CHEMISTRY

JEE (MAIN AND ADVANCED) CHEMISTRY

REDOX REACTIONS

Lecture Sheet Exercise I Level I Main Straight Objective Type Questions

1. Oxidation state of .S. in S_8 molecule is

A. 0

B. $+2$

C. $+4$

D. $+6$

Answer: A

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2. Oxidation state of N in N_3H is

A. $+1/3$

B. $+3$

C. $-1/3$

D. -1

Answer: C

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3. Oxidation number of C in CH_2O is

A. -2

B. $+2$

C. 0

D. 4

Answer: C

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4. Oxidation state of Ni in $Ni(CO)_4$ is

A. -2

B. $+2$

C. 0

D. 4

Answer: A

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5. Oxidation state of Fe in $K_4\left[Fe(CN)_6\right]$

A. $+6$

B. $+4$

C. $+2$

D. $+5$

Answer: C

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6. Oxidation number and valency of oxygen in OF_2 are

A. $+1, 2$

B. $+2, 2$

C. $+1, 1$

D. $+2, 1$

Answer: B

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7. In which of the following the oxidation state of chlorine is +5?

A. $HClO_4$

B. $HClO_3$

C. $HClO_2$

D. HCl

Answer: B

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8. All elements commonly exhibit an oxidation state of

A. $+1$

B. -1

C. zero

D. $+2$

Answer: C

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9. The maximum oxidaton state that fluorine exhibits is

A. -1

B. zero

C. $+1$

D. $+2$

Answer: B

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10. The element that always exhibits a negative oxidation state in its compounds is

A. Nitrogen

B. Oxygen

C. Fluorine

D. Chlorine

Answer: C

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11. The minimum oxidation state that nitrogen exhibits is

A. -2

B. -3

C. -4

D. -5

Answer: B

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12. In the conversion of $K_2Cr_2O_7$ to K_2CrO_4 the oxidation number of the following changes

A. K

B. Cr

C. Oxygen

D. None

Answer: D

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13. The oxidation number of 'Mn' in potassium permanganate is

A. $+6$

B. -7

C. $+5$

D. $+8$

Answer: B

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14. The oxidation number of .N. in NH_2OH is

A. $1/3$

B. 0

C. -1

D. 1

Answer: C

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15. What is the oxidation state of carbon in carbondioxide?

A. $+2$

B. $+4$

C. $+6$

D. $+1$

Answer: B

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16. In which of the following compounds oxygen exhibits an oxidations state of $+2$?

A. H_2O

B. H_2O_2

C. OF_2

D. H_2SO_4

Answer: C

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17. The oxidation number of sulphur in S_8, S_2F_2 and H_2S are

A. 0,+1 and -2

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

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

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

Answer: A

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18. In the conversion of $CrO_4^{-2} \rightarrow Cr_2O_7^{-2}$, the oxidation number of oxygen

A. increases

B. decreases

C. becomes zeo

D. remains unchanged

Answer: D

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19. Oxidation number of carbon is zero in the compound

A. methyl chloride

B. chloroform

C. glucose

D. carbon tetrachloride

Answer: C

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	LIST - 1 (Oxidation state)	LIST - 2 (Substance)
	A) $+3$	1) Nitrogen
20.	B) $+1$	2) Nitrous oxide
	C) 0	3) Nitrate ion
	D) $+5$	4) Hydroxylamine
		5) Nitrite ion

The correct match is

A.

A	B	C	D
1	4	3	2

B.

A	B	C	D
5	2	4	3

C.

A	B	C	D
4	5	3	1

D.

A	B	C	D
5	2	1	3

Answer: D

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21.

LIST - 1	LIST - 2
A) NH_3	1) Oxidant
B) $KMnO_4$	2) Both oxidant and reductant
C) SO_2	3) Neither oxidant nor reductant
D) He	4) Reductant
	5) Dehydrating agent

The correct match is

A.

A	B	C	D
4	3	1	5

B.

A	B	C	D
2	4	1	3

C.

A	B	C	D
4	1	2	3

D.

A	B	C	D
3	2	1	4

Answer: C

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22. In the reaction, $I_2 + 2KClO_3 \rightarrow 2KIO_3 + Cl_2$

i) Iodine is oxidised

ii) Chlorine is reduced

iii) Iodine displaces chlorine

iv) $KCIOP_3$ is decomposed

The correct combination is

A. Only i & iv are correct

B. Only iii & iv are correct

C. i,ii,iii are correct

D. All are correct

Answer: C

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23. Which of the following reactions does not involve the change in oxidation state of metal?

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

B. $K \rightarrow K^+$

C. $Cu^{2+} \rightarrow Cus$

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

Answer: B

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

A. $2BaO + O_2 \rightarrow 2BaO_2$

B. $BaO_2 + H_2SO_4 \rightarrow BaSO_4 + H_2O_2$

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

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

Answer: C

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25. (A) : Reaction of NaOH with chlorine is a disproportionation reaction .

(R) : All redox reactions are disproportionation reactions .

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26. $2CuI \rightarrow Cu + CuI_2$ the reaction is

A. disproportionation

B. Neutralisation

C. Oxisation

D. Reduction

Answer: A

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27. Which of the following is not chemical combinations

A. $C + O_2 \rightarrow CO_2$

B. $S + O_2 \rightarrow SO_2$

C. $2Al + N_2 \rightarrow 2AlN$

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

Answer: A

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28. Which of the following is decomposition reaction

A. $2HgO \rightarrow 2Hg + O_2$

B. $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

C. $S + O_2 \rightarrow SO_2$

D. $Cl_2 + 2KBr + 2KCl + Br_2$

Answer: A

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29. Which of the following is not Decomposition reactions

A. $2HgO \rightarrow 2Hg + O_2$

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

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

D. $CH_{4(g)} + 2O_{2(g)} + 2H_2O_{(l)}$

Answer: D

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30. Following reaction describes the rusting of iron $4Fe + 3O_2 \rightarrow 4Fe^{3+} + 6O^{2-}$. Which one of the following statement is incorrect .

A. This is an example of a redox reaction

B. Metallic iron is reduced to Fe^{3+}

C. Fe^{3+} is an oxidising agent

D. Metallic iron is a reducing agent

Answer: B

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Lecture Sheet Exercise I Level Ii Advanced Straight Objective Type Questions

1. Most stable oxidation state of gold is

A. $+1$

B. $+3$

C. $+2$

D. $+4$

Answer: B

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2. The most stable oxidation state of chromium is

A. $+5$

B. $+3$

C. $+2$

D. $+4$

Answer: B

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3. Oxidation number of carbon in C_3O_2, Mg_2O_3 are respectively :

A. $-\frac{4}{3}, +\frac{4}{3}$

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

C. $-\frac{2}{3}, +\frac{2}{3}$

D. $-\frac{2}{3}, +\frac{4}{3}$

Answer: B

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4. The atomic number of an element which shows the oxidation state of + 3 is

A. 13

B. 32

C. 33

D. 17

Answer: A

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

A. 2

B. 4

C. 6

D. 8

Answer: C

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6. It is found that V forms a double salt, isomorphous will Mohr.s salt. The oxidation number of V in this compound is

A. $+3$

B. $+2$

C. $+4$

D. -4

Answer: B

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7. The oxidation number of phosphorous in $Mg_2P_2O_7$ is

A. $+5$

B. -5

C. $+6$

D. -7

Answer: A

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

A. $+1$

B. $+2$

C. $+3$

D. $+4$

Answer: B

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9. Among the following , 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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10. Oxidation number of CI in $NOCIO_4$ is

A. $+7$

B. -7

C. $+5$

D. -5

Answer: A

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11. Oxidation number of Chlorine in chlorine heptaoxide is

A. $+1$

B. $+4$

C. $+6$

D. $+7$

Answer: D

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12. Oxidation number of Cr in K_3CrO_8 is

A. $+3$

B. $+5$

C. $+8$

D. $+6$

Answer: B

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13. Addition of zinc power to $CuSO_4$ solution precipitate copper due to

A. reduction of Cu^{2+}

B. reduction of SO_4^{2-}

C. reduction of Zn

D. hydrolysis of $CuSO_4$

Answer: A

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14. Which change occurs when lead monoxide is converted into lead nitrate ?

A. Oxidation

B. Reduction

C. Neither oxidation nor reduction

D. Both oxidation and reduction

Answer: C

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15. In the reaction , $As_2S_3 + HNO_3 \rightarrow H_3AsO_4 + H_2SO_4 + NO$, the element oxidised is/are :

A. As only

B. S only

C. N only

D. As and S both

Answer: D

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16. Which combination is odd with respect to oxidation number ?

A. $H_2SO_5, H_2S_2O_8, K_2Cr_2, SF_6$

B. $K_2Cr_2O_7, K_2CrO_4, CrO_5, CrO_2Cl_2$

C. $NH_3, NH_4^+, N_3H, NO_2^-$

D. CaH_2, NaH, LiH, MgH_2

Answer: C

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17. In a conjugate pair of reductant and oxidant, the oxidant has

A. higher ox. no

B. lower ox.no.

C. same ox.no

D. either of these

Answer: A

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18. In which SO_2 acts as oxidant, while reacting with

A. acidified $KMnO_4$

B. acidified $K_2Cr_2O_7$

C. H_2S

D. acidified C_2H_5OH

Answer: C

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19. Which is not an oxidising agent ?

A. $KClO_3$

B. O_2

C. $C_6H_{12}O_6$

D. $K_2Cr_2O_7$

Answer: C

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20. In which reactions hydrogen is acting as an oxidizing agent?

A. with iodine to give hydrogen iodie

B. with lithium to give lithium hydride

C. with nitrogen to give ammonia

D. with sulphur to give hydrogen sulphide

Answer: B

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21. Which substance serves as a reducing agent in the following reactions ?

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

A. H_2O

B. O_2

C. H^+

D. $Cr_2O_7^{2-}$

Answer: B

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22. Which reaction indicates the oxidising behaviour of H....

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

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

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

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

Answer: D

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23. As the oxidation state for any metal increases, the tendency to show ionic nature

A. Decreases

B. Increases

C. Remains same

D. None of these

Answer: A

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

A. XY_1Z_2

B. $Y_2(XZ_3)_2$

C. $X_3(YZ_4)_2$

D. $X_3(Y_4Z)_2$

Answer: C

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25. How many electrons are transferred from reductant to oxidant is the following redox $As_2S_3 + HNO_3 \rightarrow H_3ASO_4 + H_2SO_4 + NO$

A. 2

B. 4

C. 24

D. 84

Answer: D

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Lecture Sheet Exercise I Level Ii Advanced More Than One Correct Answer Type Questions

1. Which statments (s) about oxidatien number is are correct?

A. The oxidation number is the number of electrons lost (+ve) or gained (-ve) by an atom during the formation of ionic compounds

B. For covalent compounds, the oxidation number is indicated by the charge that an atom of element would have acquired if the subtance would have been ionic

C. Oxidation number may have fractional values

D. Oxidation number is always negative.

Answer: A::B::C

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2. The different oxidation state (s) by oxygen is (are) _____

A. -2

B. -1

C. 0

D. $-\frac{1}{2}$

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

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3. The oxidation number of carbon is zero is

A. HCHO

B. CH_2Cl_2

C. $C_6H_{12}O_6$

D. $C_{12}H_{22}O_{11}$

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

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4. The oxidation number of Cr is +6 in

A. $FeCr_2O_4$

B. $KCrO_3Cl$

C. CrO_3

D. $[Cr(OH_4)]^-$

Answer: B::C

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5. Which of the following 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. $H_2SO_5 > H_2SO_3 > SCl_2 > H_2S$

D. $H_2SO_4 > SO_2 > H_2S > H_2S_2O_8$

Answer: A::C

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6. Which of the following statements (s) is (are) correct ?

A. All reaction are oxidation and reduction reactions

B. Oxidizing agent is itself reduced

C. Oxidation and reduction always go side by side

D. Oxidation number during reduction decreases

Answer: B::C::D

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7. Which of the following reactions involve oxidation reduction?

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

B. $CuI_2 + Cl_2 \rightarrow CuCl_2 + I_2$

C. $NH_4Cl + NaOH \rightarrow NaCl + NH_3 + H_2O$

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

Answer: A::B

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8. In the redox reaction $2S_2O_3^{2-} + I_2 \rightarrow S_4O_6^{2-} + 2I^-$

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

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

C. I_2 gets reduced to I^-

D. I_2 gets oxidised to I^-

Answer: A::C

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9. Which of the following represents redox reaction ?

A. $SO_3^{2-} + I^- \rightarrow I_2 + SO_3^{2-}$

B. $Ca(OH)_2 + Cl_2 \rightarrow Ca(OCl)_2 + CaCl_2$

C. $PCl_5 \rightarrow PCl_3 + Cl_2$

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

Answer: A::B::C

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10. Which of the following act both as oxidising as well as reducing agents?

A. HNO_2

B. SO_2

C. H_2O_2

D. H_2S

Answer: A::B::C

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11. In the reaction : $Cl_2 + OH^- \rightarrow Cl^- + ClO_4^- + H_2O$ chlorine is :

A. Oxidized

B. Reduced

C. Disproportionate

D. Neither oxidized nor reduced

Answer: A::B::C

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Lecture Sheet Exercise I Level Ii Advanced Linked Comprehension Type Questions

1. For the reaction $2KClO_3 \rightarrow 2KCl + 3O_2$ which statments (s) is (are) correct ?

A. It is disproportionation

B. It is intramolecular redox change

C. Cl atoms are reduced

D. Oxygen atoms are oxidized

Answer: B::C::D

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2. Oxidation number is the charge which an atom of an element has in its ion or appears to have when present in the combined state. It is also called oxidation state. Oxidation number of any atom in the elementary state is zero. Oxidation number of a monoatomic ion is equal to the charge on it. In compounds of metals with non metals, metals have positive oxidation number while non metals have negative oxidation

numbers. In compounds of two difference elements, the more electronegative element has negative oxidation number whereas the other has positive oxidation number. In complex ions, the sum of the oxidation number of all the atoms is equal to the charge on the ion. If a compound contains two or more atoms of the same element, they may have same or different oxidation states according as their chemical bonding is same or different.

Oxidation number of sodium in sodium amalgam is

A. $+1$

B. 0

C. -1

D. $+2$

Answer: B

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3. Oxidation number is the charge which an atom of an element has in its ion or appears to have when present in the combined state. It is also called oxidation state. Oxidation number of any atom in the elementary state is zero. Oxidation number of a monoatomic ion is equal to the charge on it. In compounds of metals with non metals, metals have positive oxidation number while non metals have negative oxidation numbers. In compounds of two difference elements, the more electronegative element has negative oxidation number whereas the other has positive oxidation number. In complex ions, the sum of the oxidation number of all the atoms is equal to the charge on the ion. If a compound contains two or more atoms of the same element, they may have same or different oxidation states according as their chemical bonding is same or different.

The oxidation state of the most electronegative element in the products of the reaction between BaO_2 and H_2SO_4 are

A. 0 and - 1

B. $-1 \text{ and } -2$

C. -2 and 0

D. -2 and -1

Answer: B

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4. Oxidation number is the charge which an atom of an element has in its ion or appears to have when present in the combined state. It is also called oxidation state. Oxidation number of any atom in the elementary state is zero. Oxidation number of a monoatomic ion is equal to the charge on it. In compounds of metals with non metals, metals have positive oxidation number while non metals have negative oxidation numbers. In compounds of two difference elements, the more electronegative element has negative oxidation number whereas the other has positive oxidation number. In complex ions, the sum of the oxidation number of all the atoms is equal to the charge on the ion. If a compound contains two or more atoms of the same element, they may have same or different oxidation states according as their chemical

bonding is same or different.

A compound of Xe and F is found to have 53.3% Xe (atomic weight =133).

Oxidation number of Xe in this compound is

A. $+2$

B. 0

C. $+4$

D. $+6$

Answer: D

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Lecture Sheet Exercise I Level Ii Advanced Matrix Matching Type Questions

1. Match the underlined element in the compound in column-I with its oxidation state in column-II

Column-I (Compound)	Column-II (Oxidation state)
A) $H_2\underline{S}_2O_8$	P) +6
B) $\underline{H}_2SO_4$	Q) +1
C) $CaO\underline{Cl}_2$	R) −1
D) $\underline{N}O_2$	S) 4

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2. Match the compound in column-I with oxidation state of Nitrogen in column -II

Column-I	Column-II
A) NaN_3	P) +5
B) N_2H_4	Q) +2
C) NO	R) −1/3
D) N_2O_5	S) −2

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3. Match the following columns

A) $FeCl_3$	P) $2KClO_3 \xrightarrow{\Delta} 2KCl + 3O_2$
B) Redox reaction	Q) Reducing agent
C) H_2S	R) Oxidising agent
D) Decomposition reaction	S) Exothermic

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Lecture Sheet Exercise I Level Ii Advanced Integer Type Questions

1. When methane is burnt in oxygen to produce CO_2 and H_2O Find the Change in oxidation number ?

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2. One mole of N_2H_4 loses 10 mole electrons to from a new compound X Assuming that at the N_2 appears in new compound There is no change in oxidation state of H. What is tha oxidation state on N in X ?

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3. The number of electrons involved in the reduction of nitrate ion to hydrazine is .....

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4. The number of of electrons required to balance the following equation

$NO_3^- + 4H^+ + e^- \rightarrow 2H_2O + NO$ is _____

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Lecture Sheet Exercise Ii Level I Main Straight Objective Type Questions

1. In the reaction $MnO_4^- + SO_3^{2-} + H^+ \rightarrow Mn^{2+} + SO_4^{2-}$ the number of H^+ ions involved is

A. 2

B. 6

C. 8

D. 16

Answer: B

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2. $Cr(OH)_3 + H_2O_2 \xrightarrow{\text{Alkali}} CrO_4^{-2} + H_2O$ the number of OH^- required to balance the above equation

A. 1

B. 3

C. 4

D. 6

Answer: C

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3. In the reaction the stoichiometry coefficients of $Cr_2O_7^{2-}$, NO_2^- and H^+ respectively are

$Cr_2O_7^{2-} + NO_2^- + H^+ \rightarrow Cr^{3+} + NO_3^- + H_2O$

A. 1,3,8

B. 1,4,8

C. 1,3,12

D. 1,5,12

Answer: A

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4. Equivalent weight of $Ba(MNO_4)_2$ in acidic medium (M = molar mass)

A. M

B. M/3

C. M/5

D. M/10

Answer: D

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5. Equivalent weight of As_2O_3 in the following equation $As_2O_3 + 2I_2 + 2H_2O \rightarrow As_2O_5 + 4HI$ [arsenci at wt. = 75]

A. 49.5

B. 156.6

C. 94

D. 75

Answer: A

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6. Whast is the oxidation state of Fe in the product formed when acidified potassium ferrocyanide $K_4[Fe(CN)_6]$ is treated with hydrogen peroxide?

A. $+2$

B. $+3$

C. $+1$

D. $+6$

Answer: B

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7. The number of moles of MnO_4^- and $Cr_2O_7^{-2}$ separately required to oxidise 1 mole of FeC_2O_4 each in acidic medium respectively

A. $0.5, 0.6$

B. $0.6, 0.4$

C. $1.2, 05$

D. $0.6, 0.5$

Answer: D

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8. Volume V_1 ml of 0.1 $K_2Cr_2O_7$ is needed for complete oxidation of 0.67g N_2H_4 in acidic medium The volume of 0.3 M $KMnO_4$ need for same oxidation state in acidic medium will be

A. $\frac{2}{5}V_1$

B. $\frac{5}{2}V_1$

C. $113V_1$

D. can.t say

Answer: A

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9. 25ml of a 0.1M solution of a stable cation of transitional metal Z reacts exactly with 25ml of 0.04M acidified $KMnO_4$ solution. Which of the following is most likely to reperesent the chance in oxidation state of Z correctly

A. $Z^+ \rightarrow Z^{2+}$

B. $Z^{2+} \rightarrow Z^{3+}$

C. $Z^{3+} + 2^{4+}$

D. $Z^{2+} \rightarrow 2^{4+}$

Answer: D

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10. What weight of HNO_3 is needed to convert 5g of iodine into HIO_3 according to the reaction $I_2 + HNO_3 \rightarrow HIO_3 + NO_2 + H_2O$

A. 12.4g

B. 24.8g

C. 0.248g

D. 49.6g

Answer: A

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11. What volume of 0.1M $KMnO_4$ is needed to oxidise 5mg of ferrous oxalate in acidc medium (MW of ferrous oxalate is 144) approximately 0.20 mL

A. 0.1 mL

B. 0.4 mL

C. 2.08mL

D. 49.6 g

Answer: A

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12. n-factors for Cu_2S and Cus when they react with $KMnO_4$ in acidic medium are (neglecting the further oxidation of released SO_2

A. 7,7

B. 6,6

C. 6,8

D. 8,6

Answer: D

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13. When 5.0 g of a metal is strongly heated, 9.44g of its oxide is obtained.

Then the equivalent mass of the metal is ?

A. 12

B. 9

C. 32.5

D. 31.75

Answer: B

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14. Equal volumes of 1 M each of $KMnO_4$ and $K_2Cr_2O_7$ are used to oxidize Fe(II) solution in acidic medium. The amcunt of Fe oxidized will be

A. more with $KMnO_4$

B. more with $K_2Cr_2O_7$

C. equal with both oxidizing agents

D. cannot be determined

Answer: B

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15. How many moles of $KMnO_4$ are needed to oxidised a mixture of 1 mole of each $FeSO_4$ & FeC_2O_4 in acidic medium

A. $4/5$

B. $5/4$

C. $3/4$

D. $5/3$

Answer: A

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16. Hydroxyl amine reduces iron (III) according to following equation

$$NH_2OH + Fe_2(SO_4)_3 \rightarrow N_2(g) + H_2O + FeSO_4 + H_2SO_4$$

Which statement is correct

A. n-factor for Hydroxyl amine is 12

B. equivalent weight of $Fe_2(SO_4)_3$, is M/2

C. 6 meq of $Fe_2(SO_4)_3$, is contained in 3 millimoles of ferric sulphate

D. all of these

Answer: D

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17. When 159.5g of $CuSo_4$ solution is reacted with KI, then the liberated iodine required 100 ml of 1 M $Na_2S_2O_3$ for complete reaction, then what is the percentage purity of Cu in $CuSO_4$ solution

A. $10\ \%$

B. $20\ \%$

C. $5\ \%$

D. $40\ \%$

Answer: A

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18. 1.60g of a metal were dissolved in HNO_3 to prepare its nitrate. The nitrate on strong heating gives 2g oxide. The equivalent weight of metal is

A. 16

B. 32

C. 48

D. 12

Answer: B

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19. Correct order of tendency to loss of electrons

A. $Zn > Cu > Ag$

B. $Zn < Cu < Ag$

C. $Zn > Cu < Ag$

D. $Cu > Zn > Ag$

Answer: A

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Lecture Sheet Exercise Ii Level Ii Advanced Straight Objective Type Questions

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

A. 2

B. 1

C. 3

D. 4

Answer: A

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2. In the reaction, $CH_3OH \rightarrow HCOOH$, the number of electrons that must be added to the right is :

A. 4

B. 3

C. 2

D. 1

Answer: A

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3. In balancing the half-reaction, $S_2O_3^{2-} \rightarrow S(s)$, the number of electrons that must be added is

A. 2 on the right

B. 2 on the left

C. 3 on the right

D. 4 on the left

Answer: D

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4. Number of electrons involved in the reduction of $Cr_2O_7^{2-}$ ion in acidic solution to Cr^{3+} is

A. 3

B. 4

C. 2

D. 6

Answer: B

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5. Equivalent mass 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: A

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6. In the following change, $3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$ If the atomic mass of iron is 56, then its equivalent mass will be :

A. 42

B. 21

C. 63

D. 84

Answer: B

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7. The eq. mass of $Na_2S_2O_3$ as reductant in the reaction, $Na_2S_2O_2 + H_2O + Cl_2 \rightarrow Na_2SO_4 + 2HCl$ is

A. $\frac{M}{1}$

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

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

D. $\frac{M}{8}$

Answer: D

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8. Equivalent mass of N, in the change $N_2 - NH_3$ is

A. 28/6

B. 28

C. 28/2

D. 28/3

Answer: A

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9. In present of dil. H_2SO_4 the equivalent mass of $KMnO_4$ is

A. M/5

B. M/6

C. M/10

D. M/2

Answer: A

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10. The equivalent mass of iron in Fe_2O_3 would be

A. 18.6

B. 28

C. 56

D. 11

Answer: A

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11. When iron reacts with Brion in acid solution Br_2 is liberated. The equivalent mass of $KBrO_3$ in this reaction is

A. M/8

B. M/3

C. M/5

D. M/6

Answer: C

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12. What is the equivalent mass of KIO_3 in the given reaction ?

$KIO_3 + 2KI + 6HCI \rightarrow 3lCl + 3KCl + 3H_2O$

A. 214

B. 428

C. 107

D. 53.5

Answer: D

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13. What is E_{O_3} in the following reaction, $2O_3 \rightarrow 3O_2$

A. 16

B. 48

C. 32

D. 8

Answer: D

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14. The mass of 50% (mass/mass) solution of HCI required to react with 100g of $CaCO_3$ would be

A. 73 g

B. 100 g

C. 146 g

D. 200 g

Answer: C

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15. For the reaction, $2Fe^{3+} + Sn^{2+} \rightarrow 2Fe^{2+} + Sn^{4+}$ the normality of SnCl, (mol. wt. = 189.7) solution prepared by dissolving 47.5g in acid solution and diluting with H_2O to a total of 2.25 litre is

A. 0.222N

B. 0.111 N

C. 0.333 N

D. 0.444 N

Answer: A

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Lecture Sheet Exercise Ii Level Ii Advanced More Than One Correct Answer Type Questions

1. The equation for a reaction is shown below:

$2MnO_4^- + 5H_2O_2 + 6H^+ \rightarrow 2Mn^{2+} + 8H_2O + 5O_2$

Which of the following statements about this reaction are correct ?

A. Hydrogen ions are oxidised to water.

B. Hydrogen peroxide is oxidised to oxygen

C. The oxidation number of manganese changes by 6.

D. Hydrogen peroxide is reduced to water.

Answer: B::D

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2. $5Cu + 2HNO_3 \rightarrow 5CuO + H_2O + N_2$, mark out the correct statement(s)

A. a. Equivalent wt. of Cu = 31.75

B. b. Equivalent wt. of $HNO_3 = 12.6$

C. c. Equivalent wt. of $N_2 = 2.8$

D. d. Balanced chemical reaction suggest that 10 equivalents of Cu combines with 10 equivalents of HNO_3 in order to produce CuO and 10 equivalents of N_2

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

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3. On being heated in oxygen, 3.120 g of a metal M converts to 4.560 g of oxide (atomic weight of M = 52.0). Mark out the correct statement(s)

A. Equivalent wt. of metal M = 17.33

B. Number of equivalents of oxygen reacted with metal = 0.09

C. Metal M forms halide MCI_2

D. The simplest formula of the metal oxide which it forms is M_2O_3

Answer: B::C

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4. Which of the following are correct about the reaction, $FeS_2 + O_2 \rightarrow Fe_2O_3 + SO_2$

A. E.q. wt. of FeS_2 is M/11

B. Eq. wt. of SO_2 is M/5.5

C. S has -2 oxidation state in FeS_2

D. 1 mole of FeS_2 requires 7/4 mole of O_2

Answer: A::B::D

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5. Preparation of Cl_2 from HCl and MnO_2 involves the process of:

A. Oxidation of MnO_2

B. Reduction of MnO_2

C. Dehydration

D. Oxidation of chloride ion

Answer: B::D

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

A. Bromine is oxidized and carbonate is reduced

B. Bromine is oxidized

C. Bromine is reduced

D. It is disproportionation reaction or auto redox change

Answer: B::C::D

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7. The salt $KHC_2O_4H_2C_2O_4.4H_2O$ may be used as reducing agent as well as an acid. Choose the correct option (S):

A. The equivalent weight of the salt is 72.5 g-equivalent^{-1}, when reacted with acidified $KMnO_4$ solution.

B. The equivalent weight of the salt is 145 g-equivalent^{-1} , when reacted with NaOH solution,

C. The volume of CO_2 liberated at STP by 1 g of salt when reacted with excess of acidified $KMnO_4$ is 309 ml.

D. The number of ionizable hydrogen ion is one.

Answer: A::C

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Lecture Sheet Exercise Ii Level Ii Advanced Linked Comprehension Type Questions

1. The equivalent weights of oxidising and reducing agents can be calculated by the number of electrons gained or lost. The equivalent weight of an oxidising agent is the number of parts by weight of the substance which gains one electron. Thus, it is equal to the molecular weight of the substance divided by the number of electrons gained in the balanced chemical equation. Similarly, equivalent weight of a reducing agent is equal to the molecular weight divided by the number of electrons lost as represented in the balanced chemical equation

Equivalent weight of MnO_4^- in acidic, basic and neutral media are in the ratio of

A. $3:5:15$

B. $5:3:1$

C. $5:1:3$

D. $3:5:5$

Answer: D

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2. The equivalent weights of oxidising and reducing agents can be calculated by the number of electrons gained or lost. The equivalent weight of an oxidising agent is the number of parts by weight of the substance which gains one electron. Thus, it is equal to the molecular weight of the substance divided by the number of electrons gained in the balanced chemical equation. Similarly, equivalent weight of a reducing agent is equal to the molecular weight divided by the number of electrons lost as represented in the balanced chemical equation

The equivalent weight of barium in $BaCrO_4$ used as an oxidising agent in acidic medium is (At, wt, of Ba - 137.34)

A. 137.34

B. 45.78

C. 114.45

D. 68.67

Answer: B

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3. The equivalent weights of oxidising and reducing agents can be calculated by the number of electrons gained or lost. The equivalent weight of an oxidising agent is the number of parts by weight of the substance which gains one electron. Thus, it is equal to the molecular weight of the substance divided by the number of electrons gained in the balanced chemical equation. Similarly, equivalent weight of a reducing agent is equal to the molecular weight divided by the number of electrons lost as represented in the balanced chemical equation

The equivalent weght of As_2, S_3 in the following reaction

$As_2S_3 + H^+ + NO_3^- \rightarrow NO + H_2O + AsO_4^{3-} + SO_4^{2-}$ is related to its molecular weight as

A. M/5

B. M /7

C. M / 14

D. M/28

Answer: D

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4. Acic base + Redox titration 1^{st} titration : $\frac{M}{10}$ reacts with oxalic acid as well as H_2SO_4 according to equation $H_2C_2O_4 + NaOH \rightarrow Na_2C_2O_4 + H_2O, H_2SO_4 + NaOH \rightarrow Na_2SO_4 +$

2^{nd} titration : The mixture solution is titrated with $\frac{M}{10} KMnO_4$ solution which will reacts with oxalic acid (redox titration) in the presence of H_2SO_4

$$H_2C_2O_4 + \underset{(\text{Purple})}{KMnO_4} + H_2SO_4 \rightarrow K_2SO_4 + \underset{(\text{Colourless})}{MnSO_4} + H_2O + CO_2$$

The reactionof oxalic acid with $KMnO_4$ is very slow therefore the oxalic acid solution is heated to $60 - 70^\circ C$ initially. Once the reation has started, its rate automatically increases. MnO_4^- acts as an oxidising agent.

$$MnO_4^- \xrightarrow{H^+} Mn^{++}, \underset{\text{colourless}}{MnO_4^{--}}, MnO_4 \xrightarrow[H_2O]{} \overset{\text{Brown ppt}}{MnO_2}$$

In the permanganate titration, the solution of reductant is always made acidic by adding H_2SO_4 rather than HCl or HNO_3 because

A. HCl is a reducing agent and it may get oxidised itself resulting into decrease in the volume of $KMnO_4$ equivalent to the reducing agent under estimation.

B. HNO_3 is an oxidising agent and it may get reduced resulting into consumption of more volume of $KMnO_4$ for the end ponit.

C. H_2SO_4 (dil.) is neither oxidising nor reducing agent

D. All of the above.

Answer: C

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5. Acic base + Redox titration 1^{st} titration : $\frac{M}{10}$ reacts with oxalic acid as well as H_2SO_4 according to equation $H_2C_2O_4 + NaOH \rightarrow Na_2C_2O_4 + H_2O, H_2SO_4) + NaOH \rightarrow Na_2SO_4 +$ 2^{nd} titration : The mixture solution is titrated with $\frac{M}{10}KMnO_4$ solution which will reacts with oxalic acid (redox titration) in the presence of

H_2SO_4

$$H_2C_2O_4 + KMnO_4 + H_2SO_4 \rightarrow K_2SO_4 + \underset{(\text{Colourless})}{MnSO_4} + H_2O + CO_2$$
$$\underset{(\text{Purple})}{}$$

The reactionof oxalic acid with $KMnO_4$ is very slow therefore the oxalic acid solution is heated to $60 - 70^\circ C$ initially. Once the reation has started, its rate automatically increases. MnO_4^- acts as an oxidising agent.

$$MnO_4^- \xrightarrow{H^+} \underset{\text{colourless}}{Mn^{++}}, MnO_4^{--}, MnO_4 \xrightarrow[H_2O]{} \overset{\text{Brown ppt}}{MnO_2}$$

Which statement is wrong?

A. In NaOH titration phenolphthalein indicator will be suitable

B. In redox titration with $KMnO_4$ the $KMnO_4$ itself acts as self indicator

C. Sulphuric acid should be added in excess other wise brown ppt of MnO_2 may appear

D. Both H_2SO_4 and $H_2C_2O_4$, are titrated with $KMnO_4$

Answer: D

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6. Acic base + Redox titration 1^{st} titration : $\frac{M}{10}$ reacts with oxalic acid as well as H_2SO_4 according to equation $H_2C_2O_4 + NaOH \rightarrow Na_2C_2O_4 + H_2O, H_2SO_4) + NaOH \rightarrow Na_2SO_4 +$ 2^{nd} titration : The mixture solution is titrated with $\frac{M}{10} KMnO_4$ solution which will reacts with oxalic acid (redox titration) in the presence of H_2SO_4

$$H_2C_2O_4 + \underset{(\text{Purple})}{KMnO_4} + H_2SO_4 \rightarrow K_2SO_4 + \underset{(\text{Colourless})}{MnSO_4} + H_2O + CO_2$$

The reactionof oxalic acid with $KMnO_4$ is very slow therefore the oxalic acid solution is heated to $60 - 70^\circ C$ initially. Once the reation has started, its rate automatically increases. MnO_4^- acts as an oxidising agent.

$$MnO_4^- \xrightarrow{H^+} \underset{\text{colourless}}{Mn^{++}, MnO_4^{--}, MnO_4} \xrightarrow[H_2O]{} \overset{\text{Brown ppt}}{MnO_2}$$

If 1.34 gm $Na_2C_2O_4$ dissolve in 50 ml of water this solution is titrated with $KMnO_4$ The volume of $KMnO_4$ used is

A. 20 ml

B. 200/3 ml

C. 40 ml

D. 60 ml

Answer: A

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7. 8.7 gm of a sample of MnO_2 (molar mass = 87) is used in a chemical reaction with HCl to release Cl_2 Released Cl_2 is used to displace I_2 from excess of KI solution. The iodine hence released is estimated using hypo and consumes 100 ml of hypo solution.12.5 ml of same hypo solution is required for complete reaction with 25 ml of 0.5 N I_2 solution.

Number of mili of iodine in the solution used with hypo are

A. 4.35

B. 43

C. 50

D. 6.25

Answer: C

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8. 8.7 gm of a sample of MnO_2 (molar mass = 87) is used in a chemical reaction with HCl to release Cl_2 Released Cl_2 is used to displace I_2 from excess of KI solution. The iodine hence released is estimated using hypo and consumes 100 ml of hypo solution.12.5 ml of same hypo solution is required for complete reaction with 25 ml of 0.5 N I_2 solution.

Number of mili of iodine in the solution used with hypo are

A. 106 g

B. 10.6 g

C. 5.3 g

D. 53 g

Answer: B

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9. 8.7 gm of a sample of MnO_2 (molar mass = 87) is used in a chemical reaction with HCl to release Cl_2 Released Cl_2 is used to displace I_2 from excess of KI solution. The iodine hence released is estimated using hypo and consumes 100 ml of hypo solution.12.5 ml of same hypo solution is required for complete reaction with 25 ml of 0.5 N I_2 solution.

Number of mili of iodine in the solution used with hypo are

A. 6.25

B. 12.5

C. 10

D. 20

Answer: A

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Lecture Sheet Exercise Ii Level Ii Advanced Matrix Matching Type Questions

1. Match the redox process in Column - I with n - factor for underlined species in Column - II

Column-I (Redox process)	Column-II (n-factor for underlined species)
A) $\underline{As_2S_3} \rightarrow AsO_3^- + SO_4^{2-}$	P) 28
B) $\underline{I_2} \rightarrow I^- + IO_3^-$	Q) 4/3
C) $\underline{H_3PO_2} \rightarrow PH_3 + 2H_3PO_3$	R) 1
D) $H_3PO_2 + \underline{NaOH} \rightarrow NaH_2PO_2 + H_2O$	S) 5/3

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2.

A) $O_2^- \rightarrow O_2 + O_2^{2-}$	P) redox reaction
B) $CrO_4^{2-} + H^+ \rightarrow$	Q) one of the products has trigonal planar structure
C) $MnO_4^- + NO_2^- + H^+ \rightarrow$	R) dimeric bridged tetra- hedral metal ion
D) $NO_3^- + H_2SO_4 + Fe^{2+} \rightarrow$	S) disproportionation

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Lecture Sheet Exercise Ii Level Ii Advanced Integer Type Questions

1. In the reaction $SnO_2 + nC \rightarrow Sn + nCO$ then the value of n is _____

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2. Find the oxidation number of Mn in the product of alkaline oxidative fusion of MnO_2

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3. $2Mn_2O_7 \rightarrow 4MnO_2 + 3O_2$ (If M is mol. wt. of Mn_2O_7). Find the equivalent, weight of Mn_2O_7 in the above change.

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4. In hot alkaline solution, Br_2 disproportionates to $3Br_2 - 6OH^- \rightarrow 5Br^- + BrO_3^- + 3H_2O$. The equivalent weight of Br_2 is 3M/x (mol wt = M). Then X is?

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5. Number of moles of $K_2Cr_2O_7$, reduced by one mole of Sn^{2+} ions is 1/x. The value of x is

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6. When copper is treated with a certain concentration of nitric acid, nitric oxide and nitrogen dioxide are liberated in equal volumes according to the following equation $xCu + yHNO_3 \rightarrow Cu(NO_3)_2 + NO + NO_2 + H_2O$. The coefficient of x is _____

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7. A 1.10 g sample of copper ore is dissolved and the Cu^{2+} is treated with excess KI. The liberated I_2 requires 12.12 mL of 0.10M $Na_2S_2O_3$ solution for titration. Find the % of copper by mass in ore.

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8. 1 mole each of FeC_2O_4 and $FeSO_4$ is oxidised separately by $1MKMnO_4$ in acid medium. Calculate the volume ratio of $KMnO_4$ used for FeC_2O_4 and $FeSO_4$

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Practice Sheet Exercise I Level I Main Straight Objective Type Questions

1. Which of the following shows highest oxidation number in combined state

A. Os

B. Ru

C. Both (1) and (2)

D. Fe

Answer: C

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2. The oxidation number that iron does not exhibit in its common compounds or in its elemental state is

A. 0

B. $+1$

C. $+2$

D. $+3$

Answer: A

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3. The halogen that shows same oxidation state in all its compounds with other element is

A. I_2

B. F_2

C. Cl_2

D. Br_2

Answer: B

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4. The oxidation states of the most electronegative element in the products of the reaction between BaO_2 with dilute H_2SO_4 are

A. 0 and - 1

B. -1 and -2

C. -2 and 0

D. -2 and $+2$

Answer: B

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5. In which, iron has the lowest oxidation state ?

A. $Fe(CO)_5$

B. Fe_2O

C. $K_4Fe(CN)_6$

D. $FeSO_4(NH_4)_2SO_46H_2O$

Answer: A

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6. Oxidation state of oxygen in H_2O_2 is

A. -2

B. -1

C. $+1$

D. $+2$

Answer: B

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7. In the conversion of Br_2 to BrO_3 the oxidation state of bromine changes from

A. 0 to + 5

B. - 1 to + 5

C. 0 to -3

D. + 2 to + 5

Answer: A

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8. The charge on cobalt in $\left[Co(CN)_6\right]^{3-}$ is

A. -6

B. $+3$

C. -3

D. $+6$

Answer: B

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9. In nitric oxide (NO), the oxidation state of nitrogen is

A. -2

B. $+1$

C. -1

D. $+2$

Answer: D

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10. In CH_2Cl_2 the oxidation number of C is

A. -4

B. $+2$

C. 0

D. $+4$

Answer: C

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11. Oxidation state of oxygen is -1 in the compound :

A. NO_2

B. MnO_2

C. PbO_2

D. Na_2O_2

Answer: D

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12. Chlorine has +1 oxidation state in

A. HCI

B. $HClO_3$

C. Cl_2O

D. ICl_3

Answer: C

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13. Oxidation number of S in S_2Cl_2 , is

A. $+1$

B. $+6$

C. 0

D. -1

Answer: A

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14. In which one of the following compounds the oxidation numberof iodine is fractional?

A. IF_7

B. I_3^-

C. IF_5

D. IF_3

Answer: B

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15. In MgH_2 oxidation number of hydrogen is:

A. -1

B. $+1$

C. -2

D. $+2$

Answer: A

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16. Which acts as a reducing agent ?

A. HNO_3

B. $KMnO_4$

C. H_2SO_4

D. $(COOH)_2$

Answer: D

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17. The compound that can work both as an oxidizing and reducing agent is

A. $KMnO_4$

B. H_2O_2

C. $Fe_2(SO_4)3$

D. $K_2Cr_2O_7$

Answer: B

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18. In the reaction, $C + 4HNO_3 \rightarrow CO_2 + 2H_2O + 4NO_2$, HNO_3 acts as

A. An oxidising agent

B. an acid

C. an acid as well as oxidising agent

D. a reducing agent

Answer: A

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19. In the reaction, $2Ag + 2H_2SO_4 \rightarrow Ag_2SO_4 + 2H_2O + SO_2$, H_2SO_4 acts as :

A. oxidising agent

B. reducing agent

C. dehydrating agent

D. none of these

Answer: A

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20. In which reaction H_2O_2 acts reducing agent ?

A. $Ag_2O + H_2O_2 + 2Ag + H_2O + O_2$

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

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

D. $H_2O_2 + SO_2 \rightarrow H_2SO_4$

Answer: A

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21. When SO_2 is passed in acidified potassium dichromate solution, the oxidation state of S 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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22. Which of the following is redox reaction

A. $N_2O_5 + H_2O \rightarrow 2HNO_3$

B. $AgNO_3 + KI \rightarrow AgI + KNO_3$

C. $BaO_2 + H_2SO_4 \rightarrow BaSO_4 + H_2O_2$

D. $SnCl_2 + HgCl_2 \rightarrow SnCl_4 + Hg$

Answer: D

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23. The decomposition of $KClO_3$ to KCl and O_2 on heating is an example of

A. Intermolecular redox change

B. Intramolecular redox change

C. Disproportionation or auto redox change

D. Comproportionation reaction

Answer: B

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24. In the reaction, $NaOH + H_2O + NaOH + H_2$

A. H^- is oxidised

B. Na^+ is reduced

C. both NaH and H_2O are reduced

D. None of the above

Answer: A

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25. Which of the following disproportionation reaction

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

B. $3I_2 \rightarrow 5I^- + I^{5+}$

C. $H_2O + Cl_2 \rightarrow Cl^- + ClO^- + 2H^+$

D. All of these

Answer: D

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Practice Sheet Exercise I Level Ii Advanced Straight Objective Type Questions

1. The oxidation state of sulphur in Caro.s and Marshel.s acids are:

A. $S^{6+}, 5^{6+}$

B. S^{6+}, S^{7+}

C. S^{6+}, S^{5+}

D. S^{6+}, S^{6-}

Answer: A

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2. Oxidation number of oxygen in KO_3, KO_2 and K_2O is

A. $-\frac{1}{3}, -\frac{1}{2}, -1$

B. $-\frac{1}{3}, -\frac{1}{2}, -\frac{1}{2}$

C. $-1, \ -1, \ -1$

D. $-2, \ -2, \ -2$

Answer: C

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3. It is found that V forms a double salt, isomorphous will Mohr.s salt. The oxidation number of V in this compound is

A. $+3$

B. $+2$

C. $+4$

D. -4

Answer: B

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4. Which among the followings shows maximum oxidation state ?

A. V

B. Fe

C. Mn

D. Cr

Answer: C

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5. Fluorine exhibits only -1 oxidation state, while iodine exhibits oxidation states of -1, +1, +3, +5 and +7. This is due to

A. Fluorine being a gas

B. available d-orbitals in iodine

C. non-availability of d-orbitals in iodine

D. iodine is a solid

Answer: B

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6. The oxidation sate of +3 for phosphorus is in

A. hypophosphorous acid

B. meta-phosphoric acid

C. ortho-phosphoric acid

D. phosphorous acid

Answer: D

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7. Oxidation number of P in $P_2O_4^{4-}$ is

A. $+3$

B. $+4$

C. $+5$

D. $+6$

Answer: C

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8. The oxidation state of I in $H_4IO_6^-$, is

A. $+7$

B. -1

C. $+5$

D. $+1$

Answer: C

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9. Oxidation state of nitrogen is incorrectly given for M

Compound	Oxidation State
a) $\left[Co(NH_3)_5Cl\right]Cl_2$	-3
b) NH_2OH	-1
c) $(N_2H_5)_2SO_4$	$+2$
d) $(Mg_3)N_2$	-3

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

A. $+3$

B. $+2$

C. -3

D. $+5$

Answer: D

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11. 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 and + 3 (three S have + 2 and one S has + 3)

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

Answer: D

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12. The oxidation state of phosphorus in $Ba(H_2PO_2)_2$ is

A. $+3$

B. $+2$

C. $+1$

D. -1

Answer: C

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13. Co-ordination number and oxidation state of Cr in $K_3[Cr(C_2O_4)_3]$ are, respectively

A. 3 and + 3

B. 3 and 0

C. 6 and + 3

D. 4 and + 2

Answer: C

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14. When SO_2 is passed in a solution of potassium iodate, the oxidation state of iodine changes from

A. $+5 \text{ to } 0$

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

C. $-5 \text{ to } 0$

D. $-7 \text{ to } -1$

Answer: A

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15. Among the following , 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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16. $K_4\left[Fe(CN)_6\right]$ is a

A. $+1$

B. $+2$

C. -1

D. 0

Answer: D

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17. Experimentally it was found that a metal oxide has formula $M_{0.98}O$. Metal M^{2+} and M^{3+} is present as M^{3+} in its oxide. Fraction of the metal which exists as M^{3+} would be

A. $6.05\ \%$

B. $5.08\ \%$

C. $7.01\ \%$

D. $4.08\ \%$

Answer: B

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18. Thiosulphate reacts differently with iodine and bromine in the reactions given below

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

$S_2O_3^{2-} + 2Br_2 + 5H_2O \rightarrow 2SO_4^{2-} + 2Br^- + 10H^+$

Which of the following statements in correct ?

A. a. Bromine is a stronger oxidant than iodine

B. b. Bromine is a weaker oxidant than iodine

C. c. Thiosulphate undergoes oxidation by bromine and reduction by iodine in these reactions

D. d. Bromine undergoes oxidation and iodine undergoes reduction in these reactions

Answer: A

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19. Which of the following arrangements represent increasing oxidation number of the central atom ?

A. a. CrO_2^- , ClO_3^- , CrO_4^{2-} , MnO_4^-

B. b. ClO_3^- , CrO_4^{2-} , MnO_4^- , CrO_2

C. c. CrO_2^- , ClO_3^- , MnO_4^- , CrO_4^{2-}

D. d. MnO_4^- , CrO_4^{2-} , ClO_3^- , CrO_2^-

Answer: A

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20. Identify disproportionation reaction

A. $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

B. $CH_4 + 4Cl_2 \rightarrow \mathrm{CCl}_4 + 4HCl$

C. $2F_2 + 2OH \rightarrow 2F^- + OF_2 + H_2O$

D. $2NO_2 + 2OH^- \rightarrow NO_2^- + NO_3^- + H_2O$

Answer: D

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21. In the preparation of HNO_3 we get NO gas by catalytic oxidation of ammonia. The moles of NO produced by the oxidation of two moles of NH_3 will be

A. 2

B. 3

C. 4

D. 6

Answer: A

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22. The electronic configuration of Cu(II) is $3d^9$ whereas that of Cu(I) is $3d^{10}$. When of the following is correct ?

A. Cu(II) is more stable in aqueous medium

B. Cu(I) is more in solid state

C. Stability of Cu(I) an Cu(II) depends on nature copper salts in solution state

D. All of these

Answer: D

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23. $KMnO_4$ acts as an oxidising agent in alkaline medium, when alkaline $KMnO_4$ is treated with KI, iodine ion is oxidised to

A. I_2

B. IO^-

C. IO_3^-

D. IO_4^-

Answer: C

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24. Strong reducing behaviour of H_3PO_2 is due to

A. low oxidation state of phosphorus

B. presence of two -OH groups and one P-H bond

C. presence of one -OH groups and two P-H bonds

D. high electron gain enthalpy of phosphorus

Answer: C

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25. Which of the following equations depict the oxidizing nature of hydrogen peroxide ?

A. $2Mn_4^- 6H + 5H_2O_2 \rightarrow 2Mn^{2+} 8H_2O + 5O_2$

B. $2Fe^{3+} + 2H^+ + H_2O_2 \rightarrow 2Fe^{2+} + 2H_2O + O_2$

C. $2I^- + 2H^+ + H_2O_2 \rightarrow I_2 + 2H_2O$

D. $KIO_4 + H_2O_2 \rightarrow KIO_3 + H_2O + O_2$

Answer: C

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26. Which of the following equation depicts reducing nature of H_2O_2 ?

A. $2\left[Fe(CN)_6\right]^{4-} + 2H^+ + H_2O_2 \rightarrow 2\left[Fe(CN)_6\right]^{3-} + 2H_2O$

B. $I_2 + H_2O_2 + 2OH^- \rightarrow 2I^- + 2H_2O + O_2$

C. $Mn^{2+} + H_2O_2 \rightarrow Mn^{4+} + 2OH^-$

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

Answer: B

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27. Which of the following reactions is an example of autoreduction ?

A. $Fe_3O_4 + 4CO \rightarrow 3Fe + 4CO_2$

B. $Cu_2O + C \rightarrow 2Cu + CO$

C. $Cu^{2+}_{(aa)} + Fe_{(g)} \rightarrow Cu_{(s)} + Fe^{2+}_{(aq)}$

D. $Cu_2 + \frac{1}{2}Cu_2S \rightarrow 3Cu + \frac{1}{2}SO_2$

Answer: D

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28. For the reaction : $F_2 + H_2O \xrightarrow[\text{temperature}]{\text{Ice cold}} HOF$ + HF which one is not correct ?

A. It is intramolecular redox reaction

B. It is intermolecular redox reacton

C. It is auto redox reaction

D. It is a disproportionation reaction

Answer: B

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29. In which SO_2 acts as oxidant, while reacting with

A. acidified $KMnO_4$

B. acidified $K_2Cr_2O_7$

C. H_2S

D. acidified C_2H_5OH

Answer: C

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30. Among the properties (i) reducing (ii) oxidising (iii) complexing the set of properties shown by CN - ion towards metal species is :

A. i,ii,iii

B. ii,iii

C. iii,i

D. i,ii

Answer: C

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31. Which substance serves as a reducing agent in the following reactions ?

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

A. H_2O

B. Pb

C. H^{+}

D. $Cr_2O_7^{2-}$

Answer: B

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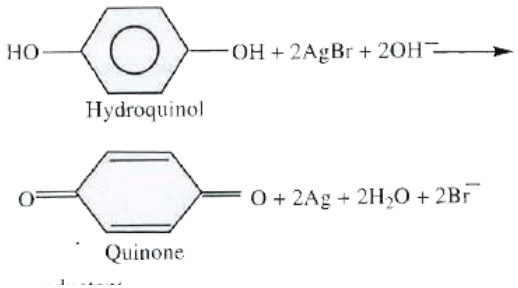
32. Select the incorrect statement for developing of an exposed camera film involving the reaction



A. a. Hydroquinol acts as reductant

B. b. Ag^{+} acts as oxidant

C. c. Hydroquinol and AgBr undergoes redox change

D. d.it is intramolecular change

Answer: D

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33. Which one is not correct for the reaction $(CN)_2 + H_2O \rightarrow HCN + HOCN$?

A. It is an auto redox change

B. Ox.no. of C in $(CN)_2$ HCN and HOCN are +3, +2 and +4 respectively

C. Ox.no. of N in $(CN)_2$ HCN and HOCN are +3, +2 and +4 respectively

D. The resultant solution is acidic

Answer: C

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Practice Sheet Exercise I Level Ii Advanced More Than One Correct Answer Type Questions

1. Which statement(s) about oxidation number is(are) correct?

A. The oxidation number is the number of electrons lost (+ve) or gained (-ve) by an atom during the formation of ionic compounds

B. For covalent compounds, the oxidation number is indicated by the charge that an atom of element would have acquired if the substance would have been ionic

C. Oxidation number may have fractional values

D. Oxidation number is always negative.

Answer: A::B::C

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2. Among the following statements the correct are :

A. Neutralisation, salt hydrolysis, precipitate formation, complex formation involve generally no electron transfer.

B. Reductant provides electron or electrons and an oxidant accepts electron (or) electons

C. Oxidant is reduced by accepting elecctrons and reductant is oxidised by losing electrons.

D. The ions which do not undergo any electronic change during a chemical reaction are termed as spectator ions.

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

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3. The process reduction. involves

A. addition of O_2 or removal of H_2 to a molecule

B. addition of a non-metal or removal of metal

C. loss of electrons

D. Addition of electrons

Answer: A::B::C

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4. Indicate in which of the following processes nitrogen is recuced ?

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::C::D

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5. Which of the following statements (s) is (are) correct ?

A. Oxidation of a substance is followed by reduction of another

B. Reduction of a substance is followed by oxidation of another

C. Oxidation and reduction are complementary that both oxidation and reduction should take place in the same reaction

D. It is not necessary that both oxidation and reduction should takes place in the same reaction.

Answer: A::B::C

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6. Which of the following reaction() is (are) not oxidation, reduction ?

A. $H^+ + OH^- \rightarrow H_2O$

B. $\frac{1}{2}H_2 + \frac{1}{2}Cl_2 \rightarrow HCl$

C. $CaCO_3 \rightarrow CaO + CO_2$

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

Answer: A::C

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7. Which of the following represents redox reaction ?

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

B. $SO_5^{2-} + I^- \rightarrow I_2 + SO_4^{2-}$

C. $Ca(OH)_2 + Cl_2 \rightarrow Ca(ClO)_2 + CaCl_2$

D. $PCl_5 \rightarrow PCl_3 + Cl_2$

Answer: B::C

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8. Which is (are) disproportionation reaction(s)?

A. $2RCHO \xrightarrow{\mathrm{Al(OEt)_3}} RCOOCH_2R$

B. $4H_3PO_3 \xrightarrow{\Delta} 3H_3PO_4 + PH_3$

C. $PCl_5 \rightarrow PCl_3 + Cl_3$

D. $RCHO \xrightarrow{KOH} \mathrm{RCOOK} + RCH_2OH$

Answer: A::B::D

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9. Which among the following are auto - redox reactions ?

A. $P_4 + OH^- \rightarrow H_2PO_2^- + PH_3$

B. $S_2O_3^{2-} \rightarrow SO_4^{-2} + S$

C. $H_2O_2 \rightarrow H_2O + O_2$

D. $AgCl + NH_3 \rightarrow \left[Ag(NH_3)_2\right]Cl$

Answer: A::B::C

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10. Thermal decomposition of $(NH_4)_2Cr_2O_7$ involves.

A. Oxidation of N

B. Reduction of Cr

C. Disproportionation of compound

D. Intermolecular redox process

Answer: A::B::D

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11. When P reacts with caustic soda. The products are PH_3 and NaH_2PO_2. This reaction is an example of

A. Oxidation-reduction

B. Disproportionation

C. Auto redox

D. Neutralization

Answer: A::B::C

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Practice Sheet Exercise I Level Ii Advanced Linked Comprehension Type Questions

1. The oxidation number of an element in a compound decides its nature to act as oxidant or reductant. Oxidation number is defined as the residual charge which an atom has or appears to have in a molecule when

all other atoms are removed from the molecule as ions. Oxidation number is frequently used interchangebly with oxidation state. The stock notations of oxidation numbers are based on the periodic property - electronegativity. An atom in a molecule can be assigned positive, negative or zero oxidation number by considering its environment. In few cases, oxidation number can even be fractional.

Maximum oxidation state shown by Os, Ru and Xe in their compounds is :

A. $+8$

B. $+6$

C. $+10$

D. $+4$

Answer: A

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2. The oxidation number of an element in a compound decides its nature to acts as oxidant or reductant. Oxidation number is defined and the

residual charge which an atom has or appears to have in a molecule whenal other atoms are removed from the molecule as ions. Oxidation number is frequently used interchangebly with oxidation state. The stock notations of oxidation number are based on the periodic property-electronegativity. An atom in a molecule can be assigned positive, negative or zero oxidation number by considering its environment. In few cases, oxidation number can evenn be fractional.

Oxidation number of oxygen in K_2O, K_2O_2, KO_2, KO_3 are in the order:

A. $KO_3 < KO_3 < K_2O_2 < K_2O$

B. $KO_2 < KO_3 < K_2O < K_2O_2$

C. $K_2O < K_2O_2 < KO_2 < KO_3$

D. $KO_3 < K_2O < KO_2 < K_2O_2$

Answer: C

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3. The oxidation number of an element in a compound decides its nature to acts as oxidant or reductant. Oxidation number is defined and the residual charge which an atom has or appears to have in a molecule whenal other atoms are removed from the molecule as ions. Oxidation number is frequently used interchangebly with oxidation state. The stock notations of oxidation number are based on the periodic property-electronegativity. An atom in a molecule can be assigned positive, negative or zero oxidation number by considering its environment. In few cases, oxidation number can evenn be fractional.

Oxidation number of Y in $YBa_2Cu_2O_7$ is +3, then oxidation number of Cu is:

A. $+7/3$

B. $+5/3$

C. $+2$

D. $+1$

Answer: A

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4. Oxidation is de-electronation whereas reduction is electronation. Oxidants are the substances which oxidise others and reduced themselves. On the other hand reductants are the substances which reduce others and oxidised themselves. The oxidation number of an element in a compound decides its nature to act as oxidant or reductant. Oxidation-reduction occur simultaneously and the overall chemical change is called redox reaction. Redox reactions are of three types: (i) Intermolecular redox reactions, (ii) Autoredox or disproportionation reaction, and (iii) Intramolecular redox reactions.

Select the species which can act as oxidant and reductant both :

(1) $H_2SO_3(II)H_2O_2(III)O_3(IV)HNO_3(V)CI_2$

A. I,II,III, IV

B. I,II,III, V

C. II,IH,IV, V

D. III,IV,V

Answer: B

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5. Oxidation is de-electronation whereas reduction is electronation. Oxidants are the substances which oxidise others and reduced themselves. On the other hand reductants are the substances which reduce others and oxidised themselves. The oxidation number of an element in a compound decides its nature to act as oxidant or reductant. Oxidation-reduction occur simultaneously and the overall chemical change is called redox reaction. Redox reactions are of three types: (i) Intermolecular redox reactions, (ii) Autoredox or disproportionation reaction, and (iii) Intramolecular redox reactions.

Which of the following show intramolecular redox change :

(I) $2KClO_3 \rightarrow 2KCI + 3O_2$ (II)

$(NH_4)_2Cr_2O_7 \rightarrow N_2 + Cr_2O_3 + 4H_2O$

(III) $NH_4NO_2 \rightarrow N_2 + 2H_2O$ (IV) $2Cu^+ \rightarrow Cu^{2+}Cu$

A. I, II, III

B. I, IV

C. II, III

D. II, IV

Answer: A

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6. Oxidation is de-electronation whereas reduction is electronation. Oxidants are the substances which oxidise others and reduced themselves. On the other hand reductants are the substances which reduce others and oxidised themselves. The oxidation number of an element in a compound decides its nature to act as oxidant or reductant. Oxidation-reduction occur simultaneously and the overall chemical change is called redox reaction. Redox reactions are of three types: (i) Intermolecular redox reactions, (ii) Autoredox or disproportionation reaction, and (iii) Intramolecular redox reactions.

Which of the following shows auto-redox change:

(I) $2HCHO + NaOH \rightarrow HCOONa + H_2O$

(II) $Cl_2 + H_2O \rightarrow HCI + HCIO$

(III) $2Cu^+ \rightarrow Cu^{2+} + Cu$

(IV) $Cr + 2H_2O + 3OCl^- \rightarrow Cr^{3+} + 3Cl^- + 6OH^-$

A. I, II, III

B. I, IV

C. II, IV

D. II, III

Answer: A

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Practice Sheet Exercise I Level Ii Advanced Matrix Matching Type Questions

1.

Column-I	Column-II
A) $2H_2O \xrightarrow{\Delta} 2H_2 + O_2$	P) Disproportionation reaction
B) $CuSO_4 + Zn \rightarrow Cu + ZnSO_4$	Q) Non-metal displacement reaction
C) $Cl_2 + 6OH^- \xrightarrow{\Delta} 5Cl^- + ClO_3^- + 3H_2O$	R) Decomposition reaction
D) $Zn + 2HCl \rightarrow ZnCl_2 + H_2$	S) Metal displacement reaction

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Practice Sheet Exercise I Level Ii Advanced Integer Type Questions

1. The oxidation number of carbon in Glucose is _____

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2. Oxidation number of Cr in K_3CrO_8 is

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3. What is the value of n in the following half equation, $Cr(OH)_4^- + OH^- \rightarrow CrO_4^{2-} + H_2O + \mathrm{ne}^-$

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4. $MnO_4^- + 8H^+ + ne^- \rightarrow Mn^{2+} + 4H_2O$

The value of n is

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5. In the equation, $NO_2^- + H_2O \rightarrow NO_3^- + 2H^+ + \mathrm{ne}^-$ .n. stands for

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Practice Sheet Exercise Ii Level I Main Straight Objective Type Questions

1. In the equation, $NO_2^- + H_2O \rightarrow NO_3^- + 2H^+ + \mathrm{ne}^-$ .n. stands for

A. H^+

B. e^-

C. $2e^-$

D. $3e^-$

Answer: C

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2. In which is transfer of five electrons takes place ?

A. a. $MnO_4^- \rightarrow Mn^{2+}$

B. b. $CrO_4^{-2} \rightarrow Cr^{3+}$

C. c. $MnO_4 \rightarrow MnO_2$

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

Answer: A

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3. The number of electrons lost or gained during the change, $Fe + H_2O \rightarrow Fe_3O_4 + H_2$

A. 2

B. 4

C. 6

D. 8

Answer: D

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4. $MnO_4^- + 8H^+ + ne^- \rightarrow Mn^{2+} + 4H_2O$

The value of n is

A. 5

B. 4

C. 3

D. 2

Answer: A

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5. Same amount of metal combines with 0.1g of oxygen and lg of a halogen. Hence the equivalent mass of halogen is :

A. 9

B. 35.5

C. 80

D. 127

Answer: C

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6. The normality of 0.3 H_3PO_3 is

A. 0.1

B. 0.9

C. 0.3

D. 0.6

Answer: D

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7. 0.32 g of metal on treatment with acid gave 112mL of hydrogen at NTP. The equivalent weight of metal is

A. 58

B. 32

C. 11.2

D. 24

Answer: B

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8. The eq. mass of $Fe_2(SO_4)_3$ the salt to be used as an oxidant in an acid solution is

A. M/1

B. M/2

C. M/3

D. M/5

Answer: B

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9. The eq. mass of $KMnO_4$ in the reaction, $MnO_4^- + Mn^{2+} + H_2O \rightarrow MnO_2 + H^+$ (unbalanced) is

A. 52.7

B. 158

C. 31.6

D. 105.4

Answer: A

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10. The eq, mass of iodine in, $I_2 + S_4O_6^{2-} + 2I^-$. The e.q mass of $Na_2S_2O_3$ is equal to its

A. M

B. M/2

C. M/4

D. M/3

Answer: B

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11. In the redox reaction $2S_2O_3^{2-} + I_2 \rightarrow S_4O_6^{2-} + 2I^-$

A. M

B. M/2

C. M/4

D. M/3

Answer: A

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12. 1 mole of chlorine combines with a certain mass of a metal giving 111g of its chloride. The atomic mass of the metal (assuming its valency to be 2) is

A. 40

B. 20

C. 80

D. 60

Answer: C

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

A. $1/5$

B. $2/5$

C. $5/2$

D. 5

Answer: A

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14. What mass of MnO_2 is reduced by 35mL of 0.16N oxalic acid in acid solution ? The skeleton equation is,

$MnO_2 + H^+ + H_2C_2O_4 \rightarrow CO_2 + H_2O + Mn^{2+}$

A. 8.7 g

B. 0.24 g

C. 0.84 g

D. 43.5 g

Answer: B

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15. How many milli-gram of iron $\left(Fe^{2+}\right)$ are equal to 1mL of 0.1055N $K_2Cr_2O_7$ equivalent ?

A. 5.9 mg

B. 0.59 mg

C. 59 mg

D. $59 \times 10^{-3} mg$

Answer: A

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Practice Sheet Exercise Ii Level Ii Advanced Straight Objective Type Questions

1. The n-factor of FeS_2 during its oxidation as $Fes_2 \rightarrow Fe_2O_3 + SO_2$

A. 10

B. 11

C. 2

D. 8

Answer: B

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2. n-factor of H_3PO_2 during its diproportionation is

$3H_3PO_2 \rightarrow PH_3 + 2H_3PO_3$

A. 1

B. 2

C. $4/3$

D. $3/4$

Answer: C

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3. What is equivalent mass of $(NH2_4)_2Cr_2O_7$ in the change $(NH_4)_2Cr_2O_7 \rightarrow N_2 + Cr_2O_3 + 4H_2O$?

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

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

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

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

Answer: D

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4. The reaction is balanced if,

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

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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5. The values of X and Y in the following redox reaction are

$$XCl_2 + 6OH \rightarrow ClO_3^- + YCl^- + 3H_2O$$

A. $X = 2, Y = 4$

B. $X = 5, Y = 3$

C. $X = 3, Y = 5$

D. $X = 4, Y = 2$

Answer: C

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6. Consider the following reaction

$$xMnO_4^- + yC_2O_4^{2-} + zH^- \rightarrow xMn^{2+} + 2yCO_2 + \frac{z}{2}H_2O$$

A. 2, 5 and 16

B. 5, 2 and 8

C. 5, 2 and 16

D. $2, 5$ and 8

Answer: A

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7. The equivalent mass of $Na_2S_2O_3$ as reductant in the reaction, $Na_2S_2O_3 + 5H_2O + 4Cl_2 \rightarrow 2NaHSO_4 + 8HCl$

A. (molar mass)/1

B. (molar mass)/2

C. (molar mass)/6

D. (molar mass)/8

Answer: D

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8. What mass of NHO_3 is needed to convert 5g of iodine into iodic acid according to the reaction ?

A. 12.4 g

B. 24.8 g

C. 0.248 g

D. 49.6 g

Answer: A

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9. What volume of 3 molar HNO_3 is needed to oxidize 8g of Fe^{2+} to Fe^{+3} ? HNO_3 , gets converted to NO

A. 8 mL

B. 16 mL

C. 32 mL

D. 64 mL

Answer: B

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10. What mass of HNO_3 is required to make llitre of 2N solution to be used as an oxidizing agent in the reaction ?

$3Cu + 8HNO_3 \rightarrow 3Cu(NO_3)_2 + 2NO + 4H_2O$

A. 63 g

B. 21 g

C. 42 g

D. 84 g

Answer: C

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11. 0.2g of a sample of H_2O_2 required 10mL of N $KMnO_4$ in a titration in the presence of H_2SO_4 Purity of H_2O_2 is

A. 0.25

B. 0.85

C. 0.65

D. 0.95

Answer: B

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12. In the following change, $3Fe + 4H_2O \rightarrow Fe_3O_4 + 4H_2$ If the atomic mass of iron is 56, then its equivalent mass will be :

A. 42

B. 21

C. 63

D. 84

Answer: B

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13. An element A in a compound AB has oxidation number -n. IT is oxidized by $Cr_2O_7^{2-}$ in acid medium. In the experiment 1.68×10^{-3} moles of $K_2Cr_2O_7$ was used for 3.36×10^{-3} moles of AB. The new oxidation number of A after oxidation is

A. 3

B. 3 - n

C. n - 3

D. $+n$

Answer: B

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14. For the reaction, $N_2 + 3H_2 \rightarrow 2NH_3$ if E_1 and E_2 equivalent masses of NH_3 and N_2 respectively then $E_1 - E_2$ is

A. 1

B. 2

C. 3

D. 4

Answer: A

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15. The anion nitrate is converted into ammonium ion. The equivalent mass of nitrate ion in the reaction would be

A. 6.20

B. 7.75

C. 10.5

D. 21.0

Answer: B

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16. Equivalent masses of NH_3 in the reactions are

(i) $4NH_3 + 5O_3 \rightarrow 4NO + 6H_2O$

A. $5:6$

B. $6:5$

C. $5:3$

D. $3:5$

Answer: D

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17. Why is HCl not used to make the medium acidic in redox titrations of $KMnO_4$ in acidic medium ?

A. Both HCl and $KMnO_4$ act as oxidising agents.

B. $KMnO_4$ also oxidised HCl into Cl_2

C. $KMnO_4$ is a weaker oxidising agent than HCl

D. $KMnO_4$ acts as a reducing agent in the presence of HCl

Answer: B

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18. Brine is electrolysed by using inert electrodes. The reaction at anode is

A. $Cl^-_{(aq)} \rightarrow \frac{1}{2}Cl_{2(g)} + e^-, E^\circ = 1.36V$

B. $2H_2O_{(l)} \rightarrow O_{2(g)} + 4H^+ + 4e^-, E^\circ = 1.23V$

C. $Na^+_{(aq)} + e^- \rightarrow Na_{(s)}, E^\circ = 2.71V$

D. $H^+_{(aq)} \rightarrow \frac{1}{2}H_{2(g)}, E^\circ = 0.00V$

Answer: A

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19. In estimation of Fe^{2+} by $KMnO_4HNO_3$ cannot be used in place of H,SO, because

A. HNO_3 oxidised Fe^{2+}

B. HNO_3 reduces MnO_4^-

C. HNO_3 reduces Fe^{2+}

D. HNO_3 oxidised Mn^{2+}

Answer: A

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Practice Sheet Exercise Ii Level Ii Advanced More Than One Correct Answer Type Questions

1. In the chemical change : $aN_2H_4 + bBrO_3^- \rightarrow aN_2 + bBr^- + 6H_2O$, answer the following questions:

The equivalent weight of N,H, in the above reaction is:

A. The element oxidised is N and element reduced is Br.

B. Oxidizing agent is BrO_3^-

C. Reducing agent is N_2H_4

D. The element oxidised is Br and element reduced is N.

Answer: A::B::C

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2. The number of moles of $KMnO_4$ that will be needed to react completely with one mole of ferrous oxalate in acidic solution is

A. 2/5

B. 3/5

C. 4/5

D. 1

Answer: A

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3. For the balanced chemical reaction $HNO_3 + H_2S \rightarrow NO + H_2O + S$. The correct statements are:-

A. a. The stoichiometric coefficient of HNO_3 is 2

B. b. The stoichiometric coefficient of H_2S is 3

C. c. The stoichiometric coefficient of NO is 2

D. d. The stoichiometric coeffecient of H_2O is 4

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

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4. When a mixture of Cu_2S and CuS is titrated with $Al(MnO_4)_3$ in acidic medium, the oxidation product of Cu_2S and CuS are Cu^{+2} and SO_2 . If the molecular weight of Cu_2S, CuS and $Al(MnO_4)_3$, be M_1, M_2 and M_3 respectively, then which of the following statement are correct?

A. Equivalent weight of Cu_2S is $M_1/8$

B. Equivalent weight of Cus is $M_2/5$

C. Equivalent weight of $Al(Mn_4)_3$ is $M_3/5$

D. Equivalent weight of $Al(MnO_4)_3$, is $M_3/15$

Answer: A::D

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5. When FeS_2 is oxidized with sufficient O_2 then its oxidation product is found to be Fe_2O_3 and SO_2 if the molecular weight of

FeS_2, Fe_2O_3 and SO_2 are M. Ma and Mc, then which of the following statements are correct?

A. equivalent wt. of FeS_2 is M/11

B. the molar ratio of FeS_2 to O_2 is 4:11

C. the molar ratio of FeS_2 to O_2 is 11:4

D. The molar ratio of Fe_2O and SO_2 is 1:4

Answer: A::B

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6. For decolourisation of 1 mol of $KMnO_4$ the number of moles of H_2O_2 used is

A. $\frac{1}{2}$

B. $\frac{3}{2}$

C. $\frac{5}{2}$

D. $\frac{7}{2}$

Answer: C

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Practice Sheet Exercise Ii Level Ii Advanced Linked Comprehension Type Questions

1. The equivalent weight of a species if acts as oxidant or reductant should be derived by: Eq. weight Mol.wt. of oxidant or reductant = $\frac{\text{Mol.w.t of oxidant or reductant}}{\text{Number of electrons lost or gained by onemclecule of oxidant or reductant}}$. During chemical reactions, equal all equivalents of one species react with same number of equivalents of other species giving same number of equivalent of products. However this is not true for reactants if they react in terms of moles. Also Molarity can be converted to normality by multiplying the molarity with valence factor or .n. factor

Equivalent weight of Fe_2O_3 in terms of its molecular weight in the change $Fe_3O_4 \rightarrow Fe_2O_3$ is :

A. M

B. M/2

C. M/3

D. 3M/2

Answer: D

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2. The equivalent weight of a species if acts as oxidant or reductant should be derived by: Eq. weight Mol.wt. of oxidant or reductant = $\frac{\text{Mol.w.t of oxidant or reductant}}{\text{Number of electrons lost or gained by onemclecule of oxidant or reductant}}$. During chemical reactions, equal all equivalents of one species react with same number of equivalents of other species giving same number of equivalent of products. However this is not true for reactants if they react in terms of moles. Also Molarity can be converted to normality by multiplying the molarity with valence factor or .n. factor

The equivalent weight of an element is 13.16. It forms an acidic oxide

which with KOH forms a salt isomorphous with K_2SO_4 The atomic weight of element is :

A. 78.96

B. 52.64

C. 26.32

D. 39.48

Answer: A

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3. The equivalent weight of a species if acts as oxidant or reductant should be derived by: Eq. weight Mol.wt. of oxidant or reductant = $\frac{\text{Mol.w.t of oxidant or reductant}}{\text{Number of electrons lost or gained by onemclecule of oxidant or reductant}}$. During chemical reactions, equal all equivalents of one species react with same number of equivalents of other species giving same number of equivalent of products. However this is not true for reactants if they react in terms of moles. Also Molarity can be converted to normality by

multiplying the molarity with valence factor or .n. factor

One mole of As_2S_3 is oxidised by HNO_3 to H_2AsO_4 and $H_2SO_4HNO_3$ is converted into NO. The moles of HNO_3 required are:

A. 3

B. 28

C. 14

D. 9.33

Answer: D

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4. All titration which involves the direct titration of Iodine with a reducing agent are grouped under Iodimetry. Iodimetry is employed to determine the strength of reducing agent such as sodium thio sulphate

$I_2 + 2Na_2S_2O_3 \rightarrow 2I^- + S_4O_6^-$

If iodine is liberated as a result of chemical reaction involving oxidation of an idodide ion by a strong oxidizing agent in neutral or acidic medium

the liberated iodine is then titrated with reducing agent. This titration is called Iodometry. Todometry is used to estimate the strength of oxidizing agent. For example the estimation of Cu^{++} with thiosulphate.

$Cu^{++} + I^- Cu_2I_2 + I_2, I_2 + S_2O_3^- \rightarrow S_4O_6^- + I^-$

Starch used as indicator near the end point which form blue colour complex with I_3^- . The blue colour disappears when

In the reaction, $2CuSO_4 + 4KI \rightarrow Cu_2I_2 + 2K_2SO_4 + I_2$ the ratio of equivalent weight of $CuSO_4$ to its molecular weight is:

A. $1/8$

B. $1/4$

C. $1/2$

D. 1

Answer: D

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5. All titration which involves the direct titration of Iodine with a reducing agent are grouped under Iodimetry. Iodimetry is employed to determine the strength of reducing agent such as sodium thio sulphate

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Starch used as indicator near the end point which form blue colour complex with I_3^- . The blue colour disappears when

When 159.50g of $CuSO_4$ in a solution is reacted with KI, then the liberated iodine required 100 ml 1 M $Na_2S_2O_3$ for complete reaction, then what is the percentage purity of sample used in making the solution.

A. $10\ \%$

B. $20\ \%$

C. $5\ \%$

D. $30\ \%$

Answer: A

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6. All titration which involves the direct titration of Iodine with a reducing agent are grouped under Iodimetry. Iodimetry is employed to determine the strength of reducing agent such as sodium thio sulphate

$I_2 + 2Na_2S_2O_3 \rightarrow 2I^- + S_4O_6^-$

If iodine is liberated as a result of chemical reaction involving oxidation of an idodide ion by a strong oxidizing agent in neutral or acidic medium the liberated iodine is then titrated with reducing agent. This titration is called Iodometry. Todometry is used to estimate the strength of oxidizing agent. For example the estimation of Cu^{++} with thiosulphate.

$Cu^{++} + I^- Cu_2I_2 + I_2, I_2 + S_2O_3^- \rightarrow S_4O_6^- + I^-$

Starch used as indicator near the end point which form blue colour complex with I_3^- . The blue colour disappears when

10 mL of H_2O_2 solution on treatment with KI and titration of liberated I_2 required 10 mL of 1 N hypo . Thus H_2O_2 is :

A. 1 N

B. 5.6 volume

C. $17gL^{-1}$

D. All are correct

Answer: D

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Practice Sheet Exercise Ii Level Ii Advanced Matrix Matching Type Questions

1.

Column - I (Reaction)	Column-II(Eq wt)
A) $NH_3 \rightarrow NO_3^-$	P) $M/3$
B) $FeC_2O_4 \rightarrow Fe^{3+} + 2CO_3^{2-}$	Q) $M/6$
C) $H_2SO_5 \rightarrow S_8$	R) $M/8$
D) $KMnO_4 \rightarrow Mn^{2+}$	S) $M/5$
	T) reducing agent

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2.

Column - I (Reaction)	Column-II(Eq wt)
A) $KMnO_4 \xrightarrow{H^+} Mn^{+2}$	P) $M/2$
B) $MgC_2O_4 \rightarrow Mg^{2+} + CO_2$	Q) $M/5$
C) $K_2Cr_2O_7 \rightarrow Cr^{3+}$	R) $M/6$
D) $CrO_5 \rightarrow Cr_2O^3$	S) $M/3$
	T) Oxidising agent

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3. Match the following columns

Column-I	Column-II
A) Equivalent w.t $= \frac{\text{Mol.w.t}}{33}$	P) When CrI_3 oxidies into $Cr_2O_7^{2-}$ and IO_4^-
B) Equivalent w.t $= \frac{\text{Mol.w.t}}{27}$	Q) When $Fe(SCN)_2$ oxidies in to Fe^{+3}, SO_4^{-2}, CO_3^{2-} and NO_3^-
C) Equivalent w.t $= \frac{\text{Mol.w.t}}{28}$	R) When NH_4SCN oxidies into SO_4^{-2}, CO_3^{-2}, NO_3^-
D) Equivalent w.t $= \frac{\text{Mol.w.t}}{24}$	S) When As_2S_3 oxidies into AsO_3^- and SO_4^{2-}

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4. Calculate the number of electrons lost in the following change :

$Fe + H_2O \rightarrow Fe_3O_4 + H_2$

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5. Calculate the number of moles of Sn^{2+} ion oxidise by 1 mole of $K_2Cr_2O_7$ in acidic medium.

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6. For the reaction, $M^{x+} + MnO_4^- \rightarrow MO_3^- + Mn^{2+} + 1/2O_2$ if one mole of MnO_4^- oxidises 1.67 moles of M^{x+} to MO_3^- then the value of x in the reaction is?

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7. If $K_2Cr_2O_7$ is source of $Cr_2O_7^{2-}$, what is the normality of solution containing 4.9 g of $K_2Cr_2O_7$ in 0.1 litre of solution ?

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Additional Practice Exercise Level I Main Straight Objective Type Questions

1. If three electrons are lost by Mn^{3+}, its final oxidation state would be

A. 0

B. $+6$

C. $+2$

D. $+4$

Answer: B

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2. Oxidation number and Covalency of sulphur in S_8 molecule are respectively

A. 6 and 8

B. 0 and 8

C. 0 and 2

D. 6 and 2

Answer: C

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3. The oxidation number of Cr is CrO_5 is

A. $+10$

B. $+6$

C. $+4$

D. $+5$

Answer: B

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4. Oxidation number of iron in $Na_2\left[Fe(CN)_5NO\right]$

A. $+2$

B. $+3$

C. $+1$

D. 0

Answer: A

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5. Sum of the oxidation numbers of carbon in acetaldehyde is

A. -2

B. $+2$

C. -4

D. -1

Answer: A

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6. Oxidation number of sulphur in oleum $(H_2S_2O_7)$ is

A. $+4$

B. $+2$

C. -2

D. $+6$

Answer: D

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7. The compound formed in the brown ring test has the formula $[Fe(H_2O)_5NO]SO_4$. The oxidation state of iron in it is

A. $+1$

B. $+2$

C. $+3$

D. zero

Answer: A

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8. In the reaction of chlorine with dry slaked lime, the oxidation number of chlorine changes

i) from -1 to $+1$

ii) from $+1$ to -1

iii) from zero to -1

iv) from zero to $+1$

The correct combination is

A. ii & iii are correct

B. iii & iv are correct

C. i & ii are correct

D. All are correct

Answer: B

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9. Oxidation numbers of sodium, mercury in sodium amalgam are

A. zero, zero

B. $+1.\ -1$

C. $-2,\ +2$

D. $0,\ +1$

Answer: A

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10. Chlorine is passed into dilute cold KOH solution. What are the oxidation numbers of chlorine in the products formed ?

A. $-1, +5$

B. $-1, +3$

C. $+1, +7$

D. $+1, -1$

Answer: D

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11. What is the oxidation number of sulphur in $Na_2S_4O_6$?

A. $3/2$

B. $2/3$

C. $5/2$

D. $2/5$

Answer: C

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12. The oxidation number of nitrogen in NCI_3 is

A. $+3$

B. -3

C. $+3,\ +6$

D. $-2,\ +2$

Answer: B

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13. What are the oxidation numbers of 'N' in NH_4NO_3?

A. $+3, -5$

B. $-3, +5$

C. $+3, +6$

D. $-2, +2$

Answer: B

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14. Iron has the lowest oxidation state in

A. $FeSO_4$

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

C. $Fe(CO)_5$

D. Feo

Answer: C

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15. The oxidation number of phosphorus in sodium hypophosphite is

A. $+3$

B. $+2$

C. $+1$

D. -1

Answer: C

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16. $PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$. In this reaction PbS undergoes

A. oxidation

B. reduction

C. both

D. can.t be predicted

Answer: A

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17. $MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$, In the reaction MnO_2 acts as

A. oxidant

B. reductant

C. both

D. can.t be predicted In the reaction P, + 3OH- + 3H,0 + 3H,PO, + PH,

phosphorus is undergoing 1) oxidation

Answer: A

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18. In the reaction

$$P_4 + 3OH^- + 3H_2O \rightarrow 3H_2PO_2^- + PH_3$$

phosphorus is undergoing

A. oxidation

B. reduction

C. disproportionation

D. hydrolysis

Answer: C

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19. Among the following ion the one that cannot undergo disproportionation

A. ClO^-

B. ClO_2^-

C. ClO_3^-

D. ClO_4^-

Answer: D

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20. The reaction is Decomposition but it's not redox reaction

A. $2HgO \rightarrow 2H_2 + O_2$

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

C. $MgCO_3 \rightarrow MgO + CO_2$

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

Answer: C

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21. Which of the following is redox reaction

A. H_2SO_4 with NaOH

B. In atmosphere, O_3 from O_2 by lightning

C. Evaporation of H_2O

D. Nitrogen oxide from nitrogen and oxygen by lightning

Answer: D

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22. Which of the following is metal displacement reaction

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

B. $2Na + 2H_2O \rightarrow 2NaOH + H_2$

C. $Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$

D. $2HgO \rightarrow 2Hg + O_2$

Answer: A

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23. Which of the following is a redox reaction?

A. $NaCI + KNO_3 \rightarrow NaNO_3 + KCI$

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

C. $Mg(OH)_2 + 2NH_4CI \rightarrow MgCl_2 + 2NH_4OH$

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

Answer: D

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24. Which of the following is not an example of disproportionation reaction?

A. $Cl_2 + 2NaOH \rightarrow NaCl + NaOCI + H_2O$

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

C. $2NaOH + 2F_2 \rightarrow 2NaF + OF_2 + H_2O$

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

Answer: C

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25. In the reaction $3Mg + N_2 \rightarrow Mg_3N_2$

A. Magnesium is reduced

B. Magnesium is oxidized

C. Nitrogen is oxidized

D. Nitrogen is reduced

Answer: B

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26. Which one of the halogn is prepared by only electrolysis method

A. Cl_2

B. Br_2

C. F_2

D. I_2

Answer: C

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27. Which of the following statement is correct for a galvanic cell?

A. Reduction occurs at cathode

B. Oxidation occurs at anode

C. Electrons flow from anode to cathode

D. All the statements are correct

Answer: D

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28. In Cu - Zn cell

A. Reduction occurs at the copper cathode

B. Oxidation occurs at the copper cathode

C. Reduction occurs at the anode

D. Chemical energy is converted to light energy

Answer: A

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29. In a electrochemical cell

A. Potential energy changes into kinetic energy

B. Kinetic energy changes into potential energy

C. Chemical energy changes into electrical energy

D. Electrical energy changes into chemical energy

Answer: C

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30. The electrode potential of an electrode is

A. The potential applied to the electrode

B. The ionization potential of the material of the electrode

C. The tendency of the electrode to loose or gain electrons when it is in contact with its ions

D. The potential energy of the electrons in an electrode.

Answer: C

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31. Daniel cell is shown as

A. $Zn(s)\,/\,Zn^{2+}(aq)//Cu(s)\,/\,Cu^{2+}(aq)$

B. $Zn(s)\,/\,Zn^{2+}(aq)//C^{2+}(aq)\,/\,Cu(s)$

C. $Cu(s)\,/\,Cu^{2+}(aq)//Zn^{2+}(aq)\,/\,Cu(s)$

D. $Cu^{2+}(aq)\,/\,Cu(s)//Zn^{2+}(aq)\,/\,Zn(s)$

Answer: B

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32. Which of the following metals will not react with solution of $CuSO_4$?

A. Fe

B. Zn

C. Mg

D. Ag

Answer: D

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33. Equal quantities of zinc are separately treated with caustic soda solution and dilute sulphuric acid. Then

A. more hydrogen is liberated in the first case

B. more hydrogen is liberated in the second case

C. equal amount of hydrogen is liberated in both cases

D. no reaction takes places

Answer: C

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34. The oxidation number of ..V.. in $Rb_4Na[HV_{10}O_{28}]$ is

A. $+3$

B. $+5$

C. $+7$

D. $+6$

Answer: B

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35. A solution of 0.1M $KMnO_4$ is used for the reaction $S_2O_3^{-2} + 2MnO_4^- + H_2O \rightarrow MnO_2 + SO_4^{2-} + OH^-$. The volume of $KMnO_4$ required to react 0.158gm of Na,s,o, is (MW = 158)

A. 13.33 ml

B. 6.66 ml

C. 3.33 ml

D. 26.67 ml

Answer: D

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36. 0.5 g mixture of oxalic acid $(H_2C_2O_4)$ and some sodium oxalate $(Na_2C_2O_4)$ with some impurities requires 40 ml of 0.1M NaOH for complete neutralization and 6ml of 0.2 M $KMnO_4$ for complete oxidation. Calculate the % of $Na_2C_2O_4$ in the mixture

A. $90\ \%$

B. $26.8\ \%$

C. $40\ \%$

D. $50\ \%$

Answer: B

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37. A solution contains mixture of H_2SO_4, $H_2C_2O_4$ 20 ml of this solution requires 40 ml of M/10 NaOH for neutralization and 20 ml of N/10 $KMnO_4$ for oxidation. The molarity of $H_2C_2O_4$, H_2SO_4 are

A. $0.1, 0.1$

B. $0.1, 0.05$

C. $0.05, 0.1$

D. $0.05, 0.05$

Answer: D

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38. 100 ml of 0.1M aqueous ferric alum solution is completely reduced with Iron to give Ferrous Ions. The volume of 0.1M acidified $KMnO_4$ solution required for complete reaction with ferrous Ions in the solution will be

A. 60 ml

B. 30 ml

C. 40 ml

D. 100 ml

Answer: C

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39. What volume of 0.2 M $Ba(MnO_4)_2$ solution is required for complete oxidation of 25 gm of 89.6% pure Fe Co, in acidic medium according to the reaction $MnO_4^- + FeCr_2O_4 \rightarrow Fe^{+3} + Cr_2O_7^{2-} + Mn^{+2}$

A. 700 ml

B. 175 ml

C. 350 ml

D. 200 ml

Answer: C

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40. A 1.0g sample of pyrolusite ore containing MnO_2 (MW = 87) was dissolved in a concentrated HCI solution and liberated Cl_2 (g) was passed through a concentrated KI solution releasing I_2 . If the liberated iodine required 16mL of 1.25 M sodium thiosulphate $(Na_2S_2O_3)$ solution, mass percentage of MnO_2 in the given sample is

A. $43.5\ \%$

B. $87\ \%$

C. $21.75\ \%$

D. $0.875\ \%$

Answer: B

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41. An equimolar mixture of ferrous oxalate & stannous chloride is treated with decinormal acidic $KMnO_4$ giving ferric, stannic & chlorate ions along with CO_2 gas. If the titre value is 225 ml. Numbers of millimoles of chlorate ions produced are

A. 1.5 m moles

B. 7.5 m moles

C. 3 m moles

D. 2.64 m moles

Answer: D

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42. A 0.518 g sample of lime stone is dissolved in HCl and then the calcium is precipitated as CaC_2O_4 After filtering and washing the precipitate, it requires 40.0 mL of 0.250 N $KMnO_4$ solution acidified with H_2SO_4 to titrate it as, $MnO_4^- + H^+ + C_2O_4^{2-} \rightarrow Mn^{2+} + CO_2 + 2H_2O$

The percentage of CaO in the sample is:

A. $54.0\ \%$

B. $27.1\ \%$

C. $42\ \%$

D. $84\ \%$

Answer: A

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43. A bottle of H_2O_2 is labelled as 10 vol H_2O_2 112ml of this H_2O_2 solution is completely titrated with 0.04M acidified $KMnO_4$ solution. The volume of $KMnO_4$ consumed in litres is

A. 13.6 V & 41.285 g/l

B. 11.2 V & 0.68 g/l

C. 5.6 V & 0.68 g/l

D. 5.6 V & 41.285 g/l

Answer: A

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44. 10mL of a solution of H_2O_2 of 10 volume strength decolourises 100mL of $KMnO_4$ solution acidified with dil H_2SO_4 The amount of $KMnO_4$ in the given solution is

A. 0.282g

B. 0.564g

C. 1.128g

D. 0.155g

Answer: B

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45. A 5.0 mL solution of H_2O_2 libearates 0.508g of iodine from an acidified KI solution. Calculate the strength of H_2O_2 solution in terms of volume strength at STP.

A. 2.24 .V.

B. 4.48 .V.

C. 8.96 .V.

D. 5.6 .V.

Answer: B

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46. When KI in acidic medium were mixed in 50ml H_2O_2 liberated I_2 requires 20ml of 0.1N hypo. What is strength of H_2O_2.

A. 6.8 g/litre

B. 0.68 g/litre

C. 680 g/litre

D. 68.0 g/litre

Answer: B

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Additional Practice Exercise Level Ii Lecture Sheet Advanced More Than One Correct Answer Type Questions

1. Which of the following are disproportionation redox changes?

A. $(NH_4)_2Cr_2O_7 \rightarrow N_2 + Cr_2O_3 + 4H_2O$

B. $5H_2O_2 + 2ClO_2 + 2OH^- \rightarrow 2Cl^- + 5O_2 + 6H_2O$

C. $3ClO^- \rightarrow ClO_3^-$

D. $2HCuCl_2 \xrightarrow[\text{water}]{\text{Dilution with}} Cu + Cu^{2+} + 4CI^- + + 2H^+$

Answer: C::D

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2. Which one are correct about the reaction?

$HgS + HCI + HNO_3 \rightarrow H_2HgCl_4 + NO + S + H_2O$

A. Hg is reduced

B. Sulphide is oxidised

C. N is reduced

D. HNO_3 is oxidant

Answer: B::C::D

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3. Which of the following disproportionation reaction

A. $2O_3 \rightarrow 3O_2$

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

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

D. $2KO_2 + 2H_2O \rightarrow 4KOH + 3O_2$

Answer: B::C::D

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4. Which is correct about tailing of Hg?

A. It is due to Hg_2O

B. It is due to HgO

C. It is removed by H_2O_2

D. It is removed by O_3

Answer: A::C

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5. 100 ml of 0.1 M NaCl and 100 ml of 0.2 MNaOH are mixed. What is the change in pH of NaCI solution ?

A. Some $KMnO_4$ is left unreacted

B. 0.02 M Mn^{2+} ions are present in the solutions

C. K_2SO_3 is partially left unreacted

D. Newly formed SO_4^{2-} has 0.05 M cocentration

Answer: A::B::D

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6. In which of the following oxidation no. of nitrogen atom is correctly matched:

A. $HC\underline{N} \quad -3$

B. $H\underline{N}C \quad -3$

C. $HOC\underline{N} \quad -3$

D. $(C\underline{N})_2 \quad -2$

Answer: A::B::C

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7. Which of the following species have + 6 state with sulphur?

A. $H_2S_2O_7$ oleum

B. $H_2S_2O_8$ Marshall.s acid

C. $Na_2S_2O_3$ hypo

D. H_2SO_5 Caro.s acid

Answer: A::B::D

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8. Which of the following ions will not undergo disproportionation?

A. Cl^-

B. ClO_3^-.

C. ClO_4^-.

D. ClO^-

Answer: A::B::C

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9. 150 mL $\frac{M}{10}$ $Ba(MnO_4)_2$, in acidic medium can oxidize completely

A. 150 mL 1M Fe^{+2}

B. 50 mL IM FeC_2O_4

C. 75 mL 1M $C_2O_4^{-2}$

D. 25 mL 1M $K_2Cr_2O_7$ solution

Answer: A::B::D

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10. $\begin{matrix} COOH \\ | \\ COOH \end{matrix}$ and $\begin{matrix} COOK \\ I \\ COOH \end{matrix}$ behave is acids as well as reduing agents. Then which of the following are correct statements?

A. When behaves as reducing agent, then its equivalent weights are equal to half of its molecular weight respectively

B. 1000 ml of 1N solution of each is neutralized by 1000 mL 1N $Ca(OH)_2$

C. 1000 mL of 1M solution is neutralized by 1000 mL of IM $Ca(OH)_2$

D. 1000 mL of 1M solution is neutralized by 200 mL 2M of $KMnO_4$ in acidic medium.

Answer: B::C::D

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11. Which of the following is /are correct about redox reactio?

$MnO_4^{\ominus} + H^{\ominus} \rightarrow Mn^{+2} + S_4O_6^{-2}$

A. 1 mol of $S_2O_3^{2-}$ is oxidised by 8 mol of MnO_4^-

B. The above redox reaction with the change of pH from 4 to 10 will have an effect on the stiochiometry of the reaction.

C. Change of pH from 4 to 7 will change the nature of the product.

D. At pH=7 $S_2O_3^{2-}$ ions are oxidised to HSO_4^-

Answer: D

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Additional Practice Exercise Level Ii Lecture Sheet Advanced Linked Comprehension Type Questions

1. A redox reaction involves oxidation of reductant liberating electrons, which are then consumed by an oxidant. The sum of two half reactions give rise to net redox change. In half reaction charge and atoms are always conserved.

In the reaction: $As_2S_3 + HNO_3 \rightarrow H_2AsO_4 + H_2SO_4, + NO$ the element oxidised is:

A. $Fe^{+8/3} \rightarrow Fe^{+3} + \frac{1}{3}e$

B. $Fe^{+8/3} \rightarrow Fe^{+2} - \frac{2}{3}e$

C. $\left(Fe^{+8/3}\right)_3 \rightarrow 3Fe^{+2} + 2e$

D. $2\left(Fe^{+8/3}\right)_3 \rightarrow 3\left(Fe^{+3}\right)_2 + 2e$

Answer: D

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2. A redox reaction involves oxidation of reductant liberating electrons, which are then consumed by an oxidant. The sum of two half reactions

give rise to net redox change. In half reaction charge and atoms are always conserved.

In the reaction: $As_2S_3 + HNO_3 \rightarrow H_2AsO_4 + H_2SO_4, + NO$ the element oxidised is:

A. As only

B. S only

C. N only

D. As and S both

Answer: D

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3. A redox reaction involves oxidation of reductant liberating electrons, which are then consumed by an oxidant. The sum of two half reactions give rise to net redox change. In half reaction charge and atoms are always conserved.

In the reaction: $As_2S_3 + HNO_3 \rightarrow H_2AsO_4 + H_2SO_4, + NO$ the element oxidised is:

A. 1

B. 2

C. 3

D. 4

Answer: B

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4. Iodine titrations: Compounds containing iodine are widely used in titrations, commonly known as iodine titration. It is of two kinds:

(i) Iodometric titrations (ii) Iodimetric titrations.

(i) Iodometric titrations : It is nothing but an indirect method of estimating the iodine. In this type of titration, an oxidising agent is made to react with excess of KI, in acidic medium or, basic medium in which I_2 oxidises into L. Now the liberated I_2 can be titrated with $Na_2S_2O_3$.

solution.

$$KI \xrightarrow{\text{Oxidising Agent}} I_2 \xrightarrow{Na_2.S_2O_3/H^+} I^- + Na_2S_4O_6$$

Although solid I_2 is black and insoluble in water, but it converts into soluble I_3 ions

$$\underset{\text{Black}}{I_2(s)} + I \Leftrightarrow \underset{\text{Dark brown}}{I_3^-}$$

Starch is used as indicator near the end point or equivalence point. Even small amount of I_2 molecules, gives blue colour with starch. The completion of the reaction can be detected when blue colour disappears at the and point. In iodimetric titration, the strength of reducing agent is determined by reacting it with I_2

When 79.75 g of $CuSO_4$ sample containing inert impurity is reacted with KI, the liberated I, is reacted with 50 mL (1M) $Na_2S_2O_3$ in basic medium, where it oxidises into SO_4^{2-} ions, and I_2 reduces into I^- then what will be the % purity of $CuSO_4$ in sample ? <

A. $60\ \%$

B. $80\ \%$

C. $50\ \%$

D. $95\ \%$

Answer: B

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5. Iodine titrations: Compounds containing iodine are widely used in titrations, commonly known as iodine titration. It is of two kinds:

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completion of the reaction can be detected when blue colour disappears at the and point. In iodimetric titration, the strength of reducing agent is determined by reacting it with I_2

When 214 g of KIO_3 reacts with excess of KI in presence of H^+ then it produces I_2 Now I_2 is completely reacted with 1 M $Na_2S_2O_3$ solution in basic medium, where it converts into SO_4^{-2} ions. Then what volume of $Na_2S_2O_3$ is needed to react the end point of the reaction?

A. 500 ml

B. 800 ml

C. 1500 ml

D. 750ml

Answer: D

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6. Iodine titrations: Compounds containing iodine are widely used in titrations, commonly known as iodine titration. It is of two kinds:

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$$KI \xrightarrow{\text{Oxidising Agent}} I_2 \xrightarrow{Na_2.S_2O_3\,/\,H^+} I^- + Na_2S_4O_6$$

Although solid I_2 is black and insoluble in water, but it converts into soluble I_3 ions

$$\underset{\text{Black}}{I_2(s)} + I \Leftrightarrow \underset{\text{Dark brown}}{I_3^-}$$

Starch is used as indicator near the end point or equivalence point. Even small amount of I_2 molecules, gives blue colour with starch. The completion of the reaction can be detected when blue colour disappears at the and point. In iodimetric titration, the strength of reducing agent is determined by reacting it with I_2

A solution containing Cu^{+2} and $C_2O_4^{-2}$ ions M which on titration with M/10 $KMnO_4$ requires 50 mL. The resulting solution is neutralized with K_2CO_3 then treated with excess of KI. M The liberated I_2 required 25 mL

M/10 $Na_2S_2O_3$ in acidic solution, then what is the difference of the number of m mole of Cu^{+2} and $C_2O_4^{-2}$ ions in the solution ?

A. 40

B. 10

C. 30

D. 50

Answer: B

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Additional Practice Exercise Level Ii Lecture Sheet Advanced Matrix Matching Type Questions

1. Match the following :

Column-I	Column-II	Column-III
A) CH_4	i) E. Wt. = M/8	P) $C^{2+} \longrightarrow C^{4+}$
B) CO	ii) E. Wt. = M/2	Q) $C^{-4} \longrightarrow C^{4+}$
C) $C_2O_4^{2-}$	iii) E. Wt = M/12	R) $C^{3+} \longrightarrow C^{4+}$
D) C_2H_4		S) $C^{-2} \longrightarrow C^{4+}$

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2. Match the n - factor of following reactant :

Column-I		Column-II
A) As_2S_3	$\longrightarrow AsO_4^{3-} + SO_4^{2-}$(half reaction)	P) 10
B) Bi_2S_3	$\longrightarrow Bi^{+5} + S$ (half reaction)	Q) 4
C) $Mn(NO_3)_2$	$\longrightarrow MnO_4^{2-} + NO_3^-$ (half reaction)	R) 2/3
D) $5P_2H_4$	$\longrightarrow 6PH_3 + P_4H_2$	S) 6/5
E) $MnO_4^{2-} + H_2O$	$\longrightarrow MnO_2 + MnO_4^- + OH^-$	T) 28

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Additional Practice Exercise Level Ii Lecture Sheet Advanced Integer Type Questions

1. A^{n+1} is maximum oxidised by acidified $KMnO_4$ solution into AO_3^- If 2.68 mmoles of $A^{+(n+1)}$ requires 32.16 mL of a 0.05 M acidified $KMnO_4$ solution for complete oxidation, value of n is

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2. 2 mole, equimolar mixture of $Na_2C_2O_4$ and $H_2C_2O_4$ required V_1L of 0.1 M $KMnO_4$ in acidic medium for complete oxidatiion. The same amount of the mixture required V_2L of 0.1 M NaOH for neutralization. The ratio of V_1 to V_2 is x:y, then the value of x + y is (x and y are integers)

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3. 0.01 mole of FeS_n (iron (II) sulphide) required 0.06 mole of AO_4^{3-} for complete oxidation. The species formed are FeO, SO_2 and A^{2+}. Calculate the value of n.

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4. A solution containing 2.68×10^{-3} mol of A^{n+} ions requires 1.61×10^{-3} mol of MnO_4^- for the complete oxidation of A^{n+} to AO_3^- in acidic medium. What is the value of n ?

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5. 1 mole of IO_3^- ions is heated with excess of I^- ions in the presence of acidic conditions as per the following equation $IO_3^- + I^- \rightarrow I_2$. How many moles of acidified hypo solution will be required toreact completley withI_2 thus produced ?

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6. 1 lit of M/10 $Ba(MnO_4)_2$, in acidic medium can be oxidised completely with 1/6 lit of x M ferric oxalate. The value of x is

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7. A bottle of H_2O_2 is labelled as 10 vol H_2O_2 112ml of this H_2O_2 solution is completely titrated with 0.04M acidified $KMnO_4$ solution. The volume of $KMnO_4$ consumed in litres is

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8. A metal oxide has the fomula M_2O_3. It can be reduced by hydrogen to give free metal and water. 0.16g of the metal requires 6mg of H_2 for complete reduction. The atomic mass of the metal is .n? times the atomic number of calcium. The value of .n. is

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Additional Practice Exercise Practice Sheet Advanced More Than One Correct Answer Type Questions

1. For the reaction, $KO_2 + H_2O + CO_2 \rightarrow KHCO_3 + O_2$ the mechanism of reaction suggests that:

A. Acid-base reaction

B. Disproportionation reaction

C. Hydrolysis

D. Redox change

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

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2. Which of the following can be used as oxidant and reductant both?

A. HNO_2

B. SO_2

C. O_2

D. CO

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

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3. Which molecules represented by the bold atoms show their highest oxidation state?

A. $H_2\underline{S}_2O_8$

B. $\underline{P}_4O_{10}$

C. $\underline{F_2O}$

D. $\underline{Mn_2O_7}$

Answer: A::B::D

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4. Which one are not correct about $CH_2 = CCl_2$?

A. Both carbon are in +2 oxidation state

B. Both carbon are in -2 oxidation state

C. One carbon has +2 and other has -2 oxidation state

D. The average oxidation number of carbon is zero

Answer: A::B

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5. LiA/H_4 is used as :

A. an oxidant

B. a reductant

C. a mordant

D. water softner

Answer: B

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6. Which of the following disproportionation reaction

A. $F_2 + H_2O \rightarrow HOF + HF$

B. $2HCHO + NaOH \rightarrow HCOONa + CH_3OH$

C. $P_{4(s)} + 3NaOH + 3H_2O \rightarrow PH_3 + 3NaH_2PO_2$

D. $2NO_2 + 2KOH \rightarrow KNO_2 + KNO_3 + HH_2O$

Answer: B::C::D

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7. Select the correct statements:

A. Oxidation number of oxygen in O_2^+ is $+\frac{1}{2}$

B. Oxidation number of oxygen in O_2^- is $-\frac{1}{2}$

C. Oxidation number of Cr in K_3CrO_8 is +5

D. Average oxidation number of Br in tribromooctaoxide (Br_3O_8) is $+\frac{18}{3}$

Answer: A::B::C

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8. Which molecules represented by the bold atoms show their highest oxidation state?

A. $F_2\underline{O}$

B. $H_2\underline{S}$

C. $\underline{P}H_3$

D. $\underline{N_2}H_4$

Answer: B::C

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9. Identify the species in which iron has lowest oxidation state?

A. $Fe(CO)_5$

B. $Fe_2(CO)_9$

C. $Fe_{0.94}O_1$

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

Answer: A::B

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10. The metal undergoing disproportionation are: Which of the following species have peroxide ion or peroxy linkage?

A. Sn

B. Na

C. Cu

D. Ca

Answer: A::C

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11. Which of the following species have peroxide ion peroxy linkage ?

A. H_2O_2

B. BaO_2

C. OF_2

D. $H_2S_2O_8$

Answer: A::B::D

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12. Which of the following statements are not true about the following decomposition reaction?

$2KCl_{3(s)} \rightarrow 2KCl_{(s)} + 3O_{2(g)} \uparrow$

A. Potassium is undergoing oxidation

B. Chlorine is undergoing oxidation

C. Oxygen is reduced

D. None of the species are undergoing oxidation or reduction

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

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13. In the chemical change $aN_2H_4 + bBrO_3^- \rightarrow aN_2 + bBr^- + 6H_2O$, answer the following questions:

The element oxidised and reduced in the reaction are respectively:

A. N_2H_4, BrO_3^-

B. N,Br

C. H,Br

D. BrO_3^- , N_2H_4

Answer: B

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14. In the chemical change $aN_2H_4 + bBrO_3^- \rightarrow aN_2 + bBr^- + 6H_2O$, answer the following questions:

Thenumber of electrons lost or gained during the redox change are:

A. 8

B. 10

C. 12

D. 6

Answer: C::D

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15. In the chemical change : $aN_2H_4 + bBrO_3^- \rightarrow aN_2 + bBr^- + 6H_2O$, answer the following questions:

The equivalent weight of N,H, in the above reaction is:

A. 8

B. 10.6

C. 16

D. 6.4

Answer: A

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16. Some amount of ..20V.. H_2O_2 is mixed with excess of acidifeid solution KI. The iodine so liberated required 200ml of 0.IN $Na_2S_2O_3$ for tritration. The volume of H_2O_2 solution is

A. 11.2 ml

B. 37.2 ml

C. 5.6ml

D. 22.4 ml

Answer: C::D

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17. Some amount of ..20V.. H_2O_2 is mixed with excess of acidifeid solution KI. The iodine so liberated required 200ml of 0.IN $Na_2S_2O_3$ for tritration. The mass of $K_2Cr_2O_7$ needed to oxidises the above volume of H_2O_2 solution :

A. 3.6 g

B. 0.8 g

C. 4.2 g

D. 0.98 g

Answer: D

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18. Some amount of ..20V.. H_2O_2 is mixed with excess of acidifeid solution KI. The iodine so liberated required 200ml of 0.IN $Na_2S_2O_3$ for tritration. The volume of O_2 at STP that would be linerated above H_2O_2 solution :

A. 56 ml

B. 112 ml

C. 168 ml

D. 224 ml

Answer: B

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19. Match the following columns

Column-I	Column-II
A) $(NH_4)_2Cr_2O_7 \rightarrow N_2 + Cr_2O_3 + 4H_2O$	P) Intermolecular redox reaction
B) $PbO_2 + H_2O \rightarrow PbO + H_2O_2$	Q) Disproportionation
C) $Cr_2O_3 + 2Al \rightarrow Al_2O_3 + 2Cr$	R) Intramolecular redox reaction
D) $Cl_2 + 2OH^- \rightarrow ClO^- + Cl^- + H_2O$	S) Metal displacement

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20. Match the following .

Column-I Redox change	Column-II Equivalent weight	Column-III Number of electrons involvedin change
A) $MnO_2 \rightarrow Mn_2O_3$	i) $E_{MnO_2} = M/2$	P) 4
B) $MnO_2 \rightarrow MnSO_4$	ii) $E_{MnO_2} = M/4$	Q) 2
C) $MnO_2 \rightarrow Mn$	iii) $E_{MnO_2} = M/1$	R) 3
D) $KMnO_4 \rightarrow Mn_2O_3$	iv) $E_{MnO_4} = M/4$	S) 8

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21. The formula of a hydrated salt of barium is $BaCl_2.xH_2O$ If 1.936g of this compound gives 1.846 g of anhydrous $BaSO_4$ upon treatment with H_2SO_4 calculate x.

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22. Consider a titration of potassium dichromate solution with acidified Mohr.s salt. The number of moles of Mohr.s salt required per mole of dichromate is:

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23. How many moles of Mg can reduce one mole of dil. HNO_3 into NH_4^+ ions ?

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24. Number of per oxide bonds in per xenate ion $[XeO_6]^{4-}$ is :

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25. $aH_2S + bHNO_3 \rightarrow cS + dNO + eH_2O$. The value of $\frac{[(c \times d) - e]}{(a - b)} =$ ------

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26. Oxidation number of .S. in $(CH_3)_2$ SO is:

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27. Number of electrons taken up by nitrogen atom when a NO^+ ion is reduced to NH_2OH is:

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28. The oxidation number of Pt in K $[PtNH_3Cl_5)$ will be

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29. The number of electrons lost during the oxidation of Cr^{3+} to $Cr_2O_7^{2-}$ are

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30. $KMnO_4$ oxidizes X^{n+} to XO_3^- and it self changing to Mn+2is acid medium 2.68×10^{-3} moles of requires mole of. The value of .n. is

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31. The coefficient of PH, in the following balanced equation will be:

$P_{4(s)} + OH^- \rightarrow PH_{3(g)} + HPO_{2(aq)}^-$

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32. Oxidation state of terminal sulphur atoms in $S_4O_6^{2-}$ 02 (tetra thionate ion) are

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33. Oxidation number of chlorine in $NOClO_4$ is:

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34. The value of 'n' in the molecular formula $Be_nAl_2Si_6O_{18}$ is

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35. How many species will have multiples of .2. in the following equation after balancing? Balanced equation must contain least integral multiples.

$$CrSCN^{2+} + BrO^- + OH^- \rightarrow Br^- + NO_3^{-1} + CO_3^{2-} + SO_4^{2-} + CrO$$

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