+2$ only

D. $+3$ only

Answer: A

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24. In the conversion of $K_2Cr_2O_7$ to K_2CrO_4, the oxidation number of chromium.

A. Remains same

B. Increase

C. Decreases

D. None

Answer: A

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25. The oxidation number of carbon in $C_{12}H_{22}O_{11}$ is

A. $+4$

B. $+3$

C. $+2$

D. Zero

Answer: D

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26. The oxidation number of C in HCN and HNC respectively are

A. $+2, +2$

B. $+2, +4$

C. $+4, +4$

D. $-2, -2$

Answer: A

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27. Oxidation number of carbon in carbon sub-oxide is:

A. $+2/3$

B. $+4/3$

C. $+4$

D. $-4/3$

Answer: B

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28. Oxidation number of silver in silver amalgam is

A. $+1$

B. zero

C. -1

D. none of these

Answer: B

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29. The oxidation number of N and Cl in $NOClO_4$ respectively are

A. $+2 \text{ and } +7$

B. $+3 \text{ and } +7$

C. $-3 \text{ and } +5$

D. $+2$ and -7

Answer: B

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30. On the basis of structure, the oxidation of two Cl atoms in $CaOCl_2$ respectively are

A. -1 and $+1$

B. $+2, -2$

C. $-2, +2$

D. -1 and $+3$

Answer: A

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31. In which of the following reactions, the underlined substance has been oxidized ?

A. $\underline{Br_2} + \underline{H_2S} \rightarrow 2HBr + S$

B. $\underline{2HgCl_2} + SnCl_2 \rightarrow \underline{Hg_2Cl_2} + SnCl_4$

C. $Cl_2 + \underline{2KI} \rightarrow 2KCl + \underline{I_2}$

D. $2Cu^{+2} + 4I^- \rightarrow \underline{Cu_2I_2} + I_2$

Answer: C

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32. In which of the following reactions, the underlined substance has been reduced ?

A. $\underline{CO} + CuO \rightarrow \underline{CO_2} + Cu$

B. $\underline{CuO} + 2HCl \rightarrow \underline{CuCl_2} + H_2O$

C. $\underline{4H_2O(g)} + 3Fe \rightarrow \underline{4H_2(g)} + Fe_3O_4$

D. $\underline{C} + HNO_3 \rightarrow \underline{CO_2} + 2H_2O + 4NO_2$

Answer: C

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33. Which of the following represents a redox reaction?

A. $NaOH + HCl \rightarrow NaCl + H_2O$

B. $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

C. $CuSO_4 + 2H_2O \rightarrow Cu(OH)_2 + H_2SO_4$

D. $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

Answer: D

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34. In the reaction

$3Cl_2 + 6NaOH \rightarrow NaClO_3 + 5NaCl + 3H_2O$

the element which loses as well as gains electrons is

A. Na

B. Cl

C. O

D. None of these

Answer: B

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35. The number of electrons lost in the following change is

$Fe + H_2O \rightarrow Fe_3O_4 + H_2$

A. 2

B. 4

C. 6

D. 8

Answer: D

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36. In the balanced chemical reaction

$$IO_3^{\ominus} + al^{\ominus} + bH^{\ominus} \rightarrow cH_2O + dI_2$$

a, b, c, and d, respectively, correspond to

A. 5,1,6

B. 1,5,6

C. 6,1,5

D. 5,6,1

Answer: A

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37. $NH_3 + OCl^- \rightarrow N_2H_2 + Cl^-$

On balancing the above equation in basic solution, using integral coefficient, which of the following whole number of will be the coefficient of N_2H_4?

A. 1

B. 2

C. 3

D. 4

Answer: A

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38. $Cr(OH)_3 + ClO^- + 3OH^- \rightarrow ? + Cl^- + 3H_2O$. The missing ion is

A. $Cr_2O_7^{2-}$

B. Cr^{3+}

C. CrO_4^{2-}

D. Cr_2O_3

Answer: C

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39. The value of x in the partial redox equation

$MnO_4^- + 8H^+ + xe \Leftrightarrow Mn^{2+} + 4H_2O$ is

A. 5

B. 4

C. 3

D. 2

Answer: A

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40. Balance the following redox equaiton by both methods.

$\left[Cr(OH)_4\right]^{\ominus} + H_2O_2 \rightarrow CrO_4^{2-} + H_2O$(basic medium)

A. 3

B. 6

C. 5

D. 2

Answer: B

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41. The following redox reaction occurs in basic medium $NO_3^- Zn(s) \rightarrow Zn^{2+} + NH_4^+$ when the above reaction is balanced such that the stoichiometric coefficients are in smallest whole number ratio, then the difference of stoichiometric coefficient of Zn (s) and OH^- ion will be:

A. 4,1,7

B. 7,4,1

C. 4,1,10

D. 1,4,10

Answer: C

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42. The ratio of coefficient of HNO_3, $Fe(NO_3)_2$ and NH_4NO_3 in the following redox reaction

$Fe + HNO_3 \rightarrow Fe(NO_3)_2 + NH_4NO_3 + H_2O$

are respectively

A. $10:1:4$

B. $10:4:1$

C. $4:10:1$

D. $4:1:10$

Answer: B

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Revision Question

1. The oxidation number of Cr in $K_2Cr_2O_7$ is

A. 4

B. 6

C. 7

D. -6

Answer: B

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2. Which of the following is not a redox reaction ?

A. $CaCO_3 \rightarrow CaO + CO_2$

B. $O_2 + 2H_2 \rightarrow 2H_2O$

C. $Na + H_2O \rightarrow NaOH + \frac{1}{2}H_2$

D. $MnCl_3 \rightarrow MnCl_2 + \frac{1}{2}Cl_2$

Answer: A

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3. The colour of $K_2Cr_2O_7$ changes from red-orange to lemon-yellow on treatment with $KOH(aq)$, because of :

A. reduction of $Cr(VI)$ or $Cr(III)$

B. formation of chromium hydroxide

C. Conversion of dichromate ion to chromate ion

D. oxidation of potassium hydroxide to potassium peroxide

Answer: C

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4. Oxidation number of O in H_2O_2 will be

A. -2

B. -1

C. $+1$

D. $+2$

Answer: B

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5. Which of the following halogen acid is better reducing agent ?

A. HCl

B. HBr

C. HI

D. HF

Answer: C

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6. Which substance is serving as a reducing agent in the following reaction?

$$14H^+ + Cr_2O_7^{2-} + 3Ni \rightarrow 2Cr^{3+} + 7H_2O + 3Ni^{2+}$$

A. H_2O

B. Ni

C. H^+

D. $Cr_2O_7^{2-}$

Answer: B

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7. For the redox reation

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

The correct stoichiometric coefficients of MnO_4^-, $C_2O_4^{2-}$ and H^+ respectively:

A. 2,5,16

B. 16,5,2

C. 5,16,2

D. 2,16,5

Answer: A

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8. In which of the following reactions H_2O_2 is a reducing agent?

A. $2FeCl_2 + 2HCl + H_2O_2 \rightarrow 2FeCl_3 + 2H_2O$

B. $Cl_2 + H_2O_2 \rightarrow 2HCl + O_2$

C. $2HI + H_2O_2 \rightarrow 2H_2O + I_2$

D. $H_2SO_3 + H_2O_2 \rightarrow H_2SO_4 + H_2O$

Answer: B

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9. The oxidation number of P in $Mg_2P_2O_7$ is

A. $+3$

B. $+2$

C. $+5$

D. -3

Answer: C

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10. In the reaction $2Ag + 2H_2SO_4 \rightarrow Ag_2SO_4 + 2H_2O + SO_2, H_2SO_{40}$ acts as a/an

A. Oxidising agent

B. Reducing agent

C. Catalyst

D. Acid as well as oxidant

Answer: D

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11. Oxidation state of S in SO_4^{2-}

A. $+8$

B. $+6$

C. $+4$

D. 0

Answer: B

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12. The oxidation number of Cr in $K_2Cr_2O_7$ is

A. -6

B. $+6$

C. $+2$

D. -2

Answer: B

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13. A 2.5 mol of hydrazine N_2H_4 loses 25 mole of electrons is being converted to a new compound X. Assuming that all of the nitrogen

appears in the new compound, what is the oxidation state of nitrogen in compound X ?

A. -1

B. -2

C. $+3$

D. $+4$

Answer: C

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14. In the chemical reaction,

$$Ag_2O + H_2O + 2e^- \rightarrow 2Ag + 2OH^-$$

A. Water is oxidised

B. Silver is oxidised

C. Silver is reduced

D. Hydrogen is reduced

Answer: C

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15. The oxidation state of Fe in $Fe(CO)_5$ is

A. Zero

B. 5

C. -5

D. $+3$

Answer: A

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16. Oxidation state of oxygen in H_2O_2 is

A. -2

B. -1

C. 0

D. 4

Answer: B

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17. The reaction

$$5H_2O_2 + XClO_2 + 2OH^- \rightarrow XCl^- + YO_2 + 6H_2O$$

is balanced if

A. $x = 5, y = 2$

B. $x = 2, y = 5$

C. $x = 4, y = 10$

D. $x = 5, y = 5$

Answer: B

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18. Which of the following is not a reducing agent ?

A. SO_2

B. H_2O_2

C. CO_2

D. NO_2

Answer: C

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19. The equivalent mass of oxidising agent in the following reaction is

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

A. 32

B. 64

C. 16

D. 8

Answer: C

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20. A,B and C are three elements forming a compound in which their oxidation state are +2,+5, and -2 respectively. Which could not be the formula of compound?

A. $A_2(BC)_2$

B. $A_2(BC_4)_3$

C. $A_3(BC_4)_2$

D. ABC

Answer: C

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21. When $KMnO_4$ is reduced with oxalic acid in acidic solution, the oxidation number of Mn changes from

A. From 7 to 2

B. From 6 to 2

C. From 5 to 2

D. From 7 to 4

Answer: A

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22. Oxidation state of in Fe_3O_4 is

A. $+2$

B. $+3$

C. $8/3$

D. $2/3$

Answer: C

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23. The number of moles of $K_2Cr_2O_7$ reduced by $1mol$ of Sn^{2+} ions is

A. $1/3$

B. 3

C. $1/6$

D. 6

Answer: A

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24. During nitration of benzene withnitrating mixture, HNO_3 acts as

A. acid

B. oxidising agent

C. reducing agent

D. Both A and B

Answer: D

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25. The chemical that undergoes self oxidation and self reduction in the same reaction is

A. benzyl alcohol

B. acetone

C. formaldehyde

D. acetic acid

Answer: C

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26. The reaction in which hydrogen peroxide acts as a reducting agent is .

A. $PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$

B. $2KI + H_2O_2 \rightarrow 2KOH + I_2$

C. $2FeSO_4 + H_2SO_4 + H_2O_2 \rightarrow Fe_2(SO_4)_3 + 2H_2O$

D. $Ag_2O + H_2O_2 \rightarrow 2Ag + H_2O + O_2$

Answer: D

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27. The set of numerical coefficients that balances the chemical equation

$$K_2CrO_4 + HCl \rightarrow K_2Cr_2O_7 + KCl + H_2O$$

A. 1,1,2,2,1

B. 2,2,1,1,1

C. 2,1,1,2,1

D. 2,2,1,2,1

Answer: D

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28. The oxidation state of sulphur in $Na_2S_4O_6$ is

A. 1.5

B. 2.5

C. 3

D. 2

Answer: B

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29. The values of X, Y and Zs in the reaction are repectively:

$$XMnO_4^- + YH_2SO_4 \rightarrow 2Mn^{2+} + 5H_2O + 9O_2 + Ze$$

A. 2,6,6

B. 5,2,9

C. 3,5,5

D. 2,6,6

Answer: A

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30. Which of the following is a redox reaction ?

A. $NaCl + KNO_3 \rightarrow NaNO_3 + KCl$

B. $CaC_2O_4 + 2HCl \rightarrow CaCl_2 + H_2C_2O_4$

C. $Mg(OH)_2 + 2NH_4Cl \rightarrow MgCl_2 + NH_4OH$

D. $Zn + 2AgCN \rightarrow 2Ag + Zn(CN)_2$

Answer: D

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31. When $KMnO_4$ acts as an oxidising agent and ultimately from MnO_4^{2-}, MnO_2, Mn_2O_3, and Mn^{2+}, then the number of electrons transferred in each case, respectively, are

A. 4,3,1,5

B. 1,5,3,7

C. 1,3,4,5

D. 3,5,7,1

Answer: C

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32. The oxidation number of Fe in $K_4\left[Fe(CN)_6\right]$ is

A. $+2$

B. $+6$

C. $+3$

D. $+4$

Answer: A

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33. The oxidation number of S in $H_2S_2O_8$ is

A. $+2$

B. $+4$

C. $+6$

D. $+7$

Answer: C

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34. The oxidation states of sulphur in the anions SO_3^{2-}, $S_2O_4^{2-}$, and $S_2O_6^{2-}$ follow the order

A. $S_2O_6^{2-} < S_2O_4^{2-} < SO_3^{2-}$

B. $S_2O_4^{2-} < SO_3^{2-} < S_2O_6^{2-}$

C. $SO_3^{2-} < S_2O_4^{2-} < S_2O_6^{2-}$

D. $S_2O_4^{2-} < S_2O_6^{2-} < SO_3^{2-}$

Answer: B

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35. MnO_4^{2-} (1 mole) in neutral aqueous medium is disproportionate to

A. 2/3 mole of MnO_4^- and 1/3 mole of MnO_2

B. 1/3 mole of MnO_4^{2-} and 2/3 mole of MnO_2

C. 1/3 mole of Mn_2O_7 and 1/3 mole of MnO_2

D. 2/3 mole of Mn_2O_7 and 1/3 mole of MnO_2

Answer: A

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36. $P_4 + NaOH + H_2O \rightarrow NaH_2PO_3 + PH_3$ is

A. Oxidation reaction

B. Reduction reaction

C. Both oxidation and reduction

D. None

Answer: C

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37. Which of the following act both as an oxidising as well as reducing agent ?

A. H_3PO_4

B. HNO_3

C. HNO_2

D. SO_3

Answer: C

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38. How many mole of electrons are involved in the reduction of one mole of MnO_4^- ion in alkaline medium to MnO_3^-

A. 1

B. 2

C. 5

D. 3

Answer: D

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39. What is the oxidation number of chlorine in ClO_3^- ?

A. $+5$

B. $+3$

C. $+4$

D. $+2$

Answer: A

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40. In acidic medium, dichromate ion oxidizes ferrous ion to ferric ion. If the gram molecular weight of potassium dichromate is $294g$, is gram equivalent weight is _____g.

A. 294

B. 127

C. 49

D. 24.5

Answer: C

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41. In the reaction,

$KMnO_4 + 16HCl \rightarrow 5C1_2 + 2MnCl_2 + 2KCl + 8H_2O$ the reduction product is

A. Cl_2

B. $MnCl_2$

C. H_2O

D. KCl

Answer: B

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42. Nitrogen shows different oxidation states in the range

A. 0 to +5

B. -3 to $+5$

C. -5 to $+3$

D. -3 to $+3$

Answer: B

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43. What is the equivalent mass of IO_4^- when it is converted into I_2 in acid medium ?

A. M/6

B. M/7

C. M/5

D. M/4

Answer: B

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44. Which is the best description of the behaviour of bromine in the reaction given below

$H_2O + Br_2 \rightarrow HOBr + HBr$

A. Reduced only

B. Proton acceptor only

C. Both oxidised and reduced

D. Oxidised only

Answer: C

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45. Oxidation state of oxygen in H_2O_2 is

A. -2

B. -1

C. 0

D. $+2$

Answer: B

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46. In the iodometric estimation in the laboratory which process is involved?

A.

$$Cr_2O_7^{2-} + H^+ + I^- \rightarrow 2Cr^{3+} + I_2, I_2 + S_2O_3^{2-} \rightarrow S_4O_6^{2-} + I^-$$

B.

$$MnO_4^{2-} + H^+ + I^- \rightarrow Mn^{2+} + I_2, I_2 + S_2O_3^{2-} \rightarrow S_4O_6^{2-} + I^-$$

C.

$$MnO_4^- + OH^- + I^- \rightarrow MnO_2 + I_2, I_2 + S_2O_3^{2-} \rightarrow S_4O_6^{2-} + I^-$$

D.

$$Cr_2O_7^{2-} + OH^- + I^- \rightarrow 2Cr^{3+} + I_2, I_2 + S_2O_3^{2-} \rightarrow S_4O_6^{2-} + I^-$$

Answer: A

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47. KI and $CuSO_4$ solution when mixed give .

A. $CuI_2 + K_2SO_4$

B. $Cu_2I_2 + K_2SO_4$

C. $K_2SO_4 + Cu_2I_2 + I_2$

D. $K_2SO_4 + CuI_2 + I_2$

Answer: C

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48. The strongest reducing agent is

A. F^-

B. Cl^-

C. Br^-

D. I^-

Answer: D

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49. Which of the following is the strongest oxidising agent ?

A. HOCl

B. $HClO_2$

C. $HClO_3$

D. $HClO_4$

Answer: A

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50. What is the net charge on ferrous ion ?

A. $+2$

B. $+3$

C. $+4$

D. $+5$

Answer: A

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51. The oxidation number of carbon in CH_2Cl_2 is

A. 0

B. 2

C. 3

D. 5

Answer: A

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52. The element which forms oxides in all oxidation states $+1$ to $+5$ is.

A. N

B. P

C. As

D. Sb

Answer: A

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53. For decolourisation of $1\text{mol of}KMnO_4$, the moles of H_2O_2 required is

A. $1/2$

B. $3/2$

C. $5/2$

D. $7/2$

Answer: C

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54. Among the properties (A) reducing(B) oxidising (C) complexing the set of properties shown by CN^{Θ} ion towards metal species is .

A. a,b

B. a,b,c

C. c,a

D. b,c

Answer: C

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55. The number of moles of $KMnO_4$ reduced by $1\text{mol of}KI$ in alkaline medium is

A. one

B. two

C. five

D. one-fifth

Answer: B

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56. In the balanced chemical reaction

$$IO_3^{\ominus} + al^{\ominus} + bH^{\ominus} \rightarrow cH_2O + dI_2$$

a, b, c, and d, respectively, correspond to

A. 5,6,3,3

B. 5,3,6,3

C. 3,5,3,6

D. 5,6,5,5

Answer: A

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57. Which fo the following statements are correct concerning redox propreties ?

(i) The reducing power of hydrogen halides increases from hydrogen chloride to hydrogen iodide.

(ii) The oxidizing power of halogens decreases from chlorine to iodine.

(iii) A metal M for which $E^{\ominus}$ for the half-reaction

$M^{n+} + ne^{-} \Leftrightarrow M$

is very negative will be a good reducing agent.

A. (i),(ii),(iii)

B. (i) and (ii)

C. (i) only

D. (i) and (iii) only

Answer: A

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58. One mole of acidified $K_2Cr_2O_7$ in reaction with excess KI will liberate â€¦â€¦ moles of I_2

A. 6

B. 1

C. 7

D. 3

Answer: D

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59. In the reaction, $As_2S_5 + xHNO_3 \rightarrow 5H_2SO_4 + yNO_2 + 2H_3AsO_4 + 12H_2O.$ The values of x and y are

A. $40, 40$

B. $10, 10$

C. $30, 30$

D. $20, 20$

Answer: A

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60. Oxidation numbers of two Cl atoms in belaching powder, $CaOCl_2$, are

A. Zero

B. $+1$

C. -1

D. $+1, -1$

Answer: D

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61. $Cr_2O_7^{2-} \xrightarrow{H^+} Cr^{3+}$, Eq. wt. of $Cr_2O_7^{2-}$ is :-

A. mol. Wt/6

B. mol. Wt/3

C. mol. Wt/4

D. mol. Wt/1

Answer: A

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62. $KMnO_4$ is a strong oxidising agent in acidic medium. To provide acidic medium H_2SO_4 is used instead of HCl. This is because

A. H_2SO_4 is a stronger acid than HCl

B. HCl is oxidised by $KMnO_4$ to Cl_2

C. H_2SO_4 is a dibasic acid

D. Rate is faster in the presence of H_2SO_4

Answer: B

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63. Which of the following is a set of reducing agents?

A. HNO_3, Fe^{2+}, F_2

B. F, Cl^-, MnO_4^-

C. I^-, Na, Fe^{2+}

D. $CrO_7^{2-}, CrO_4^{2-}, Na$

Answer: C

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64. Which of the following is a redox reaction ?

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

B. $SO_2 + H_2O \rightarrow H_2SO_3$

C. $Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2NaCl$

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

Answer: A

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65. Oxidation number if iodine in IO_3^-, IO_4^-, KI and I_2 respectively are

A. $-1, -1, 0, +1$

B. $+3, +5, +7, 0$

C. $+5, +7, -1, 0$

D. $-1, -5, -1, 0$

Answer: C

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66. MnO_4^- ions are reduced in acidic conditions to Mn^{2+} ions whereas they are reduced in neutral condition to MnO_2. The oxidation of 25 mL of a solution x containing Fe^{2+} ions required in acidic condition 20 mL of a solution y containing MnO_4 ions. What value of solution y would be required to oxidize 25 mL of solution x containing Fe^{2+} ions in neutral condition ?

A. 11.4 mL

B. 12.0 mL

C. 33.3 mL

D. 35.0 mL

Answer: C

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67. Which of the following reactions involve disproportionation ?

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

B. $As_2O_3 + 3H_2S \rightarrow As_2S_3 + 3H_2O$

C. $2KOH + Cl_2 \rightarrow KCl + KOCl + H_2O$

D. $Ca_3P_2 + 6H_2O \rightarrow 3Ca(OH)_3 + 2PH_3$

Answer: C

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68. The reaction $P_4 + 3NaOH + 3H_2O \rightarrow 2NaH_2PO_2 + PH_3$ is an example of

A. Disproportionation reaction

B. Neutralization reaction

C. double decomposition reaction

D. Pyrolytic reaction

Answer: A

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69. Cr_2O_5 has structure as shown

The oxidation number of chromium in the above compound is

A. 4

B. 5

C. 6

D. 10

Answer: C

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70. The oxidation number of S in S_8, S_2F_2, and H_2S, respectively, are

A. $0, +1, -2$

B. $+2, +1$ and -2

C. $0, +1$ and $+2$

D. $-2, +1$ and $+2$

Answer: A

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71. In the following reaction:

$xKMnO_4 + yNH_3 \rightarrow KNO_3 + MnO_2 + KOH + H_2O$

x and y are

A. $x = 4, y = 6$

B. $x = 3, y = 8$

C. $x = 8, y = 6$

D. $x = 8, y = 3$

Answer: D

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72. The brown ring complex compound of iron is formulated as $\left[Fe(H_2O)_5(NO)\right]SO_4$. The oxidation state of iron is

A. $+3$

B. 0

C. $+2$

D. $+1$

Answer: C

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73. The equivalent mass of potassium permanganate in alkaline medium is

A. Molar mass/5

B. Molar mass/3

C. Molar mass/2

D. Molar mass/1

Answer: D

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74. In which of the following reactions, there is no change in valency ?

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

B. $2Na + O_2 \rightarrow 2Na_2O_2$

C. $Na_2O_2 + H_2SO_4 \rightarrow Na_2SO_4 + H_2O_2$

D. $3KClO_3 \rightarrow 3KClO_4 + KCl$

Answer: C

Watch Video Solution

75. In the balanced chemical reaction

$$IO_3^{\ominus} + al^{\ominus} + bH^{\ominus} \rightarrow cH_2O + dI_2$$

a, b, c, and d, respectively, correspond to

A. 5,6,3,3

B. 5,3,6,3

C. 3,5,3,6

D. 5,6,5,5

Answer: A

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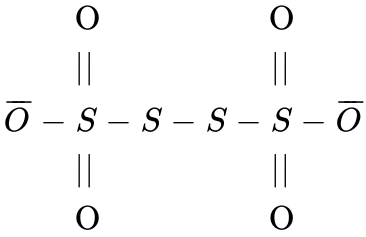
76. The oxidation states of S atoms in $S_2O_6^{2-}$ from left to right respectively are



A. $+6, 0, 0, +6$

B. $+3, +1, +1, +3$

C. $+5, 0, 0, +5$

D. $+4, +1, +1, +4$

Answer: C

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77. Small quantities of compounds TX, TY and TZ are put into separate test tubes containing X, Y and Z solutions. TX does not react with any of

these. TY reacts with both X and Z. TZ reacts only with X. The decreasing order of ease of oxidation of the anions X^-, Y^- and Z^- is

A. Y^-, Z^-, X^-

B. Z^-, X^-, Y^-

C. Y^-, X^-, Z^-

D. X^-, Z^-, Y^-

Answer: A

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78. The oxidation number of sulphur in $H_2SO_4, H_2S_2O_4$ and $H_2S_2O_6$ are respectively

A. $+3, +4, +5$

B. $+5, +4, +3$

C. $+6, +3, +5$

D. $+3,\ +5,\ +4$

Answer: C

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79. Which of the following has//have been arranged in order of decreasing oxidation number of sulphur?

A. $Na_2S_4O_6 > H_2S_2O_7 > Na_2S_2O_3 > S_8$

B. $H_2SO_4 > SO_2 > H_2S > H_2S_2O_8$

C. $SO_2 > SO_4^{2-} > SO_3^{2-} > HSO_4^-$

D. $H_2SO_5 > H_2SO_3 > SCl_2 > H_2S$

Answer: D

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80. Which of the following species can functon as an oxidising as well as reducing agent ?

A. Cl^-

B. ClO_4^-

C. ClO^-

D. MnO_4^-

Answer: C

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81. Oxidation no. of P in $H_4P_2O_5$, $H_4P_2O_6$, and $H_4P_2O_7$ are respectively

A. $+3,\ +5,\ +4$

B. $+5,\ +3,\ +4$

C. $+5,\ +4,\ +3$

D. $+3,\ +4,\ +5$

Answer: D

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82. The oxidation state of chrominium in the final product formed in the reaction between KI and acidified potassium dichromate soluttion is

A. $+3$

B. $+2$

C. $+6$

D. $+4$

Answer: A

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83. Acidified $K_2Cr_2O_7$, solution turns green when Na_2SO_3 is added to it. Thus is due to the formation of

A. $Cr_2(SO_4)_3$

B. CrO_4^{2-}

C. $Cr_2(SO_3)_3$

D. $CrSO_4$

Answer: A

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84. In which of the following compounds, carbon exhibits a valency of four but oxidation state of -2 ?

A. CH_3Cl

B. $CHCl_3$

C. CH_2Cl_2

D. $HCHO$

Answer: A

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85. In the disproportionation $3HClO_3 \rightarrow HClO_4 + Cl_2 + 2O_2 + H_2O$ the equivalent mass of the oxidising agent is (molar mass of $HClO_4 = 84.45$)

A. 16.89

B. 32.22

C. 84.45

D. 28.15

Answer: A

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86. If the molecular mass of $Na_2S_2O_3$ and I_2 are M_1 and M_2 respectively, then what will be the equivalent mass of $Na_2S_2O_3$ and I_2 in

the following reaction

$2S_2O_3^{2-} + I_2 \rightarrow S_2O_6^{2-} + I$

A. M_1, M_2

B. $M_1, M_2/2$

C. $2M_1, M_2$

D. $M_1, 2M_2$

Answer: B

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87. Which ordering of compounds is according to the decreasing order of the oxidation state of nitrogen ?

A. HNO_3, NO, NH_4Cl, N_2

B. HNO_3, NO, N_2, NH_4Cl

C. HNO_3, NH_4Cl, NO, N_2

D. NO, HNO_3, NH_4Cl, N_2

Answer: B

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88. 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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89. When Cl_2 gas reacts with hot and concentrated sodium hydroxide solution, the oxidation number of chlorine changes from

A. Zero to +1 and zero to 5

B. Zero to -1 and zero to +5

C. Zero to -1 and zero to +3

D. Zero to +1 and zero to -3

Answer: B

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90. The reaction of white phosphorus with aqueous $NaOH$ gives phosphine along with another phosphorus containing compound. The reaction type, the oxidation states of phosphorus in phosphine and the other product are respectively :

A. redox reaction, -3 and -5

B. redox reaction, $+3$ and $+5$

C. disproportionation reaction, -3 and -1

D. disproportionation reaction, -3 and $+3$

Answer: C

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91. What is the oxidation state of $Co\left[Co(H_2O)_5Cl\right]^{2+}$?

A. $+2$

B. $+3$

C. $+1$

D. $+4$

Answer: C

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92. Consider the following reaction

$$xMnO_4^- + C_2O_4^{2-} + zH^+ \rightarrow xMn^{2+} + 2yCO_2 + \frac{z}{2}H_2O$$

The value of x, y and z in the reaction are respectively

A. 5,2 and 8

B. 5,2 and 6

C. 2,5 and 8

D. 2,5 and 6

Answer: D

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Selected Straight

1. Which of the following reactions is (are) not redox reaction (s) ?

A. $NH_3Cl + KOH \rightarrow NH_3 + H_2O + KCl$

B. $4KCN + Fe(CN)_2 \rightarrow K_4[Fe(CN)_6]$

C. $2Rb + 2H_2O \rightarrow 2RbOH + H_2$

D. $2CuI_2 \rightarrow 2CuI + I_2$

Answer: A::B

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2. Which of the following act both as an oxidising as well as reducing agent ?

A. H_2O_2

B. H_2S

C. SO_2

D. HNO_2

Answer: A::C::D

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3. Which of the following reactions is (are) redox reactions ?

A. $6CO_2 + 6H_2O \xrightarrow{\text{Sun light}} C_6H_{12}O_6 + 6O_2$

B. $KCN + AgCN \rightarrow K\left[Ag(CN)_2\right]$

C. $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

D. $BaCl_2 + H_2SO_4 \rightarrow BaSO_4 + 2HCl$

Answer: A::C

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4. A reducing agent in a redox reaction undergoes

A. a decrease in oxidation number

B. an increase in oxidation number

C. loss of electrons

D. gain of electrons

Answer: B::C

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5. When Cl_2 is passed through NaOH in cold, the oxidation number of Cl changes from

A. 0 to -1

B. 0 to +1

C. 0 to -2

D. 0 to +2

Answer: A::B

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6. Oxidation number of carbon is correctly given for

A. Compound O.N.
$HN \equiv C$ $+2$

B. Compound O.N.
$H - C \equiv N$ $+4$

C. Compound O.N.
CCl_4 $+4$

D. Compound O.N.
$C_6H_{12}O_6$ 0

Answer: C::D

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7. The oxidation state of Cr in CrO_5 is:

A. $+10$

B. $+8$

C. $+6$

D. $+4$

Answer: C

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8. Oxidation number of sulphur in $Na_2S_2O_3$ is

A. $+2$

B. -2

C. $+6$

D. Both B and C

Answer: D

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9. The oxidation state of Fe in Fe_3O_4 is :

A. $+2$

B. $+8/3$

C. $+3$

D. Both A and C

Answer: D

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10. Oxidation number of N and HN_3 is

A. $+3$

B. -3

C. $+1/3$

D. $-1/3$

Answer: D

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11. Oxidation state of O in KO_2 is

A. -2

B. 0

C. $+2$

D. None of these

Answer: D

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12. Oxidation number of S in KCNS is

A. -2

B. $+2$

C. 0

D. None of these

Answer: C

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13. Oxidation numbers of Mn in K_2MnO_4 and $MnSO_4$ are respectively

A. $+5$

B. $+7$

C. $+4$

D. $+2$

Answer: D

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14. The oxidation number of C in CH_2O is

A. -2

B. $+2$

C. 0

D. $+4$

Answer: C

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15. The brown ring complex compound of iron is formulated as $\left[Fe(H_2O)_5(NO)\right]SO_4$. The oxidation state of iron is

A. 1

B. 2

C. 3

D. 0

Answer: B::C

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16. 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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17. White P reacts with caustic soda, the products are PH_3 and NaH_2PO_2. This reaction is an example of:

A. oxidation

B. reduction

C. disproportionation

D. neutralisation

Answer: C

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18. The oxidation states of the most electronegative elements in the products of the reaction between BaO_2 and H_2SO_4 are

A. 0 and -1

B. -1 and -2

C. -2 and 0

D. -2 and $+1$

Answer: B::C

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19. For the redox reaction

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

the correct coefficients of the reactions for the balanced reaction are

A.

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

B.

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

C.

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

D.

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

Answer: A

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20. In the reaction

$$3Br_2 + 6CO_3^{2-} + 3H_2O \rightarrow 5Br^{\ominus} + BrO_3^{\ominus} + 6HCO_3^{\ominus}$$

A. Bromine is oxidised and carbonate is reduced

B. Bromine is reduced and water is oxidised

C. Bromine is neither reduced not oxidised

D. Bromine is both reduced and oxidised

Answer: D

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21. The oxidation number of sulphur in S_8, S_2F_2, H_2S and H_2SO_4 respectively are:

A. $0, +1, -2$ and 6

B. $+2, 0, +2$ and 6

C. $0, +1, +2$ and $+4$

D. $-2, 0, -2$ and 6

Answer: A

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22. Among these, identify the species with an atom in $+6$ oxidation state :

A. MnO_4^-

B. $Cr(CN)_6^{3-}$

C. NiF_6^{2-}

D. CrO_2Cl_2

Answer: D

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23. The reaction

$3ClO^{\ominus}(aq) \rightarrow ClO_3(aq) + 2Cl^{\ominus}(aq)$

is an example of

A. Oxidation reaction

B. Reduction reaction

C. disproportionation reaction

D. decomposition reaction

Answer: C

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24. In the standardization of $Na_2S_2O_3$ using $K_2Cr_2O_7$ by iodometry, th equivalent weight of $K_2Cr_2O_7$ is

A. (molecular weight)/2

B. (molecular weight)/6

C. (molecular weight)/3

D. same as molecular weight

Answer: B

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25. The pair of the compounds in which both the metals are in the highest possible oxidation state is

A. $\left[Fe(CN)_6\right]^{3-}, \left[Co(CN)_6\right]^{3-}$

B. CrO_2Cl_2, MnO_4^-

C. TiO_3, MnO_2

D. $\left[Co(CN)_6\right]^{3-}, MnO_2$

Answer: B::C

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26. Which of the following chemical reactions depicts the oxidizing behaviour of H_2SO_4 ?

A. $NaCl + H_2SO_4 \rightarrow NaHSO_4 + HCl$

B. $2PCl_5 + H_2SO_4 \rightarrow 2POCl_3 + 2HCl + SO_2Cl_2$

C. $2HI + H_2SO_4 \rightarrow I_2 + SO_2 + 2H_2O$

D. $Ca(OH)_2 + H_2SO_4 \rightarrow CaSO_4 + 2H_2O$

Answer: C

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27. What products are expected from the desproprtionation reactin of hypochorous acid ?

A. HCl and Cl_2O

B. HCl and $HClO_3$

C. $HClO_3$ and Cl_2O

D. $HClO_2$ and $HClO_4$

Answer: B::C

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28. The products formed when an aqueous solution of $NaBr$ is electrolysed in a cell having inert electrodes are :

A. Na and Br_2

B. Na and O_2

C. $H_2, Br_2, NaOH$

D. H_2 and O_2

Answer: C

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29. Consider a titration of potassium dichromate solution with acidified Mohr's salt solution using diphenylamine as indicator. The number of moles of Mohr's salt required per mole of dichromate is:

A. 3

B. 4

C. 5

D. 6

Answer: D

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30. Amount of oxalic acid present in a solution can be determined by its titration with $KMnO_4$ solution in the presence of H_2SO_4. The titration gives unsatisfactory result when carried out in the presence of HCl because HCl

A. oxidizes oxalic acid to carbon dioxide and water

B. gets oxidized by oxalic acid to chlorine

C. furnishes H^+ ions in addition to those from oxalic acid

D. reduces permanganate to Mn^{2+}

Answer: D

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31. Number of moles of MnO_4^- required to oxidise one mole of ferrous oxalate completely in acidic medium will be

A. 7.5 mol

B. 0.2 mol

C. 0.6 mol

D. 0.4 mol

Answer: C

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32. Oxidation state of P in $H_4P_2O_5$, $H_4P_2O_6$, $H_4P_2O_7$ are respectively

A. $+3,\ +5,\ +4$

B. $+5,\ +3+4$

C. $+5,\ +4,\ +3$

D. $+3,\ +4,\ +5$

Answer: D

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Linked Comprehension

1. Redox reactions involve simultaneous reduction-oxidation reactions. The process of oxidation involves addition of oxygen or any other electronegative element or loss of hydrogen or any other electropositive element. The reverse of this process is called reduction. Reduction also involves addition of electrons or decrease in the oxidation number an atom or ion present in a substance. Substances which bring about oxidation of other substances are called oxidants while those which bring about the reduction of other substances are called reductants. In terms of electronic concept, reductants. In terms of electronic concept, reductants are electron donors while oxidants are electron acceptors. Oxidants also involve decrease in oxidation number of one of its atoms/ions while reductants involve increase in the oxidation number of one of its atoms/ions.

Oxidation numbers are always while numbers and must be always calculated on the basis of their structures and never from their molecular

formulae. Redox reactants may involve combination of atoms/molecules, decomposition of substances, displacement of metals of non metals and disproportionation of a particular species which may be metals, non-metals or ions. Redox reactions can be balanced both by oxidation number method as well as by ion electron method.

From the reaction $M^{x+} + MnO_4^- \rightarrow MO_3^- + Mn^{2+} + 1/2O_2$ If one mole of MnO_4^- oxidizes 1.67 moles of M^{x+} to MO_3^-, then the value of x in the reaction is

A. 5

B. 3

C. 2

D. 0

Answer: C

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2. Redox reactions involve simultaneous reduction-oxidation reactions. The process of oxidation involves addition of oxygen or any other electronegative element or loss of hydrogen or any other electropositive element. The reverse of this process is called reduction. Reduction also involves addition of electrons or decrease in the oxidation number an atom or ion present in a substance. Substances which bring about oxidation of other substances are called oxidants while those which bring about the reduction of other substances are called reductants. In terms of electronic concept, reductants. In terms of electronic concept, reductants are electron donors while oxidants are electron acceptors. Oxidants also involve decrease in oxidation number of one of its atoms/ions while reductants involve increase in the oxidation number of one of its atoms/ions.

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metals or ions. Redox reactions can be balanced both by oxidation number method as well as by ion electron method.

For the redox reaction $xMnO_4^- + yC_2O_4^{2-} + zH^+ \rightarrow x, y \text{ and } z$ are

A. $2 \quad 5 \quad 16$

B. $16 \quad 5 \quad 2$

C. $5 \quad 16 \quad 2$

D. $2 \quad 16 \quad 5$

Answer: A

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3. Redox reactions involve simultaneous reduction-oxidation reactions. The process of oxidation involves addition of oxygen or any other electronegative element or loss of hydrogen or any other electropositive element. The reverse of this process is called reduction. Reduction also involves addition of electrons or decrease in the oxidation number an atom or ion present in a substance. Substances which bring about

oxidation of other substances are called oxidants while those which bring about the reduction of other substances are called reductants. In terms of electronic concept, reductants. In terms of electronic concept, reductants are electron donors while oxidants are electron acceptors. Oxidants also involve decrease in oxidation number of one of its atoms/ions while reductants involve increase in the oxidation number of one of its atoms/ions.

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A mole of N_2H_4 loses 10 moles of electrons to forn a new compound Y. Assuming that all the nitrogen appears in the new compound, what is the oxidation rate of nitrogen in Y ?

(There is no change in the oxidation number of hydrogen)

A. -1

B. -3

C. $+3$

D. $+5$

Answer: C

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4. Redox reactions involve simultaneous reduction-oxidation reactions. The process of oxidation involves addition of oxygen or any other electronegative element or loss of hydrogen or any other electropositive element. The reverse of this process is called reduction. Reduction also involves addition of electrons or decrease in the oxidation number an atom or ion present in a substance. Substances which bring about oxidation of other substances are called oxidants while those which bring about the reduction of other substances are called reductants. In terms of electronic concept, reductants. In terms of electronic concept, reductants are electron donors while oxidants are electron acceptors.

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Oxidation numbers are always while numbers and must be always calculated on the basis of their structures and never from their molecular formulae. Redox reactants may involve combination of atoms/molecules, decomposition of substances, displacement of metals of non metals and disproportionation of a particular species which may be metals, non-metals or ions. Redox reactions can be balanced both by oxidation number method as well as by ion electron method.

When copper is treated with a certain concentration of nitric acid, nitric oxide and nitrogen dioxide are liberated in equal volumes according to the equation $xCu + uHNO_3 \rightarrow Cu(NO_3)_2 + NO + NO_2 + H_2O$. The coefficients of x and y are

A. 2 and 3

B. 2 and 6

C. 1 and 3

D. 3 and 8

Answer: B

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5. Redox reactions involve simultaneous reduction-oxidation reactions. The process of oxidation involves addition of oxygen or any other electronegative element or loss of hydrogen or any other electropositive element. The reverse of this process is called reduction. Reduction also involves addition of electrons or decrease in the oxidation number an atom or ion present in a substance. Substances which bring about oxidation of other substances are called oxidants while those which bring about the reduction of other substances are called reductants. In terms of electronic concept, reductants. In terms of electronic concept, reductants are electron donors while oxidants are electron acceptors. Oxidants also involve decrease in oxidation number of one of its atoms/ions while reductants involve increase in the oxidation number of one of its atoms/ions.

Oxidation numbers are always while numbers and must be always calculated on the basis of their structures and never from their molecular

formulae. Redox reactants may involve combination of atoms/molecules, decomposition of substances, displacement of metals of non metals and disproportionation of a particular species which may be metals, non-metals or ions. Redox reactions can be balanced both by oxidation number method as well as by ion electron method.

In the reaction $3Br_2 + 6CO_3^{2-} + 3H_2O \rightarrow 5Br^- + BrO_3^- + 6HCO_3^-$.

A. Bromine is oxidized and carbonate is reduced

B. Bromine is reduced and water is oxidized

C. Bromine is neither reduced nor oxidized

D. Bromine is both reduced and oxidized

Answer: D

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6. Redox reactions involve simultaneous reduction-oxidation reactions. The process of oxidation involves addition of oxygen or any other electronegative element or loss of hydrogen or any other electropositive

element. The reverse of this process is called reduction. Reduction also involves addition of electrons or decrease in the oxidation number an atom or ion present in a substance. Substances which bring about oxidation of other substances are called oxidants while those which bring about the reduction of other substances are called reductants. In terms of electronic concept, reductants. In terms of electronic concept, reductants are electron donors while oxidants are electron acceptors. Oxidants also involve decrease in oxidation number of one of its atoms/ions while reductants involve increase in the oxidation number of one of its atoms/ions.

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A compound contains atoms of three elements A, B and C. If the oxidation

number of A is $+2$, B is +5 and that of C is -2 the possible formula of the compound is

A. $A_3(BC_4)_2$

B. $A_3(B_4C)_2$

C. ABC_2

D. $A_3(BC_3)_2$

Answer: A

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7. Redox reactions involve simultaneous reduction-oxidation reactions. The process of oxidation involves addition of oxygen or any other electronegative element or loss of hydrogen or any other electropositive element. The reverse of this process is called reduction. Reduction also involves addition of electrons or decrease in the oxidation number an atom or ion present in a substance. Substances which bring about oxidation of other substances are called oxidants while those which bring

about the reduction of other substances are called reductants. In terms of electronic concept, reductants. In terms of electronic concept, reductants are electron donors while oxidants are electron acceptors. Oxidants also involve decrease in oxidation number of one of its atoms/ions while reductants involve increase in the oxidation number of one of its atoms/ions.

Oxidation numbers are always while numbers and must be always calculated on the basis of their structures and never from their molecular formulae. Redox reactants may involve combination of atoms/molecules, decomposition of substances, displacement of metals of non metals and disproportionation of a particular species which may be metals, non-metals or ions. Redox reactions can be balanced both by oxidation number method as well as by ion electron method.

Amongst the following, identify the species with an atom in +6 oxidation state

A. MnO_6^-

B. $Cr(CN)_6^{3-}$

C. MnF_6^{2-}

D. CrO_2Cl_2

Answer: D

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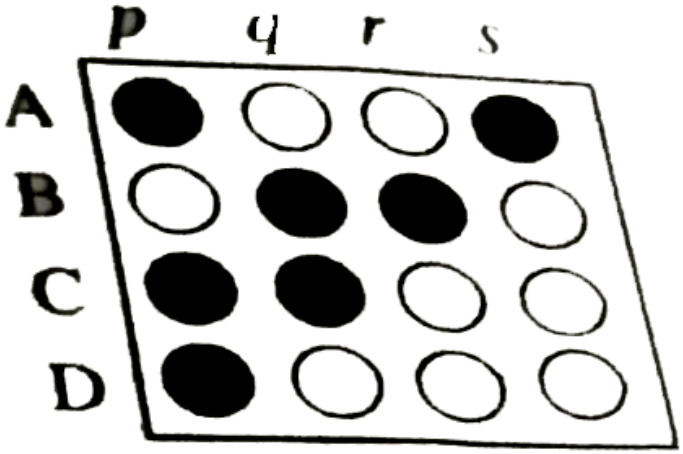
Matrix

1. Here, each question contains statements given in two columns which have to be matched.

Statements in column I are labelled as A,B, C, and D whereas in column II are labelled as p,q,r and s.

The answers to these questions are to be appropriately bubbled as illustrated in the following example.

If the correct matches are A-p, A-s, B-q, B-r, C-p, C-q and D-p, then correctly labelled 4×4 matrix looks like



	Column-I		Column-II
A.	$CuSO_4 + Zn \rightarrow Cu + ZnSO_4$	$p.$	Non-metal displacem
B.	$2KClO_3 \rightarrow KCl + 3O_2$	$q.$	Disproportionation r
C.	$3Cl_2 + 6KOH \rightarrow 5Cl^- + ClO_3^- + 3H_2O$	$r.$	Decomposition reacti
D.	$Cl_2 + 2KCl \rightarrow 2KCl + I_2$	$s.$	Redox reaction

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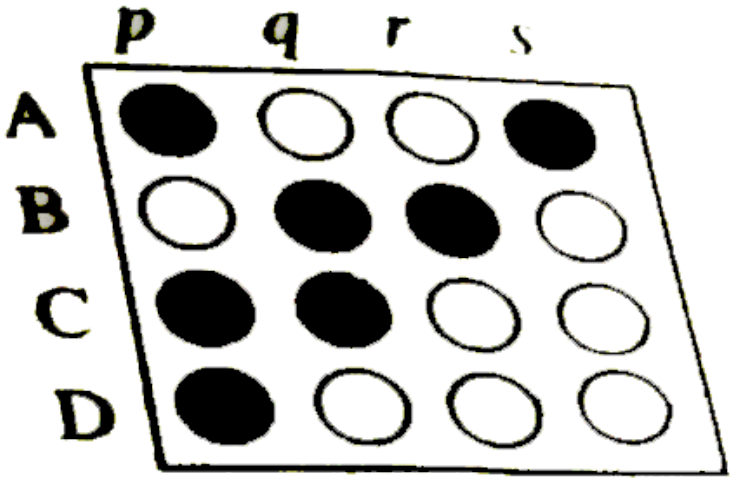
2. Here, each question contains statements given in two columns which have to be matched.

Statements in column I are labelled as A,B, C, and D whereas in column II are labelled as p,q,r and s.

The answers to these questions are to be appropriately bubbled as illustrated in the following example.

If the correct matches are A-p, A-s, B-q, B-r, C-p, C-q and D-p, then correctly labelled 4×4 matrix looks like



	Column-I		Column-II
(A)	I	$p.$	zero oxidation state
(B)	$KMnO_4$	$q.$	Reducing agent
(C)	H_2O_2	$r.$	Oxidizing agent
(D)	$M(CO)_4$	$s.$	Oxidizing as well as reducing agent

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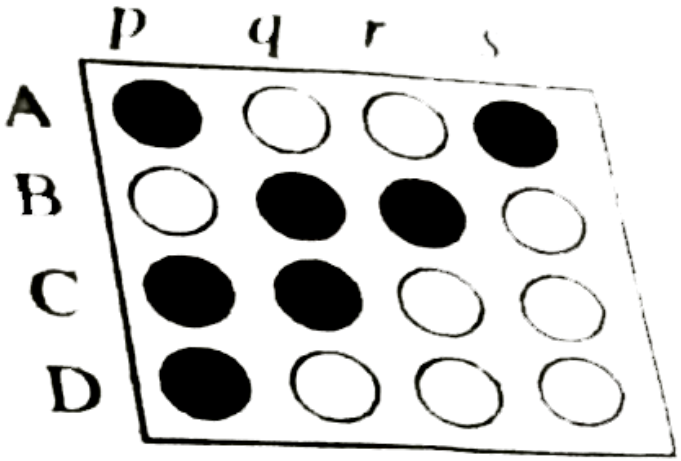
3. Here, each question contains statements given in two columns which have to be matched.

Statements in column I are labelled as A,B, C, and D whereas in column II

are labelled as p,q,r and s.

The answers to these questions are to be appropriately bubbled as illustrated in the following example.

If the correct matches are A-p, A-s, B-q, B-r, C-p, C-q and D-p, then correctly labelled 4×4 matrix looks like



	Column-I		Column-II
(A)	H_2S	$p.$	Oxidising as well a
(B)	SO_2	$q.$	reducing agent
(C)	P_4	$r.$	zero oxidation stat
(D)	$6OH^- + 3Br_2 \rightarrow 5Br^- + BrO_3^- + 3H_2O$	$s.$	This proportionati

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Integer

1. The difference in the oxidation numbers of two types of sulphul atoms in $Na_2S_4O_6$ is.....

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2. Reaction of Br_2 with Na_2CO_3 in aqueous solution given sodium bromide and sodium bromate with evolution of CO_2 gas. The number of sodium bromide molecules involved in the balanced chemical equation is

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3. The value of n in the molecular formula $Be_nAl_2SiO_{18}$ is .....

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4. Among the following, what is the number of elements showing only one non-zero oxidation state?

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Assertion And Reason

1. Assertion: Nitrous acid (HNO_2) may act as an oxidising as well as a reducing agent.

Reason: The oxidation number of nitrogen remains same in all the compounds.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation A

C. A is true but R is false

D. A is false but R is true

Answer: C

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2. Assertion : The reaction of ammonia solution with calomel is a disproportionation reaction in which a mixture Hg(II) amido chloride and mercury are formed

Reason : In a disproportionation reaction species under reaction is neither oxidised nor reduced.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation A

C. A is true but R is false

D. A is false but R is true

Answer: C

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3. Assertion : When $SnCl_2$ solution is added to $HgCl_2$ solution, a milky white precipitate is obtained and on adding excess $SnCl_2$, a black

precipitate is formed.

Reason : The disproportionation if Hg(II) is easier than its reduction only.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation A

C. A is true but R is false

D. A is false but R is true

Answer: A

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4. Assertion(A) : The oxidation numbers are artificial, they are useful as a book keeping device of elements in reactions

Reason(R) : The oxidation numbers do not usually represent real charge on atoms, they are simply conventions that indicate what the maximum charge could possibly be on an atom in a molecule.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation A

C. A is true but R is false

D. A is false but R is true

Answer: A

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5. Assertion : In the reaction $Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)Cu^{2+}$ ions acts as oxidising agent and Zn atoms act as a reducing agent

Reason : A substance (atom, ion, or molecule) which readily gain electrons from other substances is an oxidising agent while reducing agent is a substance (atom, ion or molecule) which can lose electrons to other substances.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation A

C. A is true but R is false

D. A is false but R is true

Answer: A

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6. Assertion : $Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$ can be split into following two half reactions $\underset{\text{(oxidation half reaction)}}{Zn(s) \rightarrow Zn^{2+} + 2e^-}$

Reason : Every redox reaction can be split into two reactions, one representing loss of electrons and the other representing gain of electrons.

$\underset{\text{(reduction half reaction)}}{Cu^{2+}(aq) + 2e^- \rightarrow Cu(s)}$

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation A

C. A is true but R is false

D. A is false but R is true

Answer: A

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7. Assertion(A): $\overset{+1-2}{H_2S} + \overset{0}{Cl_2} \rightarrow \overset{+1-1}{2HCl} + \overset{0}{S}$

In the above reaction, Cl has been oxidised to Cl^- while S^{2-} has been reduced to S.

Reason(R): In a reaction the element whose oxidation number decreases is reduced and element whose oxidation number increases is oxidised.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct explanation A

C. A is true but R is false

D. A is false but R is true

Answer: D

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Ultimate Preparation

1. When copper is treated with a certain concentration of nitric acid, nitric oxide and nitrogen dioxide are liberated in equal volumes according to the equation

$xCu + yHNO_3 \rightarrow Cu(NO_3)_2 + NO + NO_2 + H_2O$

The coefficients x and y are

A. 2 and 3

B. 2 and 6

C. 1 and 3

D. 3 and 8

Answer: B

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2. For the reaction

$M^{x+} + MnO_4^- \rightarrow MO_3^- + Mn^{2+} + (1/2)O_2$

if $1\text{mol of} MnO_4^-$ oxidises $1.67\text{mol of} M^{x+} \text{to} MO_3^-$, then the value of x in the reaction is

A. 5

B. 3

C. 2

D. 1

Answer: C

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3. The number of electrons involved in the reduction of nitrate $\left(NO_3^{\ominus}\right)$ to hydrazine (N_2H_4) is

A. 8

B. 7

C. 5

D. 3

Answer: B

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4. The oxidation number of S in $Na_2S_4O_6$ is

A. $+2.5$

B. $+2 \text{ and } +3$ (two S have +2 and other two have +3)

C. $+2 \text{ and } +3$ (three S have +2 and one S has +3)

D. $+5 \text{ and } 0$ (two S have +5 and the other two have 0)

Answer: D

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5. A compound of Xe and F is found to have 53.5% Xe. What is the oxidation number of Xe in this comound?

A. $+2$

B. 0

C. $+4$

D. $+6$

Answer: D

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6. The number of moles of $KMnO_4$ required to oxidise $1mol$ of $Fe(C_2O_4)$ in acidic medium is

A. 0.6

B. 1.67

C. 0.2

D. 0.4

Answer: A

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7. In a reaction, 4 mole of electrons are transferred to 1 mole of HNO_3, the possible product obtained due to reduction is:

A. 0.5 mole of N_2

B. 0.5 mole of N_2O

C. 1 mole of NO_2

D. 1 mole of NH_3

Answer: B

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8. If equal volumes of 1 M $KMnO_4$ and 1M $K_2Cr_2O_7$ solutions are allowed to oxidise Fe(II) to Fe(III) in acidic medium, then Fe(II) oxidised will be

A. more by $KMnO_4$

B. more by $K_2Cr_2O_7$

C. equal in both the cases

D. can't be determined

Answer: B

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9. Equivalent weight of MnO_4^- in acidic, neutral and basic media are in ratio of:

A. $3:5:15$

B. $5:3:1$

C. $5:1:3$

D. $3:5:5$

Answer: D

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