CHEMISTRY

FOR IIT JEE ASPIRANTS OF CLASS 11 FOR CHEMISTRY

REDOX REACTION

Example

1. Which compound amongst the following gas the highest oxidation number of Mn?

$KMnO_4, K_2MnO_2, MnO_2$ and Mn_2O_3

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2. Calculate the oxidation number of N in NOCl, NH_4^+ and NO_3^-

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3. What is the oxidation number of nitrogen in HNO_3, HNO_2, NO, N_2O and N_2?

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4. One mole of N_2H_4 loses ten moles of electrons of form a new compound Y. Assuming that all the nitrogen appears in the new compound, what is the oxidation state of nitrogen in Y ? (There is no change in the oxidation state of hydrogen.)

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5. An element A in a compound ABD has oxidation number A^{n-}. It is oxidised by $Cr_2O_7^{2-}$ in acid medium. In the experiment

1.68×10^{-3} moles of $K_2Cr_2O_7$ were used for 3.26×10^{-3} moles of ABD. The new oxidation number of A after oxidation is:

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6. Arrange the following in order of:

(a) Increasing oxidation no:

$MnCl_2, MnO_2, Mn(OH)_3, KMnO_4$

(b) Decreasing oxidation no:

HXO_4, HXO_3, HXO_2, HXO

(c) Increasing oxidation no.: I_2, HI, HIO_4, ICI

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7. $FeCr_2O_4 + Na_2CO_3 + O_2 \rightarrow Fe_2O_3 \downarrow + Na_2CrO_4$

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8. $AgI \downarrow + 2Na_2S_2O_3 \rightarrow Na_3\left[Ag(S_2O_3)_2\right] + NaI$

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9. Which of the following reactions is a redox reaction?

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

(b).$Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2NaCl$

(c).$SO_2 + H_2O \rightarrow H_2SO_4$

(d).$2CuSO_4 + 4KI \rightarrow Cu_2I_2 + 2K_2SO_4 + I_2$

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10. Explain why HNO_3 acts only as oxidising agent while HNO_2 can act both as a reducing agent and an oxiding agent?

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11. Balance the equation by oxidation number method

$$Mg + HNO_3 \rightarrow Mg(NO_3)_2 + N_2O + H_2O$$

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12. $Fe^{2+}(aq.) + Cr_2O_7^{2-} + H^+ \rightarrow Fe^{3+}(aq.) + Cr^{3+}$

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13. Balance the ionic equation in alkaline medium

$$Cr(OH)_3 + IO_3^- \rightarrow I^- + CrO_4^{2-}$$

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14. Balance the net equtation fro th reaction of potassium dichromate (VI), $K_2Cr_2O_7$, with sodium sulphite, Na_2SO_3, in an

acid solution to give chromium (III) ion and and sulphate ion.

Strategy : Follow the seven -step proceduce , one step at a time.

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15. In the equation

$$xP + HNO_3 \rightarrow HPO_3 + yNO + H_2O$$

A. x=5,y=5

B. x=5, y=3

C. x=3, y=5

D. x=3, y=3

Answer:

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16. Balance the redox reaction by half reaction method :

$Br_2 + H_2O_2 \rightarrow BrO_3^- + H_2O$ (in acidic medium)

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17. In passing chlorine gas through a concentrated solution of alkali we get chloride and chlorate ions Obtain balanced chemical equation for this reaction.

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18. Balance the equation by ion electron method

$MnO_4^- + Br^- \rightarrow Mn^{2+} + Br_2$ (acidic medium)

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19. Balance the following equation

$xH_2S + yHNO_3 \rightarrow zNO + \omega S + H_2O$

The coefficients ω, x, y, z are

(1) x=3, y=2, z=2, $\omega = 3$

(2) x=2, y=2, z=3, $\omega = 3$

(3) x=3, y=3, z=2, $\omega = 3$

(4) x=3, y=2, z=3, $\omega = 3$

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20. Balance the following equation by the oxidatoin number method.

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

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21. $20mL0.2MMnSO_4$ are completely oxidised by $16mL$ of $KMnO_4$ of unknown normality each forming Mn^{4+} oxidation state. The normality and molarity of $KMnO_4$ are respectively:

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22. $KMnO_4$ solution is to be standardised by titration against $As_2O_3(s)$. A 0.1097 g sample of As_2O_3 requires 26.10 mL of the $KMnO_4$ solution for its titration. What are the molarity and normality of the $KMnO_4$ solution (Mol. Wt. of As=75)

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23. 5.5 g of a mixutre of $FeSO_{4.7}H_2O$ and $Fe_2(SO_4)_{3.9}H_2O$ requires 5.4 " mL of " $0.1NKMnO_4$ solution for complete

oxidation. Calculate the number of gram moles of hydrated ferric sulphate in the mixture.

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24. $0.56g$ of lime stone was treated with oxalic acid to give CaC_2O_4. The precipitate decolorized $45ml$ of $0.2NKMnO_4$ in acid medium. Calculate $\%$ of CaO in lime stone.

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25. What is the weight of sodium bromate and molarity of solution to prepare $85.5mL$ of $0.672N$ solution when half cell reaction are:

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

(ii) $2BrO_3^- + 12H^+ + 10e^- \rightarrow Br_2 + 6H_2O$

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26. Br_2 undergoes disproportionation reaction in basic medium to give $Br^{\ominus}$ ion and $BrO_3^{\ominus}$ (bromate) ion in reduction and oxidation reaction.

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27. P_4 undergoes disproportionation in basic medium to give PH_3 (phosphine) and $H_2PO_2^{\ominus}$ (dihydrogen hypophoshite ion). Atomic weight of P is 31.

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28. 1.0 g of a metal oxide gave 0.2 g of metal. Calculate the equivalent weight of the metal.

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29. 3.0 g of metal chloride gave 2.0 g of metal. Calculate the equivalent weight of the metal.

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30. 1.0 g of metal nitrate gave 0.86 g of metal sulphate. Calculate the equivalent weight of metal.

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31. Calculate E^0_{cell} of given electrochemical cell:

$Zn(s) + Cu^{2+} \rightarrow Zn^{2+}(aq) + Cu(s)$

Given : $E^0_{Zn^{2+}/Zn} = -0.76V$

$E^0_{Cu^{2+}/Cu} = 0.34V$

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32. Calculate E_{cell} of given electrochemical cell

$Zn(S) + Pb^{2+} \rightarrow Pb(s) + Zn^{2+}$

Given $E^0_{Zn^2/Zn} = -0.76V$, $E^0_{Pb^{2+}/Pb} = -0.12V$

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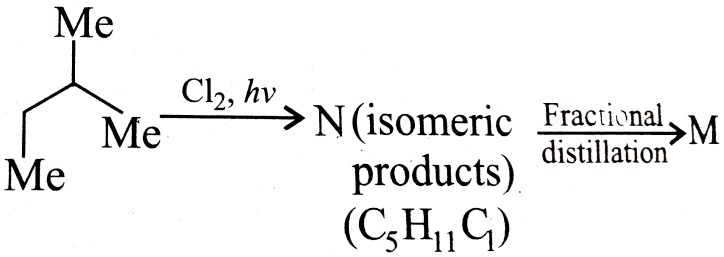
Evaluate Yourself 1

12



1.

The value of N and M are:

A. 5

B. 4

C. 3

D. 2

Answer: A

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2. The oxidation state of underlined in compound Ba_2XeO_2

A. 0

B. $+8$

C. $+6$

D. 5

Answer: A

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3. The oxidation state of underlined in compound $\underline{V}_2O_7^{2-}$

A. 0

B. $+8$

C. $+6$

D. 5

Answer: C

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Evaluate Yourself 2

1. Oxidation is a process of

A. loss of electron

B. gain of electron

C. increase in the negative valency

D. decrease in the positive valency

Answer: A

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2. 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. $Cl_2 + H_2O \rightarrow 2HCl + O_2$

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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3. 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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Evaluate Yourself 3

1. $I_2 + NaOH \rightarrow NaI + NaOI$

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

B. $2I_2 + 6NaOH \rightarrow NaIO_3 + 5NaI + 3H_2O$

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

D. $4I_2 + 4NaOH \rightarrow NaIO_3 + 4NaI + 2H_2O$

Answer: B

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2. In the reaction

$MnO_4^- + SO_3^{-2} + H^+ \rightarrow SO_4^{-2} + Mn^{2+} + H_2O$

A. 10,1

B. 10,2

C. 5,2

D. 5,5

Answer: B

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3. Balance the following equation $Cr_2O_7^{2-} + C_2O_4^{2-} + H^+ \rightarrow Cr^{3+} + CO_2 + 4H_2O$ and determine the coefficient for H^+ ion in balanced equation.

A. 14

B. 8

C. 6

D. 24

Answer: C

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Evaluate Yourself 4

1. The number of moles of $KMnO_4$ reduced by one mole of KI in neutral medium is $\left(\text{Hint} \quad KI \rightarrow IO_3^-\right)$

A. One

B. Two

C. Five

D. One-fifth

Answer: B

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2. Equivalent weight of Potassiumpermaganate in strong 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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Evaluate Yourself 5

1. Out of Cu, Ag, Fe and Zn, the metal which can displace all others from their salt solutions is :

A. Ag

B. Cu

C. Zn

D. Fe

Answer: C

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2. The standard E°_{Red} values of A,B,C are 0.68V, - 2.54V,- 0.50V respectively. The order of their reducing power is

A. $A > B > C$

B. $A > C > B$

C. $C > B > A$

D. $B > C > A$

Answer: D

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3. Electrode potentials $\left(E_{\text{red}}^{\circ}\right)$ of 4 element A, B, C, D are $-1.36, -0.32, 0, -1.26V$ respectively. The decreasing reactivity order of these elements is

A. A, D, B and C

B. C, B, D and A

C. B, D, C and A

D. C, A, D and B

Answer: B

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Cuq

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

A. $FeSO_4.7H_2O$

B. $Fe(CO)_5$

C. $Fe_{0.94}O$

D. Fe_3O_4

Answer: B

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2. Oxidation state of nitrogen is not an integer in

A. Hydroxyl amine (NH_2OH)

B. Ammonia (NH_3)

C. Hydrazine (NH_3)

D. Hydrazoic acid (N_3H_4)

Answer: D

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3. The oxidation state of phosphorus is maximum is

A. Phospine (PH_3)

B. Diphosphine (P_2H_4)

C. Metaphosphoric acid (HPO_3)

D. Phosphorus acid (H_3PO_3)

Answer: C

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4. The oxidation state of oxygen is maximum in

A. Bleaching powder $(CaOCl_2)$

B. Oxygen difluoride (OF_2)

C. Dioxygen difluoride (O_2F_2)

D. Hydrogen peroxide (H_2O_2)

Answer: B

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5. The oxidation number of chlorine is maximum

A. HOCl

B. Cl_2O_6

C. $KClO_4$

D. $NaClO_3$

Answer: C

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6. One of the following element always exhibits only-1 oxidation state in all of its compounds with other elements. The element is

A. Hydrogen

B. Sodium

C. Fluorine

D. Oxygen

Answer: C

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7. In one of the following compounds, the oxidation number of sulphur is not a whole number

A. $Na_2S_4O_6$

B. H_2SO_5

C. H_2SO_4

D. $Na_2S_2O_3$

Answer: A

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8. Bromine is converted to Bromate ion. The change in oxidation number of bromine is from

A. 0 to +1

B. 0 to +3

C. 0 to +5

D. 0 to +7

Answer: C

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9. Which of the following statements is wrong?

A. Oxidation number of oxygen is +1 in peroxides

B. Oxidation number of oxygen is +2 in oxygen difluoride

C. Oxidation number of oxygen is -1/2 is super oxides

D. Oxidation number of oxygen is -2 in most of its compounds

Answer: A

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10. The conversion of Glucose to carbon dioxide with respect to carbon is

A. Oxidation

B. Reduction

C. both oxidation & recution

D. Neither oxidation nor reduction

Answer: A

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11. $P_4 + NaOH \rightarrow PH_3 \uparrow + NaH_2PO_2$

A. P is oxidised only

B. P is reduced only

C. Na is reduced

D. P is reduced as well as oxidised

Answer: D

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12. Compound that acts as oxidant as well as reductant

A. SO_2

B. CrO_3

C. SO_3

D. Al_2O_3

Answer: A

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13. Which of the following is comproportionation reaction :

A. $Cl_{2(g)} + OH^-_{(aq)} \rightarrow ClO^-_{3(aq)} + Cl^-_{(aq)} + H_2O_{(l)}$

B. $Ag^{2+}_{(aq)} + Ag_{(s)} \rightarrow 2Ag^+_{(aq)}$

C. $Na_{(s)} + H_2O_{(i)} \rightarrow NaOH_{(aq)} + H_{2(g)}$

D. $Zn_{(s)} + CuSO_{4(aq)} \rightarrow ZnSO_{4(aq)} + Cu_{(s)}$

Answer: B

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14. Which of the following is a disproportionation reaction?

A. $P_{4_s}) + OH^-(aq) \rightarrow PH_{3(g)} + H_2PO_2^-(aq)$

B. $S_{(s)} + OH^-(aq) \rightarrow S_{aq}^{-2} + S_2O_3^{2-}(aq) + H_2O_{(l)}$

C. $Cl_{2(g)} + OH^-(aq) \rightarrow ClO^-(aq) + H_2O_{(l)}$

D. $F_{2g} + OH^-(aq) \rightarrow F^-(aq) + OF_{2_g} + H_2O_{(l)}$

Answer: D

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15. The oxidation number of Oxygen in KO_2 is

A. -2

B. -1

C. $-1/2$

D. $-1/3$

Answer: C

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

A. 6 & 8

B. 0 & 8

C. 0 & 2

D. 6 & 2

Answer: C

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17. In the reaction: $Na_2S_2O_3 + 4Cl_2 + 5H_2O \rightarrow Na_2SO_4 + H_2SO_4 + 8HCl,$ the equivalent weight of $Na_2S_2O_3$ will be: (M= molecular weight of $Na_2S_2O_3$)

A. H_2O_2 is bleached

B. H_2O_2 is oxidised

C. H_2O_2 is dehydrated

D. H_2O_2 is neither oxidised nor reduced

Answer: B

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18. In which of the following compounds, sulphur atom has different oxidation number

A. H_2SO_4

B. HSO_3^-

C. SO_2Cl_2

D. SO_3

Answer: B

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19. What is the change in oxidation number of carbon in the following reaction?

$$CH_4(g) + 4Cl_2(g) \rightarrow CCl_4(l) + 4HCl(g)$$

A. $Cu. + 4HNO_3 \rightarrow Cu(NO_3)_2 + 2NO_2 + 2H_2O$

B. $H_2S + 4F_2 \rightarrow 2HF + SF_6$

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

D. $KClO_3 + H_2O + F_2 \rightarrow KClO_4 + 2HF$

Answer: B

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20. Which of the following is a redox reaction ?

A. $CH_3COOH + C_2H_5OH \rightarrow CH_3COOC_2H_5 + H_2O$

B. $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

C. $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

D. $NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$

Answer: C

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21. Which of the following are neutral oxide?

A. $K_2Cr_2O_7$

B. $KMnO_4$

C. Cl_2

D. CrO_3

Answer: B

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22. The oxidation state of N in HNO_4 is

A. $+7$

B. $+10$

C. $+5$

D. $+3$

Answer: C

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23. Which of the following can acts as a reducing agent ?

A. $K_2Cr_2O_7$

B. $CaOCl_2$

C. PbO_2

D. H_2S

Answer: D

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24. Which of the following pairs will give displacement reactions?

A. $S_{(s)} + O_{2_g} \rightarrow SO_{2_g}$

B. $KClO_{3_s} \rightarrow KCl_{(s)} + O_{2(g)}$

C. $Ca_{(s)} + H_2O_{(l)} \rightarrow Ca(OH)_{2_{(aq)}} + H_{2_g}$

D. $F_{2g} + OH^-(aq) \rightarrow F^-(aq) + OF_{2_g} + H_2O_{(l)}$

Answer: C

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Exercise 1 C W

1. Oxidation state of iron in $Fe(CO)_4$ is

A. $+1$

B. $+2$

C. 0

D. $+3$

Answer: B

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2. Oxidation number of carbon in carbon suboxide (C_3O_2) is :

A. $\frac{+2}{3}$

B. $\frac{+4}{3}$

C. $+4$

D. $\frac{-4}{3}$

Answer: B

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3. Oxidation number of Sodium in Sodium amalgam

A. $+2$

B. $+1$

C. -2

D. $+3$

Answer: D

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4. The oxidation number of Fe in $Fe_{0.94}O$ is

A. 200

B. 200/94

C. 94/200

D. None

Answer: B

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5. Oxidation number of S in $\left[(CH_3)_2SO\right]$ is:

A. 0

B. $+1$

C. -2

D. $+5$

Answer: C

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6. Oxidation number of 'Co' in $Hg[Co(SCN)_4]$

A. $+2$

B. $+1$

C. $+3$

D. $+5$

Answer: A

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7. Oxygen can show positive oxidation state in its compounds with

A. Fluroine

B. Nitrogen

C. Hydrogen

D. Sulphur

Answer: A

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

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

Answer: D

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9. Which of the following is an example of disproportionation reaction?

A.

$$3Cl_2(g) + 6OH^-(aq) \rightarrow ClO_3^-(aq) + 5Cl^-(aq) + 3H_2O(1)$$

B. $Ag^{2+}(aq) + Ag(s) \rightarrow 2Ag^{-4}(aq)$

C. $Zn(s) + CuSO_4(aq) \rightarrow Cu(s) + ZnSO_4(aq)$

D. $2KClO_3(s) \rightarrow 2KCl(s) + 3O_2(g)$

Answer: A

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Exercise 1 H W

1. The oxidation state of phosphorus is minimum in

A. P_4O_6

B. NaH_2PO_2

C. PH_3

D. Na_3PO_4

Answer: C

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2. Oxidation state of phosphorus in pyrophosphophosphate ion $\left(P_2O_7^{-4}\right)$ is

A. $+7$

B. $+3$

C. $+8$

D. $+5$

Answer: D

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3. The oxidation state of sulphur in sodium tetrathionate ($Na_2S_4O_6$) is :

A. $+2$

B. $+4$

C. $+1.5$

D. $+2.5$

Answer: D

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4. The oxidation number of phosphorus in $Ba(H_2PO_2)_2$ is:-

A. -3

B. $+1$

C. $+3$

D. $+5$

Answer: B

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5. When Cl^- ions are converted to Cl_2, the oxidation number of chlorine changes from

A. -1 to 0

B. -1 to +1

C. -1 to +2

D. -2 to 0

Answer: A

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6. $3Cu + 8HNO_3 \rightarrow 3Cu(NO_3)_2 + 2NO + 4H_2O$ the wrong statement for the value

A. Cu is oxidized

B. HNO_3 is reduced

C. Cu is reduced

D. Cu acts as reducing agent

Answer: A::B::C::D

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7. $KMnO_4$ reacts with oxalic acid according to the equation

$$2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \rightarrow 2Mn^{2+} + 10Co_2 + 8H_2O$$

Here, 20mL of 1.0M $KMnO_4$ is equivalent to:

A. MnO_4^-

B. H^+

C. $C_2O_4^{2-}$

D. Both 1 & 2

Answer: A::C::D

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8. What is the oxidation state of chlorine in hypochlorous acid?

A. $+1$

B. $+3$

C. $+5$

D. $+7$

Answer: A::C::D

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9. In the reaction $NO_2^- + OCl^- \rightarrow NO_3^- + Cl^-$ the oxidation state of chlorine

A. Does not change

B. Changes from +1 to -1

C. Changes from -2 to -1

D. Changes from 0 to -1

Answer: B

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10. M^{+3} ion loses $3e^{-}$. Its oxidation number will be

A. 0

B. $+3$

C. $+6$

D. -3

Answer: C

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11. Oxidation state of carbon is not zero in

A. CH_2

B. $C_6H_{12}O_6$

C. CH_2Cl_2

D. $CHCl_3$

Answer: D

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12. In which of the following processes is nitrogen oxidised ?

A. $NH_4^+ \rightarrow N_2$

B. $NO_3^- \rightarrow NO$

C. $NO_2 \rightarrow NO_2^-$

D. $NO_3^- \rightarrow NH_4^+$

Answer: A

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13. Iron exhibits $+2$ and $+3$ oxidation states. Which of the following statements about iron is incorrect?

A. $K_4[Fe(CN)_6]$

B. $K_3[Fe(CN)_6]$

C. $FeSO_4(NH_4)_2SO_46H_2O$

D. $Fe(CO)_9$

Answer: D

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Exercise 2 C W

1. The oxidation state of iron in the coordination sphere of prussain blue is

A. $+2$

B. 0

C. $+1$

D. $+3$

Answer: A::B

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2. Oxidation number of carbon in SCN ion is

A. $+2$

B. -2

C. $+4$

D. -4

Answer: A::C::D

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3. In ICl_3 oxidation numbers of iodine and chlorine are

A. 0 & 0

B. $+3 \& -1$

C. $-1 \& +3$

D. $-3 \& +1$

Answer: A::B::C::D

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4. Lead Nitrate is strongly heated. In this reaction the oxidation numbers of following atoms change

A. Only in Pb and N

B. Only in N and O

C. Pb, N and O

D. Only in N

Answer: B::C

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5. The sum of the oxidation number of the carbon atoms in CH_3CHO is

A. -2

B. $+2$

C. -4

D. -1

Answer: A::C::D

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6. Ethylene reacts with alkaline $KMnO_4$ to form-

A. -4

B. 0

C. $+4$

D. $+6$

Answer: B::C

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7. One gas bleaches the colour of flowers by reduction and other by oxidation. These gases are

A. $CO\&Cl_2$

B. $H_2S\&Br_2$

C. $SO_2\&Cl_2$

D. $NH_3\&SO_3$

Answer: A::B::C::D

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8. Why in the redox titration of $KMnO_4$ vs oxalic acid, we heat oxalic acid solution before starting the titration?

A. K^+

B. MnO_4^-

C. $C_2O_4^{2-}$

D. CO_2

Answer: B::D

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

A. $H_2S_2O_7 > Na_2S_4O_6 > Na_2S_2O_3 > S_8$

B. $SO^{2+} > SO_4^{2-} > SO_3^{2-} > HSO_4^-$

C. $H_2S > SCl_2H_2SO_3 > H_2SO_5$

D. $H_2SO_4 > SO_2 > H_2S > H_2S_2O_8$

Answer: A::B::C::D

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10. Arrange $HOCl, HClO_2, HClO_3$ and $HClO_4$ in order of (i) acidic strength and (ii) oxidising power. Give reason.

A. Disproportionation reaction

B. Displacement reaction

C. Chemical combination reaction

D. Decomposition reaction

Answer: A

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11. The oxidation state of the most electronegative atom in each of the product is

$$H_2 + O_2 \rightarrow H_2O_2 + H_2O$$

A. $-2, \ -2$

B. $+1, \ -2$

C. $+2, \ -1$

D. $-1, \ -2$

Answer: D

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12. Which of the following reactions involves neither oxidation nor reduction ?

A. $CrO_4^{-2} \rightarrow Cr_2O_7^{2-}$

B. $Cr \rightarrow CrCl_3$

C. $Na \rightarrow Na^+$

D. $2S_2O_3^{2-} \rightarrow S_4O_6^{2-}$

Answer: A

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13. In the chemical reaction

$$K_2Cr_2O_7 + xH_2SO_4 + ySO_2 \rightarrow K_2SO_4 + Cr_2(SO_4)_3 + zH_2O$$

Here x,y and z are

A. 1,3,1

B. 4,1,4

C. 3,2,3

D. 2,1,2

Answer: A

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14. Consider the following reaction,

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

The reaction 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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15. In the balanced chemical reaction

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

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::B::C::D

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16. One mole of N_2H_4 loses ten moles of electrons of form a new compound Y. Assuming that all the nitrogen appears in the new compound, what is the oxidation state of nitrogen in Y ? (There is no change in the oxidation state of hydrogen.)

A. $+1$

B. $+2$

C. $+3$

D. $+5$

Answer: C

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17. What is the oxidation state of Fe in nitroprusside ion ?

A. $+2$

B. $+3$

C. $+1$

D. $+6$

Answer: B

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18. The number of mole of oxalate ions oxidised by one mole of MnO_4^- is :

A. 1

B. 2

C. 3

D. 4

Answer: C

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19. Which of the following sequence is correct with reference to the oxidation number of iodine?

A. $I_2 < ICl < HI < HIO_4$

B. $HIO_4 < ICl < I_2 < HI$

C. $I_2 < HI < ICl < HIO_4$

D. $HI < I_2 < ICl < HIO_4$

Answer: D

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20. When $KMnO_4$ acts as an oxidant and ultimately forms $[MnO_4]^{2-}$, MnO_2, Mn_2O_3 and Mn^{2+} then number of electrons transferred in each case respectively is:

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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21. In Balancing the reaction $XZn + NO_3^- + YH^+ \rightarrow XZn^{2+} + NH_4^+ + ZH_2O, X, Y\&Z$ are

A. 4,10,3

B. 3,8,3

C. 3,10,3

D. 4,3,10

Answer: A

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22. 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 reaction are

A. 2,5,16

B. 16,5,2

C. 5,16,2

D. 2,16,5

Answer: A

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23. 1 mole of equimolar mixture of ferric oxalate and ferrous oxalate requres x mole of $KMnO_4$ in acidic medium for complete oxidation. X is:

A. 0.5 mole

B. 0.9 mole

C. 1.2 mole

D. 4.5 mole

Answer: B

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Exercise 2 H W

1. The element which has only one oxidation state in its compounds is

A. Fluorine

B. Oxygen

C. Nitrogen

D. Hydrogen

Answer: D

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2. The oxiation number of manganese in potassium manganate is

A. $+7$

B. $+6$

C. $+4$

D. $+2$

Answer: B

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3. Assertion: Oxygen atom in both O_2 and O_3 has oxidation number zero.

Reason: In F_2O, oxidation number of O is $+2$.

A. Decreases from +4 to +2

B. Decreases from +2 to 0

C. Increases from -4 to -2

D. Does not change

Answer: D

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4. $KMnO_4$ 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: D

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5. In the reaction,

$2KMnO_4 + 16HCl \rightarrow 5Cl_2 + 2MnCl_2 + 2KCl + 8H_2O$ the reduction product is

A. Cl_2

B. $MnCl_2$

C. H_2O

D. KCl

Answer: B

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

A. -4

B. 0

C. $+4$

D. $+6$

Answer: D

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7. In this reaction: $S_2O_8^{2-} + 2I^- \rightarrow 2SO_4^{2-} + I_2$

A. Oxidaton of iodide into iodine takes place

B. Reduction ofiodine into iodide takes place

C. Both oxidation ane reduction of iodine takes place

D. None of the above

Answer: A

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

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

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

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

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

Answer: A

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9. In the coordination compound, $K_4\left[Ni(CN)_4\right]$ oxidation state of nickel is

A. -1

B. 0

C. $+1$

D. $+2$

Answer: B

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

A. $+5$

B. $+3$

C. $+4$

D. $+2$

Answer: A

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11. In a balanced equation $H_2SO_4 + xHI \rightarrow H_2S + YI_2 + zH_2O$, the value of x, y, z are

A. x=3, y=5, z=2

B. x=4, y=8, z=5

C. x=8, y=4, z=4

D. x=5, y=3, z=1

Answer: C

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Exercise 3

1. 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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2. Which of the following oxidation states are the most characteristics for lead and tin, respectively?

A. $+4,\ +2$

B. $+2,\ +4$

C. $+4, +4$

D. $+2, +2$

Answer: B

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3. Which of the following oxidation states is the most common among the lanthanoids ?

A. Ni(28)

B. Fe(26)

C. Zn(30)

D. Cu(29)

Answer: B

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4. Oxidation state of chlorine in hypochlorous acid

A. -1

B. $+1$

C. $+7$

D. -7

Answer: C

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5. Of the following outer electronic configurations of atoms, the highest oxidation state is achieved by which one of them ?

A. $(n-1)d^8ns^2$

B. $(n-1)d^5ns^2$

C. $(n-1)d^3ns^2$

D. $(n-1)d^5ns^1$

Answer: B

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

$H_2O + Br_2 \rightarrow HOBr + HBr$

A. Proton accepted only

B. Both oxidised ad reduced

C. Oxidised only

D. Reduced only

Answer: B

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7. In the ionic equation,

$BiO_3^- + 6H^+ + xe^- \rightarrow Bi^3 + 3H_2O$, the value of x is

A. 6

B. 2

C. 4

D. 3

Answer: B

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8. In the reaction,

$$IO_3^- + SO_2 + 4H_2O \rightarrow I_2 + SO_4^{2-} + 8H^+$$

The coefficient of SO_2 is

A. Three

B. Four

C. Five

D. Six

Answer: C

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9. Which of the following molecules can act as an oxidating as well as a reducing agent?

A. H_2S

B. SO_3

C. H_2O_2

D. F_2

Answer: C

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10. Which of the following substances acts as an oxidising as well as a reducing agent?

A. Na_2O

B. $SnCl_2$

C. $NaNO_3$

D. $NaNO_2$

Answer: D

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11. In the conversion fo Br_2 to BrO_3^- , the oxidation state of Br changes from.

A. zero to +5

B. $+1 \text{ to } +5$

C. zero to -3

D. $+2 \text{ to } +5$

Answer: A

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12. The oxidation sates of iodine in HIO_4, H_3IO_5 and H_5IO_6 are respectively :

A. $+1,\ +3,\ +7$

B. $+7,\ +7,\ +3$

C. $+7,\ +7,\ +7$

D. $+7,\ +5,\ +3$

Answer: C

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13. Oxidation state of oxygen in F_2O is

A. $+1$

B. -1

C. $+2$

D. -2

Answer: C

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14. When sulphur dioxide is passed in an acidified $K_2Cr_2O_7$ solution,the oxidation state of sulphur is changed from

A. $+4$ to 0

B. $+4$ to $+2$

C. $+4$ to $+6$

D. $+6$ to $+4$

Answer: C

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

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

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

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

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

Answer: A

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17. Which of the following have been arranged in the decreasing order of 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. $SO_2^{2+} > SO_4^{2-} > SO_3^{-2} > HSO_4^-$

D. $H_2SO_5 > H_2SO_3 > SCl_2 > H_2S$

Answer: D

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18. The highest oxidation state of Mn is shown by

A. $KMnO_4$

B. K_2MnO_4

C. MnO_2O_3

D. MnO_2

Answer: A

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

A. HCl

B. $HClO_4$

C. ICl

D. Cl_2O

Answer: D

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20. How many moles of iodine are liberated when one mol of potassium dichromate reacts with excess of potassium iodide in the presence of concentrated sulphuric acid?

A. 1

B. 2

C. 3

D. 4

Answer: C

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21. 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 reaction are

A.

	MnO_4^-	$C_2O_4^-$	H^+
1	2	5	16

B.

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

C.

	MnO_4^-	$C_2O_4^-$	H^+
3	5	16	2

D.

	MnO_4^-	$C_2O_4^-$	H^+
4	2	16	5

Answer: A

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22. An oxidation process involves

A. Oxidation number decreases.

B. Number of electrons decreases.

C. Oxygen content decreases.

D. Number of ions decreases.

Answer: B

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23. Which of the following is the most powerful oxidising agent?

A. F_2

B. O_2

C. Br_2

D. I_2

Answer: A

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24. Which of the following reaction involves oxidation reduction?

A. $H_2 + Br_2 \rightarrow 2HBr$

B. $NaBr + HCl \rightarrow NaCl + HBr$

C. $HBr + AgNO_3 \rightarrow AgBr + HNO_3$

D. $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

Answer: A

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25. In the reaction

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

the substance oxidised is

A. H_2S

B. SO_2

C. S

D. H_2O

Answer: A

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26. The value of n in : $MnO_4^- + 8H^+ + ne \rightarrow Mn^{2+} + 4H_2O$ is

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

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

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

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

Answer: D

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27. Which can act as an oxidising as well as a reducing agent ?

A. $HClO_4$

B. HNO_3

C. H_2O_2

D. H_2SO_4

Answer: C

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28. Which change requires an oxidising agent?

A. $2S_2O_3^{2-} \Leftrightarrow S_4O_6^{2-}$

B. $Zn^{2+} \Leftrightarrow Zn$

C. $ClO^- \Leftrightarrow Cl^-$

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

Answer:

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29. In the reaction , $2H_2O_2 \rightarrow 2H_2O + O_2$, oxygen is

A. Oxygen is oxidised only.

B. Oxygen is reduced only.

C. Oxygen is neither oxidised nor reduced.

D. Oxygen is both oxidised and reduced

Answer: D

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30. In chromite ore, the oxidation number of iron and chromium are respectively.

A. $+3, \ +2$

B. $+3, \ +6$

C. $+2, \ +6$

D. $+2, \ +3$

Answer: D

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31. In which of the following compounds, nitrogen exhibits highest oxidation state?

A. NH_3

B. N_3H

C. NH_2OH

D. N_2H_4

Answer: B

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32. Which of the following species can function both as oxidizing as well as reducing agent?

A. Cl^-

B. ClO_4^-

C. ClO^-

D. MnO_4^-

Answer: C

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33. For the decolorization of 1 mol of $KMnO_4$, the moles of H_2O_2 requiered are .

A. Mn^{4+} and MnO_2

B. Mn^{4+} and O_2

C. Mn^{2+} and O_2

D. Mn^{2+} and O_3

Answer: C

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34. The pair of compounds that can exist together is:

A. $FeCl_3, KI$

B. $FeCl_3, SnCl_2$

C. $HgCl_2, SnCl_2$

D. $FeCl_3, SnCl_2$

Answer: D

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35. In acidic medium, H_2O_2 changes $Cr_2O_7^{2-}$ to CrO_5 which has two (-O-O-) bonds. Oxidation state of Cr in CrO_5 is

A. -10

B. $+5$

C. $+3$

D. $+6$

Answer: D

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36. Which of the following processes does not involve oxidation of iron ?

A. Formation of $Fe(CO)_5$ from Fe

B. Liberation of H_2 from steam by iron at high temperature

C. Rusting of iron sheets

D. Decolourization of blue $CuSO_4$ solution by iron

Answer: A

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37. Assuming complete ionization, same moles of which of the following compounds will require the least amount of acidified $KMnO_4$ for complete oxidation ?

A. FeC_2O_4

B. $Fe(NO_2)_2$

C. $FeSO_4$

D. $FeSO_3$

Answer: C

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38. Hot concentrated sulpuric acis is a moderatly strong oxidizing agent. Which of the following reaction does not shwo oxidizing behaviour?

A. $CaF_2 + H_2SO_4 \rightarrow CaSO_4 + 2HF$

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

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

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

Answer: A

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Exercise 4

1. 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:

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2. In the reaction

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

the substance oxidised is

A. H_2S

B. SO_2

C. S

D. H_2O

Answer:

Watch Video Solution

3. 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. O

C. Cl

D. None

Answer:

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4. The oxidation number of oxygen in OF_2 is

A. $+2$

B. -2

C. $+1$

D. -1

Answer:

Watch Video Solution

5. An oxidation process involves

A. Increase in oxidation number

B. Decrease in oxidation number

C. Both decrease and increase in oxidation number

D. No change in oxidation number

Answer:

Watch Video Solution

6. Which of the following is the strongest reducing agent in aqueous medium?

A. Mg

B. Na

C. Li

D. Ca

Answer:

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

A. I_2

B. F_2

C. Cl_2

D. Br_2

Answer:

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8. The oxidation number of phosphorus in $Ba(H_2PO_2)_2$ is:-

A. $+3$

B. $+2$

C. $+1$

D. -1

Answer:

Watch Video Solution

9. Which of the following reactions do not involve oxidation reduction ?

I. $2Cs + 2H_2O \rightarrow 2CsOH + H_2$

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

III. $NH_4Br + KOH \rightarrow KBr + NH_3 + H_2O$

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

A. I,II

B. I,III

C. I,III,IV

D. III,IV

Answer:

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10. 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^+
1	2	5	16

B.

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

C.

	MnO_4^-	$C_2O_4^{2-}$	H^+
3	5	16	2

D.

	MnO_4^-	$C_2O_4^{2-}$	H^+
4	2	16	5

Answer:

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11. The oxidation state of nitrogen is correctly given for

A.

	Compound	Oxidation state
1	$[CO(NH_3)_5Cl]Cl_2$	0

B.

	Compound	Oxidation state
2	NH_2OH	-2

C.

	Compound	Oxidation state
3	$(N_2H_5)_2SO_4$	$+2$

D.

	Compound	Oxidation state
4	Mg_3N_2	-3

Answer:

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12. The oxidation state of chromium in $Cr(CO)_6$ is

A. 0

B. $+2$

C. -2

D. $+6$

Answer:

Watch Video Solution

13. 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. $MnCl_3 \rightarrow MnCl_2 + (1/2)Cl_2$

Answer:

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14. In the chemical reaction,

$$K_2Cr_2O_7 + xH_2SO_4 + ySO_2 \rightarrow K_2SO_4 + Cr_2(SO_4)_3 + zH_2O$$

$x, y,$ and z are

A. 1,3,1

B. 4,1,4

C. 3,2,3

D. 2,1,2

Answer:

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15. One mole of N_2H_4 loses ten moles of electrons of form a new compound Y. Assuming that all the nitrogen appears in the new compound, what is the oxidation state of nitrogen in Y ? (There is no change in the oxidation state of hydrogen.)

A. -1

B. -3

C. $+3$

D. $+5$

Answer:

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16. 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:

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17. In which of the following pairs is there the greatest difference in the oxidation numbers of the underlined elements?

A. $NO_2 \& N_2O_4$

B. $P_2O_5 \& P_4O_{10}$

C. $N_2 \& NO$

D. $SO_2 \& SO_3$

Answer:

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18. In the reaction

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

A. Bromine is oxidised and carbonate is reduced

B. Bromine is reduced and water is oxidised

C. Bromine is neither reduced nor oxidised

D. Bromine is both reduced and oxidised

Answer:

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19. In the reaction

$$2FeCl_3 + H_2S \rightarrow 2FeCl_2 + 2HCl + S$$

A. $FeCl_3$ acts as anoxidising agnet

B. Both $H_2S \& FeCl_3$ are oxidised

C. $FeCl_3$ is oxidised while H_2S is reduced

D. H_2S acts as an oxidising agent.

Answer:

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20. The oxidation number of cobalt in $K\left[Co(CO)_4\right]$ is:

A. $+1$

B. $+3$

C. -1

D. -3

Answer:

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21. Which of the following is not a disproportionation reaction?

I. $NH_4NO_3 \xrightarrow{\Delta} N_2O + H_2O$

II. $P_4 \xrightarrow{\Delta} PH_3 + HPO_2^{\ominus}$

III. $PCl_5 \xrightarrow{\Delta} PCl_3 + Cl_2$

IV. $IO_3^{\ominus} + I^{\ominus} \rightarrow I_2$

A. I,II

B. I,III,IV

C. II,IV

D. I,III

Answer:

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22. which of the following represent redox reactions?

I. $Cr_2O_7^{2-} + 2\overset{\ominus}{O}H \rightarrow 2CrO_4^{2-} + H_2O$

II. $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

iii. $MnO_4^{\ominus} + 3Mn^{2+} + 4\overset{\ominus}{O}H \rightarrow 5MnO_2 + 2H_2O$

IV. $2Cu^{\oplus} \rightarrow Cu + Cu^{2+}$

A. I,II

B. I,III

C. II,IV

D. II,III,IV

Answer:

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23. In which of the following cases is the oxidation state of N atom wrongly calculated?

A. $NH_4Cl \quad -3$

B. $(N_2H_5)_2SO_4 \quad +2$

C. $Mg_3N_2 \quad -3$

D. $NH_2OH \quad -1$

Answer:

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24. Which of the following is not a disproportionation reaction ?

A. $KO_2 + H_2O + CO \rightarrow KHCO_3 + O_2$

B. $KClO_3 \rightarrow KClO_4 + KCl$

C. $PbO_2 + H_2O \rightarrow PbO + H_2O_2$

D.

$$OHC - COOH \xrightarrow{O^- H} HOH_2C - COOH + O^- OC - COO^-$$

Answer:

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25. 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:

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26. Which of the following is a redox reaction?

A. H_2SO_4 with NaOH

B. In atmosphere, $O_3 \quad \text{from} \quad O_2$ by lightning

C. Nitrogen oxides from nitrogen and oxygen by

D. Evaporation of H_2O

Answer:

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

A. 0

B. $+2$

C. -2

D. $+6$

Answer:

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28. In which of the following pairs is there the greatest difference in the oxidation numbers of the underlined elements?

A. $NO_2 \& N_2O_4$

B. $SO_3^{2-} \& SO_4^{2-}$

C. $S^2 \& SO_3^{2-}$

D. $S^2 \& SO_4^{2-}$

Answer:

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29. [Which of the following is not an intermolecular redox reaction?

A. $MgCO_3 \rightarrow MgO + CO_2$

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

C. $K + H_2O \rightarrow KOH + (1/2)H_2$

D. $MnBr_3 \rightarrow MnBr_2 + (1/2)Br_2$

Answer:

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

A. 0.6

B. 0.167

C. 0.2

D. 0.4

Answer:

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31. In the reaction

$K + O_2 \rightarrow KO_2$

A. O_2 acts as oxidising agent

B. Both K and O_2 as oxidised

C. O_2 is oxidised with K is reduced

D. K acts as an oxidising agent

Answer:

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

$H_2O + Br_2 \rightarrow HOBr + HBr$

A. Proton acceptor only

B. Both oxidised and reduced

C. Oxidised only

D. Reduced only

Answer:

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33. $Cr_2O_7^{2-} + X \xrightarrow{H^{\oplus}} Cr^{3+} + H_2O + \text{oxidised product of } X$, X in the above reaction cannot be

A. $C_2O_4^{2-}$

B. Fe^{2+}

C. SO_4^{2-}

D. S^{2-}

Answer:

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34. The oxidation state of chromium in the final product formed by the reaction between Kl and acidified potassium dichromate solution is :

A. $+4$

B. $+6$

C. $+2$

D. $+3$

Answer:

Watch Video Solution

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

A. 1

B. 2

C. 5

D. $1/5$

Answer:

Watch Video Solution

36. In the balanced chemical reaction

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

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:

Watch Video Solution

37. For the reaction

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

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

A. 5

B. 3

C. 2

D. 1

Answer:

Watch Video Solution

38.

$$aK_2Cr_2O_7 + bKCl + cH_2SO_4 \rightarrow xCrO_2Cl_2 + yKHSO_4 + zH_2O$$

The above equation balances when

A. a=2, b=4, c=6 and x=2, y-6, z=3

B. a=4, b=4, c=2 and x=6, y-2, z=3

C. a=6, b=4, c=2 and x=6, y-3, z=2

D. a=1, b=4, c=6 and x=2, y-6, z=3

Answer:

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39. The oxidation number of carbon in $.CH_2Cl_2$ is .

A. 0

B. 2

C. 3

D. 5

Answer:

Watch Video Solution

40. Exess of KI reacts with $CuSO_4$ solution and then $Na_2S_2O_3$ solution is added to it. Which of the following statement is incorrect for this reaction ?

A. Evolved I_2 is reduced

B. $C\underline{\underline{\quad}}2$ is formed

C. $Na_2S_2O_3$ is oxidised

D. Cu_2I_2 is formed

Answer:

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41. It is found that V forms a double salt isomorphous with Mohr's salt. The oxidation number of V in this compound is:

A. $+8$

B. $+6$

C. $+4$

D. $+2$

Answer:

Watch Video Solution

42. The number of peroxide bonds in perxenate ion $[XeO_6]^{4-}$ is

A. 0

B. 2

C. 3

D. 1

Answer:

Watch Video Solution

43. The oxidation number of Pr in Pr_6O_{11} is

A. $\frac{22}{6}$

B. $\frac{20}{6}$

C. 3

D. 4

Answer:

Watch Video Solution

44. In which of the following is the highest oxidation state not possible?

A. $[XeO_6]^{4-}$

B. XeF_8

C. OsO_4

D. RuO_4

Answer:

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45. which of the following statements is not correct about the reaction given below?

$$K_4\left[Fe(CN)_6\right] \xrightarrow{\text{Oxidation}} Fe^{3+} + CO_2 + NO_3^{\ominus}$$

A. Fe is oxidised from Fe^{2+} to Fe^{3+}

B. Carbon is oxidised from C^{2+} to C^{4+}

C. N is oxidised from N^{3-} to C^{4+}

D. Carbon is not oxidised

Answer:

Watch Video Solution

46. Which of the following reactions is not a disproportionation reaction ?

A. $P_4 + 5O^-H \rightarrow H_2PO_2^- + PH_3$

B. $Cl_2 + O^-H \rightarrow Cl^- + ClO^-$

C. $2H_2O \rightarrow 2H_2O + O_2$

D. $PbO_2 + H_2O \rightarrow PbO + H_2O_2$

Answer:

Watch Video Solution

47. Which of the following is not an intramolecular redox reaction?

A. $NH_4 + NO_2 \rightarrow N_2 + 2H_2O$

B. $2Mn_2O_7 \rightarrow 4MnO_2 + 3O_2$

C. $2KClO_3 \rightarrow 2KCl + 3O_2$

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

Answer:

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48. In the equation $NO_2^- + H_2O \rightarrow NO_3^- + 2H^+ + ne^-$ value of n is :-

A. 1

B. 2

C. 3

D. 4

Answer:

Watch Video Solution

49. Which of the following is an intermolecular redox reaction?

A. $2OCH - CHO \xrightarrow{O^- H} HOCH_2 - CH_2OH$

B. $2C_6H_5CHO \xrightarrow{Al(OC_2H_5)_3} C_6H_5COOH + C_6H_5CH_2OH$

C. $4CrO_3 + 6H_2SO_4 + \rightarrow 2Cr_2(SO_4)_3 + 6H_2 + 7O_2$

D. $Ag_2S_3 + HNO_3 \rightarrow H_3AsO_4 + H_2SO_4 + NO$

Answer:

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50. The oxidation state of A, B, and C in a compound are $+2, +5$, and -2, respectively. The compounds is

A. $A_2(BC)_2$

B. $A_2(BC)_3$

C. $A_3(BC_4)_2$

D. $A_2(BC_4)_3$

Answer:

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51. 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:

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52. The oxidation number of Pt in $[Pt(C_2H_4)Cl_3)]^{\ominus}$ is

A. $+1$

B. $+2$

C. $+3$

D. $+4$

Answer:

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

A. $+3$

B. $+2$

C. $+5$

D. -3

Answer:

Watch Video Solution

54. The oxidation number of phosphorus in PO_4^{3-}, P_4O_{10}, and $P_2O_7^{4-}$ is

A. $+5$

B. $+3$

C. -3

D. $+2$

Answer:

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55. which of the following leads to redox reaction ?

A. $AgNO_3 + HCl$

B. $KOH + HCl$

C. $KI + Cl_2$

D. $NH_3 + HCl$

Answer:

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56. The oxidation number of sulphur in $Na_2S_4O_6$ is .

A. $+0.5$

B. 2.5

C. $+4$

D. $+6$

Answer:

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57. The oxidation state of iodine in $H_4IO_6^-$ is:

A. $+7$

B. -1

C. $+5$

D. $+1$

Answer:

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58. When iron is rusted, it is

A. Oxidised

B. Iodide ion

C. Oxidising agent

D. Reducing agent

Answer:

Watch Video Solution

59. An element that never has a positive oxidation state in any of its compounds is

A. Boron

B. Oxygen

C. Chlorine

D. Fluorine

Answer:

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60. Starch iodide paper is used to test for the presence of

A. Iodine

B. Iodide ion

C. Oxidising agent

D. Reducing agent

Answer:

Watch Video Solution

61. Which of the following acids possesses oxidising, reducing, and complex forming properties ?

A. HNO_3

B. H_2SO_4

C. HCl

D. HNO_2

Answer:

Watch Video Solution

62. In the reaction

$8Al + 3Fe_3O_4 \rightarrow 4Al_2O_3 + 9Fe$

the number of electrons transferred from the reductant to the oxidant is

A. 8

B. 4

C. 16

D. 24

Answer:

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63. Which of the following examples does not represent disproportionation ?

A. $MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$

B. $2H_2O_2 \rightarrow 2H_2O + O_2$

C. $4KClO_3 \rightarrow 3KClO_4 + KCl$

D. $3Cl_2 + 6NaOH \rightarrow 5NaCl + NaCl_3 + 3H_2O$

Answer:

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64. Which of the following statements is/are correct

A. The oxidation number of S in $(NH_4)_2S_2O_8$ is

B. The oxidation number of Os in +8

C. The oxidation number of S in is +8

D. The oxidation number of O in is -1/2

Answer:

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65. The oxide which cannot act as reducing agent is

A. SO_2

B. NO_2

C. CO_2

D. ClO_2

Answer:

Watch Video Solution

66. The coordination number and oxidation number of Cr in $K_3\left[Cr(C_2O_4)_3\right]$ are, respectively,

A. 4 and 2

B. 6 and +3

C. 3 and -3

D. 3 and 0

Answer:

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67. Which of the following reactions does not involve either oxidation or reduction ?

A. $VO^{2+} \rightarrow V_2O_3$

B. $Na \rightarrow Na^+$

C. $CrO_4^{2-} \rightarrow Cr_2O_7^{2-}$

D. $Zn^{2+} \rightarrow Zn$

Answer:

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68. In which of the following processess is nitrogen oxidised ?

A. $NH_4^+ \rightarrow N_2$

B. $NO_3^- \rightarrow NO$

C. $NO_2 \rightarrow NO_2^-$

D. $NO_3^- \rightarrow NH_4^+$

Answer:

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69. The oxidation number of C in HNC is

A. $+2$

B. -3

C. $+3$

D. 0

Answer:

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70. The oxidation number of Fe in $Fe_{0.94}O$ is

A. 200

B. $200/94$

C. $94/200$

D. None

Answer:

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71. The oxidant number of Fe in $Na_2\left[Fe(CN)_5NO\right]$ is

A. $+2$

B. $+1$

C. $+3$

D. -2

Answer:

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72. The oxidation number of Cl in $CaOCl_2$ is

A. -1 and $+1$

B. $+2$

C. -2

D. None

Answer:

Watch Video Solution

73. The equivalent weight of FeC_2O_4 in the change

$FeC_2O_4 \rightarrow Fe^{3+} + CO_2$ is

A. $M/3$

B. M/6

C. M/2

D. M/1

Answer:

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74. The oxidation state of Fe in Fe_3O_8 is

A. $3/2$

B. $4/5$

C. $5/4$

D. $16/3$

Answer:

Watch Video Solution

75. In which of the following compounds, the oxidation state of transition metal is zero ?

A. CrO_5

B. Fe_3O_4

C. $FeSO_4$

D. $Fe(CO)_5$

Answer:

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76. The oxidation state of S in $H_2S_2O_8$ is

A. $+2$

B. $+4$

C. $+6$

D. $+7$

Answer:

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77. Oxidation reaction involves loss of electrons, and reduction reaction involves gain of electrons. The reaction in which a species disproportinates into two oxidation states (lower and higher) is

called disproportionation reaction.

Which of the following is not a dispropotional reaction?

A. $Cu_2O + 2H^+ \rightarrow Cu + Cu^+ + H_2O$

B. $2CrO_4^{2-} + 2H^+ \rightarrow Cr_2O_7^{2-} + H_2O$

C. $CaCO_3 + 2H^+ \rightarrow Ca^{2+} + H_2O + CO_2$

D. $Cr_2O_7^{2-} \rightarrow 2CrO_4^{2-} + H_2O$

Answer:

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78. When $KMnO_4$ acts as an oxidising agnet and ultimetely 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:

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79. Which of the following is a redox reaction?

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

B. $CaC_2O_4 \rightarrow CaCl_2 + H_2C_2O_4$

C. $Mg(OH)_3 + 2NH_4Cl \rightarrow MgCl_2 + 2NH_4OH$

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

Answer:

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

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

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

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

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

Answer:

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81. 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:

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82. A metal ion M^{3+} loses three electrons , its oxidation number will be

A. $+3$

B. $+6$

C. 0

D. -3

Answer:

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83. To an acidic solution of an anion, a few drops of $Kmno_4$ solution are added. Which of the following, if present, will not decolourise the $KMnO_4$ solution?

A. CO_3^{2-}

B. NO_2^-

C. S^{2-}

D. Cl^-

Answer:

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

A. $1/6$

B. $1/3$

C. $2/3$

D. 1

Answer:

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

A. SO_2

B. H_2O_2

C. CO_2

D. NO_2

Answer:

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86. The oxidation state of chromium is $\left[Cr(PPh_3)_3(CO)_3\right]$ is

A. $+3$

B. $+8$

C. 0

D. $+5$

Answer:

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87. The values of the x and y in the following redox reaction.

$$xCl_2 + 6\overset{\ominus}{O}H \rightarrow ClO_3^{\ominus} + yCl^{\ominus} + 3H_2O$$

A. x=2, y=4

B. x=5, y=3

C. x=3, y=5

D. x=4, y=2

Answer:

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88. Which gas is evolved when PbO_2 is treated with conc HNO_3 ?

A. NO_2

B. O_2

C. N_2

D. N_2O

Answer:

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89. 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:

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90. In alkaline medium, ClO_2 oxidises $H_2O_2 \text{to} O_2$ and is itself reduced to $Cl^{\ominus}$. How many moles of H_2O_2 are oxidised by $1 \text{mol of } ClO_2$?

A. 1

B. $3/2$

C. $5/2$

D. $7/2$

Answer:

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91. Match the reaction in column I with average number given in column II.

	Column - I Reaction		Column - II Average oxidation number of Fe
a	$Fe_4[Fe(CN)_6]_3$ (Ferri – ferrocyanide) (Prussian blue)	p	$\frac{12}{5}$
b	$Fe_4[Fe(CN)_6]$ (Ferro ferri cyanide) (Turnbull's blue)	q	2
c	$Fe[Fe(CN)_6]_2$ (Ferri – Ferricyanide)	r	$\frac{18}{7}$
d	$Fe[Fe(CN)_6]$ (Ferri – ferricyanide)	s	1
e	$Na_2[Fe(CN)_5NO]$ (Sodium nitrorusside)	t	3
f	$[Fe(NO)(H_2O)_5]SO_4$	u	$\frac{8}{3}$
g	Fe_3O_4		

A. a-r, b-c, c-q, d-t, e-q,t, f-s, g-u

B. a-r, b-q, c-p, d-t, e-q, f-s, g-u

C. a-u, b-q, c-p, d-t, e-q, f-s, g-r

D. a-r, b-q, c-p, d-t, e-s, f-q, g-u

Answer:

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92. Assertion (A): H_2O_2 acts only as an oxidising agnet.

$H_2O_2 \rightarrow H_2O + O$

Reason (R): All peroxides behave as oxidising agnets only.

A. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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93. Assertion (A): $KMnO_4$ is a stronger oxidising agent than $K_2Cr_2O_7$.

Reason (R): This is due to increasing stability of the lower species to which they are reduced.

A. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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94. Assertion (A): SO_2 and Cl_2 are both bleaching agents.

Reason (R): Both are reducing agents.

A. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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95. Assertion (A): F_2 undergoes disproportionation reaction.

Reason (R): Fluorine shows both positive and negative oxidation states.

A. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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96. Assertion (A): Sn reacts with HCl to produce H_2 gas.

Reason (R): Sn is a better reducing agent than H_2 gas.

A. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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97. Assertion (A): In aqueous solution, SO_2 reacts with H_2S liberating sulphur

Reason (R): SO_2 is an effective reducing agent.

A. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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98. Assertion (A): $PbCl_2$ is more stable than $PbCl_4$.

Reason (R): $PbCl_4$ is a powerful oxidising agent.

A. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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99. Assertion (A):F_2 is stronger reducing agent than O_2

Reason (R): O_2 is more electronegative.

A. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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100. Assertion (A): The two Fe atoms in Fe_3O_4 have different oxidation numbers.

Reason (R): Fe^{2+} ions decolourise $KMnO_4$ solution.

A. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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101. Assertion (A): HNO_3 acts only as an oxidising agent, while HNO_2 acts both as an oxidising agnet and a reducing agent.

Reason (R): The oxidation number of N in HNO_3 is maximum.

A. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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102. Assertion (A): O_3 can act as an oxidising agent as wll as a reducing agent, but SO_2 can act only as an oxidant.

Reason (R): The oxidation number of O in O_3 is zero, and the oxidiation number of S in SO_2 is $+4$.

A. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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103. Assertion (A): Sodium perxenate (Na_4XeO_6) reacts with NaF in acidic medium to give XeO_3 and F_2

Reason (R): XeO_6^{4-} is a stronger oxidant than F_2.

A. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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104. Assertion (A): In the process of drying dishes with a towel, the wetting agent is the dish and the drying agent is the towel.

Reason (R): The wetting agent gets wet during the process.

A. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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105. Assertion (A): A reaction between Fe and I_2 occurs, but a reaction between Fe^{2+} and $I^{\ominus}$ does not occur.

Reason (R): Fe is a better reducing agent than $I^{\ominus}$.

A. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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106. Assertion: (A): The reactions between NH_3 and $MnO_4^{\ominus}$ occurs in an acidic medium.

$NH_3 + MnO_4^{\ominus} \rightarrow MnO_2 + NO_2$

Reason (R): $MnO_4^{\ominus}$ is reduced to MnO_2 in acidic medium.

A. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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107. Oxidation number of nickel in $Ni(CI)_4$

A. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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108. Assertion :- $H_2S + Cl_2 \rightarrow 2HCl + S$

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

Reason :- In a reaction the element whose oxidation number decreases is reduced and the element whose oxidation number increases is oxidised

A. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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109. Oxidation number of sulphur in H_2SO_5 is

A. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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110. In $K_4Fe(CN)_6$

A. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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111. Assertion (A) Among halogens fluorine is the best oxidation.

Reason (R) Fluorine is the most electronegative atom

A. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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112. 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. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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

Reason : 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. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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114. 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. If Both A and R are correct but R is the not correct explanation of A

B. If A is correct but R is incorrect

C. If A is incorrect but R is correct

D. If both A and R are incorrect

Answer:

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