



## CHEMISTRY

### JEE (MAIN AND ADVANCED) CHEMISTRY

#### STOICHIOMETRY

##### Lecture Sheet Straight Objective Type Questions

1. One mole of molecules of oxygen represents

A.  $6.02 \times 10^{23}$  molecules of oxygen

B. 8 gms of oxygen

C. 16 g of  $O_2$

D. 11.2 L of  $O_2$  at STP

**Answer: A**



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2. The ratio between the number of molecules in equal masses of nitrogen and oxygen is

A. 7:8

B. 1:9

C. 9:1

D. 8:7

**Answer: D**

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3. The atomic masses of two elements A and B are 20 and 40 respectively.

If  $x$  gm of A contains  $Y$  atoms, how many atoms are present in  $2x$  gm of B

A.  $2y$

B.  $y/2$

C.  $y$

D.  $4y$

**Answer: C**



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**4.** Total number of sulphate ions present in 3.92 g of chromic sulphate is

(Cr=52, S=32, O=16)

A.  $1.8 \times 10^{22}$

B.  $1.8 \times 10^{23}$

C.  $1.2 \times 10^{21}$

D.  $6 \times 10^{23}$

**Answer: A**



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5. Analysis of chlorophyll shows that it contains 2.68% Mg. Number of magnesium atoms present in 2.4 g of chlorophyll is

A.  $2.68 \times 6 \times 10^{21}$

B.  $2.68 \times 6 \times 10^{23}$

C.  $2.68 \times 6 \times 10^{20}$

D.  $2.68 \times 6 \times 10^{20} / 24$

**Answer: C**



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6. The mass of water (in grams) in one mole of crystalline hypo is

A. 18

B. 90

C. 158

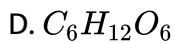
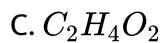
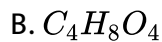
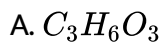
D. 248

**Answer: B**



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7. The empirical formula of a compound is  $CH_2O$ . Its molecular weight is 120. The molecular formula of the compound is

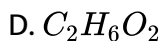
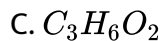
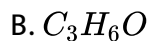


**Answer: B**



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8. 0.262 g of a substance gave, on combustion 0.361 g of  $CO_2$  and 0.147 g of  $H_2O$ . What is the empirical formula of the substance



**Answer: A**



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9. 0.66 g of a compound gave 112 ml of nitrogen at STP in the Dumas method. The percentage of Nitrogen in the compound is

A. 25

B. 41.5

C. 42.4

D. 21.2

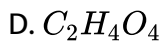
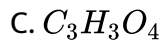
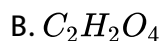
**Answer: D**



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10. A dibasic acid containing C,H and O was found to contain C=26.7% and H=2.2%. The vapour density of its dimethyl ester was found to be 73.

The molecular formula of the acid is



**Answer: B**



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11. A peroxidase enzyme contains 2% selenium( $\text{Se}=80$ ). The minimum molecular weight of the enzyme is

- A. 1000
- B. 2000
- C. 4000
- D. 800

**Answer: C**



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12. Carbon and oxygen combine to form two oxides, carbon monoxide and carbond dioxide in which the ratioi of the weights of carbon and oxygen is respectively 12:16 and 12:32. these figures illustrate the

- A. Law of multiple proportions
- B. Law of reciprical proportions



C. Law of conservation of mass

D. Law of constant proportions

**Answer: A**



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**13.** A chemical equation is always balanced with respect which one of the following

(i) Number of atoms (ii) Number of molecules

(iii) Number of moles (iv) Mass

A. Only I is correct

B. Only iii correct

C. Only iv correct

D. Both I and iv are correct

**Answer: D**



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14. Which of the following has highest mass?

- A. One gram atom of Iron
- B. 5 moles of  $N_2$
- C.  $10^{24}$  carbon atoms
- D. 44.8 lit of He at STP

**Answer: B**



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15. Which contains more number of molecules?

- A. 1 mole of carbon dioxide
- B. 4 g of hydrogen
- C. 33.6 litres of oxygen at StP

D. 6g of helium

**Answer: B**



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**16.** Which of the following gases has the highest density under standard conditions?

A. CO

B.  $N_2O$

C.  $C_3H_8$

D.  $SO_2$

**Answer: B**



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1. Which of the following contains Avagadro number of atoms?

- A. one mole of Helium gas
- B. 22.4 lits of  $CO_2$  at STP
- C. 11.2 lits of Hydrogen gas at STP
- D. 3.2 gms of methane

**Answer: A::C::D**



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2. Equal masses of oxygen and ozone have equal

- A. number of grammolecules
- B. number of gramafoms
- C. volumes at STP
- D. number of electrons

**Answer: B::D**



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3. 0.5 mole of  $P_4IO_{10}$  contains

- A. 80 gm oxygen
- B. 2 gram atoms phosphorous
- C. 5 gram atoms oxygen
- D. 10 gram atoms oxygen

**Answer: A::B::C**



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**Lecture Sheet Linked Comprehension Type Questions**

1. A mole of any substance contains  $6.023 \times 10^{23}$  particles. The particles may be atom, molecule ions, electron, proton or neutron. One mole of atom is equal to 1 gm -atom which is equal to atomic weight of atom. 1 gm molecule of any gas is 1 mole of gas whose volume is 22.4 litre at N.T.P. The volume of  $3.011 \times 10^{23}$  atoms of hydrogen gas at N.T.P. is

- A. 1.12 litres
- B. 2.24 litres
- C. 2.8 litres
- D. 5.6 litres

**Answer: D**



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2. A mole of any substance contains  $6.023 \times 10^{23}$  particles. The particles may be atom, molecule ions, electron, proton or neutron. One mole of atom is equal to 1 gm -atom which is equal to atomic weight of atom. 1

gm molecule of any gas is 1 mole of gas whose volume is 22.4 litre at N.T.P.

Mass of 1 atom of an element  $X_2$  is  $6.64 \times 10^{-23} \text{ gm}$ . Molecular weight of  $X_2$  is

A. 80

B. 60

C. 40

D. 20

**Answer: A**



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3.4.4 gms of a hydrocarbon on complete combustion produced 13.2 gms of  $CO_2$  and 7.2 gms of  $H_2O$ .

What is the hydrocarbon?

A. Propane

B. Propene

C. Butane

D. Butene

**Answer: A**



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4. 4.4 gms of a hydrocarbon on complete combustion produced 13.2 gms of  $CO_2$  and 7.2 gms of  $H_2O$ .

How many moles of oxygen is consumed per mole of hydrocarbon in the combustion?

A. 3

B. 5

C. 4

D. 6

**Answer: B**



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## Lecture Sheet Matrix Matching Type Questions

1. Match the following columns

**Column-I**

- A)  $\text{NH}_3$
- B)  $\text{N}_2\text{H}_4$
- C)  $\text{N}_3\text{H}$
- D)  $\text{C}_2\text{N}_2$

**Column-II**

- P)  $\text{EF} = \text{MF}$
- Q)  $\text{MF} = (\text{EF})_2$
- R) Maximum percentage of nitrogen by mass
- S) Least percentage of nitrogen by mass



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2. Match the following columns

**Column-I**

- A) 0.1 mole Benzene
- B) 0.1 mole glucose
- C) 0.6 mole  $\text{CO}_2$
- D) 0.4 mole ethylene

**Column-II**

- P) 0.3 moles ' $\pi$ ' bond
- Q) 0.6 gram atoms of carbon
- R) 0.3 gram molecules of  $\text{O}_2$
- S) 1.2 gram atoms of hydrogen



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## Lecture Sheet Integer Type Questions

1. An enzyme contains 2% of sulphur. The molecular weight of the Enzyme is 6400. How many sulphur atoms are present in that enzyme molecule?



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2. The weight of a gaseous mixture containing  $12.044 \times 10^{23}$  atoms of He and  $3.011 \times 10^{23}$  molecules of hydrogen is \_\_\_\_\_g.



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3. The weight of methane which occupies the same volume at STP as 7.5 gm of ethane is \_\_\_\_\_g .A compound contains 40% carbon 6.6% hydrogen and the rest oxygen. If 100 ml of its decimolar solution contains 1.8 gms of its how many empirical units are present in its molecule?



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4. A compound contains 40% carbon 6.6% hydrogen and the rest oxygen. If 100 ml of its decimolar solution contains 1.8 gms of it, how many empirical units are present in its molecule?



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5. Air contains 20%  $O_2$  by volume. An alkane ( $C_xH_y$ ) requires 10 times its volume of air for complete combustion. What is  $y/x$ ?



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6. 4.4 gms of a hydrocarbon on complete combustion produced 13.2 gms of  $CO_2$  and 7.2 gms of  $H_2O$ .

How many moles of oxygen is consumed per mole of hydrocarbon in the combustion?



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1. The oxidation number of nitrogen in  $HN_3$  is

A.  $+1/3$

B.  $+3$

C.  $-1/3$

D.  $-1$

Answer: C



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2. Oxidation state of Fe in  $K_4[Fe(CN)_6]$

A. Oxidation number of and valency of oxygen in  $OF_2$  are

B.  $+1, 2$

C.  $+2, 2$

D. +1, 1

**Answer: C**



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3. 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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4. 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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List-1

- A) + 3 Oxidation state
- B) + 1 Oxidation state
- C) 0 Oxidation state
- D) + 5 Oxidation state

List-2

- 1) Nitrogen
- 2) Nitrous oxide
- 3) Nitrate ion
- 4) Hydroxylamine
- 5) Nitrite ion

5.

The correct match is

	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
A.	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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6. 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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7. In bleaching powder oxidation states of Cl are

A.  $-1, +2$

B.  $-2, +1$

C.  $-1, +1$

D.  $-2, +1$

**Answer: C**



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8. (A): Oxidation state of carbon in  $C_6H_{12}O_6$  is zero.

(R) : Oxidation state of carbon in all organic compounds is zero.

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

B. Both (A) and (R) are true and (R) is not the correct explanation of (A).



C. (A) is true but (R) is false

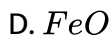
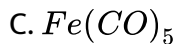
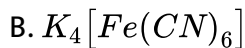
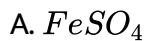
D. (A) is false but (R) is true

**Answer: C**



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**9. Iron has the lowest oxidation state in**



**Answer: C**



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10. The oxidation number of Cr is  $CrO_5$  is

A. +10

B. +6

C. +4

D. +5

**Answer: B**



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11. In the reaction  $P_4 + 3OH^- + 3H_2O \rightarrow 3H_2PO_2 \rightarrow 3H_2PO_2^- + PH_3$  phosphorus is undergoing.

A. oxidation

B. reduction

C. disproportionation

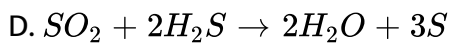
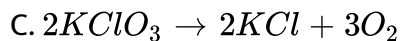
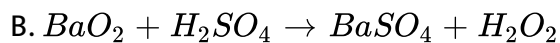
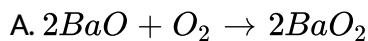
D. hydrolysis

Answer: C



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



Answer: B



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13. Which one of the following is not prepared from halide by chemical oxidation process



**Answer: A**



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



D.  $\text{ClO}_4^-$

**Answer: D**



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15. In  $\text{C} + \text{H}_2\text{O} \rightarrow \text{CO} + \text{H}_2$ ,  $\text{H}_2\text{O}$  acts as

A. Oxidising agent

B. Reducing agent

C. Both a and b

D. None of these

**Answer: A**



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16. Which one of the following generally gets displaced by more electro positive metals in nonmetal displacement reactions.



**Answer: A**



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### Lecture Sheet Exercise II More Than One Correct Answer Type Questions

1. The different oxidation state (s) exhibited by oxygen is (are)



C. 0

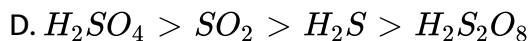
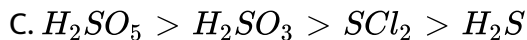
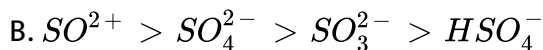
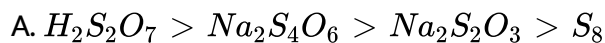
D.  $-\frac{1}{2}$

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



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2. Which of the following have been arranged in order of decreasing oxidation number of sulphur?

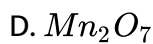
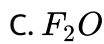
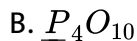
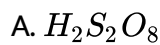


**Answer: A::C::D**



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

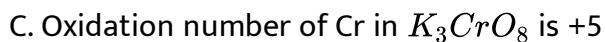
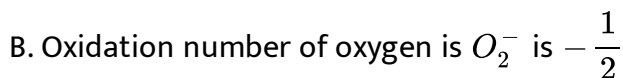
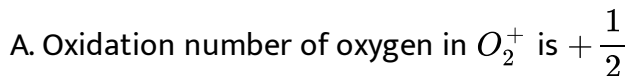


Answer: A::B::D



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4. Select the correct statements:





D. Average oxidation number of Br in tribromooctaoxide ( $Br_3O_8$ ) is

$$+\frac{18}{3}$$

**Answer: A::B::C**



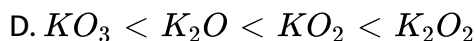
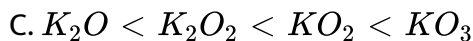
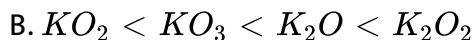
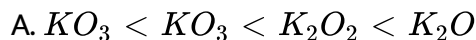
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## Lecture Sheet Exercise II Linked Comprehension Type Questions

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 interchangeably 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 even be fractional.

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



**Answer: C**



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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 interchangeably 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 even 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

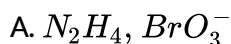
**Answer: A**



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3. 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:



B.  $N$ ,  $Br$

C.  $H$ ,  $Br$

D.  $BrO_3^-$ ,  $N_2H_4$

**Answer: B**



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4. In the chemical change  $aN_2H_4 + bBrO_3^- \rightarrow aN_2 + bBr^- + 6H_2O$ ,

answer the following questions:

The number of electrons lost or gained during the redox change are:

A. 8

B. 10

C. 12

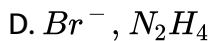
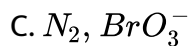
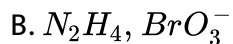
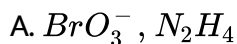
D. 6

**Answer: C**

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

The species acting as oxidant and reductant respectively are:



**Answer: A**

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Lecture Sheet Exercise II Matrix Matching Type Questions

1. Match the following columns

**Column-I**

- A)  $\text{AgNO}_3 + \text{NaCl} \rightarrow \text{AgCl} + \text{NaNO}_3$   
B)  $2\text{KCl} + \text{Br}_2 \rightarrow 2\text{kBr} + \text{Cl}_2$   
C)  $2\text{HCHO} \xrightarrow{\text{NaOH}} \text{HCOONa} + \text{CH}_3\text{OH}$   
D)  $\text{AgSO}_4 + \text{Ag} \rightarrow \text{Ag}_2\text{SO}_4$   
E)  $\text{BaCl}_2 + \text{K}_2\text{CrO}_4 \rightarrow \text{BaCrO}_4 + 2\text{KCl}$

**Column-II**

- P) Metathesis  
Q) Reaction possible but not redox reaction  
R) Disproportionation  
S) Comproportionation  
T) Reaction not possible



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2. Match the following columns

**Element**

- A) Nitrogen  
B) Chlorine  
C) Oxygen  
D) Fluorine

The oxidation number shown  
by the element in its compounds

P) -1

Q) +5

R) +7

S) +3

T) +1



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Lecture Sheet Exercise II Integer Type Questions

1. The oxidation number of iron in brown ring complexes  $+x$ . What is value of  $x$ .



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2. The oxidation number of sulphur in caro's acid is  $+x$ . What is value of  $x$ .



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3. In first transition series elements the highest oxidation number shown is  $+x$ . What is the value of  $x$ .



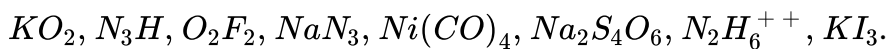
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4. The oxidation number of hydrogen (per atom) in hydrolith as  $-x$ . What is value of  $x$ .



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5. In how many of the following compounds an element has fractional oxidation number



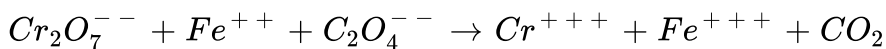
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6. When the redox reaction  $Zn + NO_3^- \rightarrow Zn^{++} + NH_4^+$  is balanced by ion electron method in acid medium what is the correct coefficient of zinc.



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7. When the redox reaction



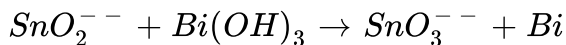
balanced by ion electron method in acid medium what is the correct coefficient of  $Cr_2O_7^{--}$



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8. When the redox reaction



is balanced by ion electron method in basic medium what is correct coefficient of  $\text{SnO}_2^{--}$



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### Lecture Sheet Exercise Iii Straight Objective Type Questions

1. 2.76 g of silver carbonate on strong ignition leaves a residue weighing

A. 2.48 g

B. 2.16 g

C. 2.32 g

D. 2.84g

Answer: B



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2. 0.01 mole of iodoform ( $CHI_3$ ) reacts with Ag powder to produce a gas whose volume at NTP is

- A. 112 ml
- B. 336 ml
- C. None
- D.

**Answer: B**



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3. Air contains 20% by volume of oxygen. The volume of air required for the complete combustion of 1L of methane under the same conditions is

- A. 2L
- B. 4L

C. 10L

D. 0.4L

**Answer: C**



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4. When a sample of baking is strongly ignited in a crucible, it suffered a loss in weight of 3.1 g. The mass of baking soda is

A. 16.8 g

B. 8.4 g

C. 11.6 g

D. 4.2 g

**Answer: B**



**Watch Video Solution**

5. X litre of carbon monoxide is present at mSTP. It is completely oxidised to  $CO_2$ . Formed is 11.207 l. What is the value of X in litres?

A. 22.414

B. 11.207

C. 5.6035

D. 44.828

**Answer: B**



**Watch Video Solution**

6. The number of moles of KI required to produce 0.4 mole  $K_2HgI_4$  is

A. 1

B. 3

C. 6

D. 1.6

**Answer: D**



**Watch Video Solution**

7. When 20 ml of methane and 20 ml of oxygen are exploded together and the reaction mixture is cooled to laboratory temperature. The resulting volume of the mixture is

A. 40 ml

B. 20 ml

C. 30ml

D. 10ml

**Answer: B**



**Watch Video Solution**

8. Acetylene can be prepared from calcium carbonate by a series of reactions. The mass of 80% calcium carbonate required to prepare 2 moles of acetylene is

A. 200g

B. 160g

C. 250 g

D. 320 g

**Answer: C**



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9. Sodium carbonate of 92% purity is used in the reaction  $Na_2CO_3 + CaCl_2 \rightarrow CaCO_3 + 2NaCl$ . The number of grams of  $Na_2CO_3$  required to yield 1 gm of  $CaCO_3$

A. 8.5g

B.  $10.5g$

C.  $11.52g$

D.  $1.152g$

**Answer: D**



**Watch Video Solution**

10.  $4g$  of mixture of  $Na_2CO_3$  and  $NaHCO_3$  on heating liberates  $448\text{ ml}$  of  $CO_2$  at STP. The percentage of  $Na_2CO_3$  in the mixture is

A. 84

B. 16

C. 54

D. 80

**Answer: B**



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11. 25.5 g of  $H_2O_2$  solution on decomposition gave 1.68 L of  $O_2$  at STP. The percentage strength by weight of the solution is

A. 30

B. 10

C. 20

D. 25

**Answer: C**



**Watch Video Solution**

12. How much  $Ca(NO_3)_2$  in mg must be present in 50 ml of a solution with 2.35 ppm of Ca?

A. 0.1175

B. 770.8



C. 4.7

D. 0.48

**Answer: D**



**Watch Video Solution**

**13.** 500 ml of a 0.1 N solution of  $AgNO_3$  added to 500 ml of 0.1 N solution of KCl. The concentration of nitrate ion in the resulting mixture is

A. 0.05 N

B. 0.1 N

C. 0.2 N

D. reduced to zero

**Answer: A**



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14. 0.84 g of an acid (mol wt. 150) was dissolved in water and the volume was made up to 100 ml. 25 ml of this solution required 28 ml of (N/10) NaOH solution for neutralisation. The equivalent weight and basicity of the acid

- A. 75,2
- B. 150,1
- C. 75,4
- D. 150,2

**Answer: A**



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15. 0.70 g of a sample of  $Na_2CO_3 \cdot xH_2O$  were dissolved in water and the volume was made to 100 ml. 20 ml of this solution required 19.8 ml of (N/10) HCl for complete neutralisation. The value of x is

- A. 2

B. 1

C. 4

D. 10

**Answer: A**



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### Lecture Sheet Exercise Iii More Than One Correct Answer Type Questions

1. Combustion of 2.24 lts ethane at STP requires

A. 7.84 lts of  $O_2$

B. 0.35 moles of  $O_2$

C. 11.2 gms of  $O_2$

D. 5.6 lts of  $O_2$  at STP

**Answer: A::B::C**

[Watch Video Solution](#)

2. One mole Barium chloride and one mole Sodium phosphate are mixed in aqueous medium.

- A.  $BaCl_2$  acts as limiting reagent
- B.  $Na_3PO_4$  acts as limiting reagent
- C. Half mole of  $Ba_3(PO_4)_2$  is formed
- D. 0.33 mole of  $Ba_3(PO_4)_2$  is formed

**Answer: A::D**

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3.  $10\text{ml } N_2$  is reacted with  $20\text{ ml } H_2$  to form  $NH_3$ . The correct statements is /are

- A.  $13.3\text{ ml } NH_3$  is formed

B. 20 ml  $NH_3$  is formed

C. 3.4 ml  $N_2$  is left after the completion of the reaction

D. 16.7 ml  $NH_3$  of mixture is left the completion of the reaction.

**Answer: A::C::D**



**Watch Video Solution**

4. 1 mole  $Ba(OH)_2$  will exactly neutralize

A. 0.5 mole HCl

B. 1 mole of  $H_2SO_4$

C. 1 mole of  $H_3PO_4$

D. 3 mole  $H_3PO_2$

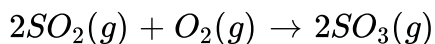
**Answer: B::C::D**



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1. 10 moles of  $SO_2$  and 4 moles of  $O_2$  are mixed in a closed vessel of volume 2 litres. The mixture is heated in the presence of Pt catalyst.

Following reaction takes place:



Assuming the reaction proceeds to completion.

Select the correct statement.

- A.  $SO_2$  is the limiting reagent
- B.  $O_2$  is the limiting reagent
- C. Both  $SO_2$  and  $O_2$  are limiting
- D. Cannot be predicted

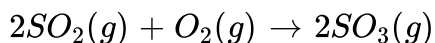
**Answer: B**



**Watch Video Solution**

2. 10 moles of  $SO_2$  and 4 moles of  $O_2$  are mixed in a closed vessel of volume 2 litres. The mixture is heated in the presence of Pt catalyst.

Following reaction takes place:



Number of moles of  $SO_3$  formed in the reaction will be

A. 10

B. 4

C. 8

D. 14

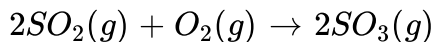
**Answer: C**



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3. 10 moles of  $SO_2$  and 4 moles of  $O_2$  are mixed in a closed vessel of volume 2 litres. The mixture is heated in the presence of Pt catalyst.

Following reaction takes place:



Number of moles of excess reactant remaining

A. 4

B. 2

C. 6

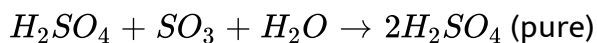
D. 8

**Answer: B**



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4. Oleum is mixture of  $H_2SO_4$  and  $SO_3$  i.e.  $H_2S_2O_7$  which is obtained by passing  $SO_3$  in solution of  $H_2SO_4$ . In order to dissolve  $SO_3$  in oleum, dilution of oleum is done by water in which oleum is converted into pure  $H_2SO_4$  as shown below:



When 100 gm oleum is diluted with water then total mass of diluted oleum is known as percentage labelling in oleum.



For example: 109 %  $H_2SO_4$  labelling of oleum sample means that 109 gm pure  $H_2SO_4$  is obtained on diluting 100 gm oleum with 9 gm  $H_2O$  which dissolves all free  $SO_3$  in oleum.

If the number of moles of free  $SO_3$ ,  $H_2SO_4$ , and  $H_2O$  be  $x$ ,  $y$  and  $z$  respectively in 118% $H_2SO_4$  labelled oleum, the value of  $(x + y + z)$  is

A. 2.2

B. 3.2

C. 3.4

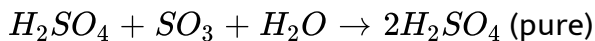
D. 4.2

**Answer: A**



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5. Oleum is mixture of  $H_2SO_4$  and  $SO_3$  i.e.  $H_2S_2O_7$  which is obtained by passing  $SO_3$  in solution of  $H_2SO_4$ . In order to dissolve  $SO_3$  in oleum, dilution of oleum is done by water in which oleum is converted into pure  $H_2SO_4$  as shown below:



When 100 gm oleum is diluted with water then total mass of diluted oleum is known as percentage labelling in oleum.

For example: 109 %  $H_2SO_4$  labelling of oleum sample means that 109 gm pure  $H_2SO_4$  is obtained on diluting 100 gm oleum with 9 gm  $H_2O$  which dissolves all free  $SO_3$  in oleum.

If 109%  $H_2SO_4$  labelled oleum, the percent of free  $SO_3$  and  $H_2SO_4$  are

A. 30%, 70%

B. 40%, 60%

C. 60%, 40%

D. 15%, 85%

**Answer: B**



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### 1. List - I

- A) 1.72 g impure  $\text{FeSO}_4$  consumed 20 mL of 0.1M acidic  $\text{KMnO}_4$
- B) 8.4 gm impure  $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$  consumed 0.1mole  $\text{NaOH}$
- C) 9.84g  $\text{FeSO}_4(\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$  impure sample reduced 0.02 equivalent  $\text{K}_2\text{Cr}_2\text{O}_7$  acidic solution
- D) 1.87eq  $\text{H}_2\text{O}_2$  reduced 75gm impure  $\text{KMnO}_4$  in acidic medium

### List - II

- P) 75% pure sample
- Q) 79.67% pure sample
- R) 79.1% pure sample
- S) 88.37% pure sample

1.



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2.

Match

the

following

columns

### List - I (Reaction)

- A) 1 mole of oxalic acid + 1 mole of  $\text{NaOH}$
- B) 1 mole of  $\text{H}_3\text{PO}_2$  + 1 mole  $\text{KOH}$
- C) 1 mole of  $\text{Ca}(\text{OH})_2$  + 1 mole of  $\text{HCl}$
- D) Dry slaked lime +  $\text{Cl}_2$

### List - II (Type of Salt)

- P) Mixed salt
- Q) Basic salt
- R) Acid salt
- S) Normal salt



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## Lecture Sheet Exercise Iii Integer Type Questions

1. What is  $\frac{\text{mol. Wt}}{\text{Eq. wt}}$  of  $\text{FeC}_2\text{O}_4$  getting converted into  $\text{Fe}^{+3}$  and  $\text{CO}_2$ ?



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2. Eq. wt  $\frac{\text{Mol wt}}{x}$  What is x for acetaldehyde converted into acetic acid.



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3. Methane is converted into faormaldehyde. What is the ratio of molecular weight to equivalent weight of Methane?



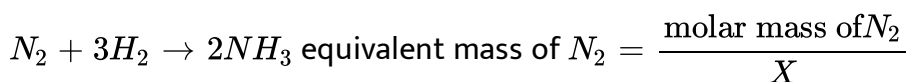
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4. What is the equivalent weight of methane during its Combustion?



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5. For the following reaction



What is the value of x.



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6. On heating 1.763 g of hydrated  $BaCl_2 \cdot nH_2O$  to dryness, 1.505 g of anhydrous salt remained. What is the value of n (Mol wt of  $BaCl_2 = 208$ )



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7. What is the  $\frac{\text{Mol wt}}{\text{Eq. wt}}$  ratio of  $Fe_2(SO_4)_3$  being converted into  $Fe(OH)_3$



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### Lecture Sheet Exercise Iv Straight Objective Type Questions

1. 500 ml of a 0.1 N solution of  $AgNO_3$  added to 500 ml of 0.1 N solution of KCl. The concentration of nitrate ion in the resulting mixture is

A. 0.05 N

B. 0.1 N

C. 0.2 N

D. reduced to zero

**Answer: A**



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2. What will be present in the solution when 50 ml of 0.1 M HCl is mixed with 50 ml of 0.1 M NaOH solution?

A. 4.5 millimole of  $H^+$

B. 0.05 millimole of  $OH^-$

C. 0.1 M NaCl

D.  $10^{-7} M$  of  $H^+$  ion

**Answer: D**

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3. Number of moles of  $KMnO_4$  required to oxidize one mole of  $Fe(C_2O_4)$  in acidic medium is

A. 0.6

B. 0.167

C. 20

D. 40

**Answer: A**

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4.  $H_2C_2O_4 \cdot 2H_2O$  (Mol wt =126) can be oxidised into  $CO_2$  by acidified  $KMnO_4$ . 6.3 gms of oxalic acid can not be oxidised

A. 3.16 gms of  $KMnO_4$

B. 200 ml of 0.1 M  $KMnO_4$

C. 0.1 mole of  $KMnO_4$

D. 0.02 moles of  $KMnO$

**Answer: C**



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5. 10 g sample of  $H_2O_2$  just decolorised 100 ml of 0.1 M  $KMnO_4$  in acidic medium % by mass of  $H_2O_2$  in the sample is

A. 3.4

B. 8.5

C. 17

D. 1.7

**Answer: B**



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6. If  $x$  g is the mass of  $NaHC_2O_4$  required to neutralize 100 ml of 0.2 M NaOH and  $y$  g that required to reduce 100 ml of 0.02 M  $KMnO_4$  in acidic medium then

A.  $x = y$

B.  $2x = y$

C.  $x = 4y$

D.  $4x = y$

**Answer: C**



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7. What volume at STP of gaseous ammonia will be required to be passed into 100 ml of 0.5M  $H_2SO_4$  to bring down its strength of 0.25 M?

A. 1.560 L

B. 1.120 L

C. 1.680 L

D. 2.240 L

**Answer: B**



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8. 20 ml of  $0.1MFeC_2O_4$  solution is titrated with  $0.1MKMnO_4$  in acidic medium. Volume of  $KMnO_4$  solution required to oxidise  $FeC_2O_4$  completely is

A. 20 ml

B. 12 ml

C. 8 ml

D. 4 ml

**Answer: B**

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9. To neutralize completely 20 ml of 0.1 M phosphorus acid, 40 ml of KOH was required. What volume of this KOH solution will be required to neutralize 0.66 g of  $H_3PO_2$ ?

- A. 100 ml
- B. 200 ml of 0.1 M  $KMnO_4$
- C. 300 ml
- D. 66.7 ml

**Answer: A**

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10. During the titration of a mixture of  $Na_2CO_3$  and  $NaHCO_3$  against HCl

- A. phenolphthalein is used to detect the first end point
- B. phenolphthalein is used to detect the second end point
- C. methyl orange is used to detect the first end point.
- D. methyl red is used to detect the first end point

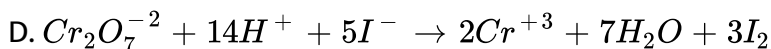
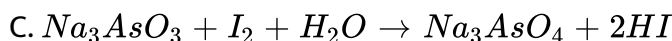
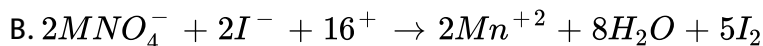
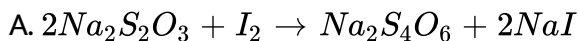
**Answer: A**



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### Lecture Sheet Exercise Iv More Than One Type Questions

**1. Which relation involve iodimetric titration?**

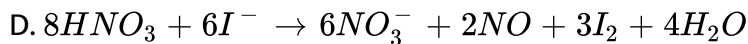
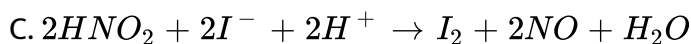
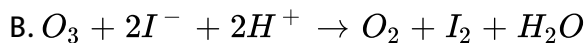
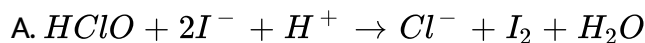


Answer: A::C::D



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2. Which of the following are valid iodometric titrations?



Answer: A::B::C



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3. One mole of  $KMnO_4$  is used for complete oxidation of  $FeSO_4$ ,  $FeC_2O_4$  and  $H_2C_2O_4$  respectively and separately. Pick up the correct statement.

- A. 5 mole of  $FeSO_4$  can be oxidised
- B.  $3/5$  mole of  $FeC_2O_4$  can be oxidized
- C.  $5/3$  mole of  $FeC_2O_4$  can be oxidized
- D. 2.5 mole of  $H_2C_2O_5$  can be oxidized

**Answer: A::C::D**



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### Lecture Sheet Exercise Iv Linked Comprehension Type Questions

1. 50 ml of given  $H_2O_2$  solution is added to excess KI solution in acidic medium. The liberated  $I_2$  required 20 ml of 0.04 M standard Hypo solution.

Molarity of  $H_2O_2$  solution is

A.  $8 \times 10^{-3} M$

B.  $4 \times 10^{-3} M$

C.  $5 \times 10^{-3} M$

D. None of these

**Answer: A**



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2. 50 ml of given  $H_2O_2$  solution is added to excess KI solution in acidic medium. The liberated  $I_2$  required 20 ml of 0.04 M standard Hypo solution.

Weight of  $H_2O_2$  present in 250 ml of given solution is

A. 0.034 g

B. 0.068 g

C. 0.136 g

D. None of these

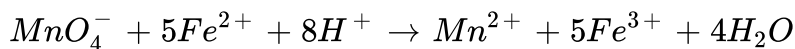
**Answer: B**



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3. A quantity of 25.0 mL of solution containing both  $Fe^{2+}$  and  $Fe^{3+}$  ions is titrated with 25.0 mL of 0.0200  $M KMnO_4$  (in dilute  $H_2SO_4$ ). As a result, all of the  $Fe^{2+}$  ions are oxidised to  $Fe^{3+}$  ions.

Next 25 mL of the original solution is treated with Zn metal finally, the solution requires 40.0 mL of the same  $KMnO_4$  solution for oxidation to  $Fe^{3+}$ .



Zinc added in the second titration will

A. oxidize  $Fe^{2+}$  to  $Fe^{3+}$

B. reduce  $Fe^{3+}$  to  $Fe^{2+}$

C. reduce  $Fe^{3+}$  to Fe

D. reduce  $Fe^{2+}$  to Fe

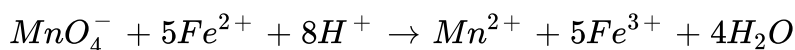
**Answer: B**





4. A quantity of 25.0 mL of solution containing both  $Fe^{2+}$  and  $Fe^{3+}$  ions is titrated with 25.0 mL of 0.0200  $M KMnO_4$  (in dilute  $H_2SO_4$ ). As a result, all of the  $Fe^{2+}$  ions are oxidised to  $Fe^{3+}$  ions.

Next 25 mL of the original solution is treated with Zn metal finally, the solution requires 40.0 mL of the same  $KMnO_4$  solution for oxidation to  $Fe^{3+}$ .



IF 0.02  $MK_2Cr_2O_7$  is used instead of 0.02 M  $KMnO_4$  its volume required in these titrations are respectively

A. 25mL, 40mL

B. 25mL, 15mL

C. 20.8 mL 33.3 mL

D. 10.4 mL , 16.7 mL

**Answer: C**



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## Lecture Sheet Exercise Iv Matrix Type Questions

1. Match the following columns

### List - I

- A) 1 mole NaOH
- B) 0.5 mole  $\text{Ca}(\text{OH})_2$
- C) 2 moles  $\text{KMnO}_4$
- D) 1 mole  $\text{K}_2\text{Cr}_2\text{O}_7$

### List - II

- P) 0.5 mole  $\text{H}_2\text{SO}_4$
- Q) 1 mole  $\text{HCl}$
- R) 10 moles Mohr's salt solution
- S) 5 moles oxalic acid solution



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## Lecture Sheet Exercise Iv Integer Type Questions

1. 100 mL of  $0.01 \text{ MXO}_4^-$  is reduced to  $\text{X}^{n+}$  by 100 mL of  $0.05 \text{ M Fe}^{2+}$  in acidic medium. Thus oxidation state of X in  $\text{X}^{n+}$  is \_\_\_\_\_



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2. 25 mL of 0.1 M solution of metallic salt (A) oxidised 25 mL of 0.1 M sodium sulphite to sodium sulphate. If oxidation number of the metal in

the salt (A) is 3, then new oxidation number of the metal is \_\_\_\_\_



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3. 25 mL of a solution containing  $6.1g L^{-1}$  of an oxalate of formula  $K_xH_y(C_2O_4)_z \cdot nH_2O$  required 18 mL of 0.1 N NaOH and 24 mL of 0.1  $KMnO_4$  in the separate titrations. Thus  $x + y + z + n =$



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4. Equivalent weights of two oxides of an element are 14 and 11 respectively. What is the ratio of atomicity of oxygen in the second oxide to first oxide?



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1. One mole of sodium represents

A.  $6.02 \times 10^{23}$  atoms of sodium

B. 46 gms of sodium

C. 11g of sodium

D. 34.5 g of sodium

**Answer: A**



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2. The charge present on 1 mole electrons is

A. 96500 Coulombs

B. Coulomb

C.  $1.60 \times 10^{-19} C$

D. 0.1 Faraday

**Answer: A**



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**3.** The gas which is twice as dense as oxygen under the same conditions is

- A. Ozone
- B. Sulphur trioxide
- C. Sulphur dioxide
- D. Carbon dioxide

**Answer: C**



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**4.** Ordinary water contain one part of heavy water per 6000 parts of water by weight. The number of heavy water molecules present in a drop of water of volume 0.01 mL is (density of water 1 g/mL)

A.  $2.5 \times 10^{16}$

B.  $5 \times 10^{17}$

C.  $5 \times 10^{16}$

D.  $7.5 \times 10^{16}$

**Answer: B**



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5. Assuming that air at STP contained 80% by volume of nitrogen, the volume of air at STP that contains  $4.8 \times 10^{23}$  molecules of nitrogen is

A. 18L

B. 44.8 L

C. 22.4 L

D. 11.2 L

**Answer: C**



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6. The percentage of nitrogen in Magnesium nitride is

A. 14

B. 28

C. 42

D. 56

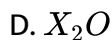
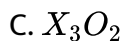
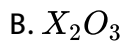
**Answer: B**



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7. An element X forms two oxides. Formula of the first oxide is  $XO_2$ . The first contains 50% of oxygen. If the second oxide contains 60% oxygen, the formula of the second oxide is

A.  $XO_3$



**Answer: A**



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8. Two gaseous samples were analysed. One contained 1.2 g of carbon and 3.2 g of oxygen. The other contained 27.3% carbon and 72.7% oxygen. The experimental data is in accordance with

A. Law of conservation of mass

B. Law of definite proportions

C. Law of reciprocal proportions

D. Law of multiple proportions

**Answer: B**



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9. Which of the following has number of molecules present equal to those present in 16 grams of oxygen

A.  $16gO_3$

B.  $32gSO_2$

C.  $16gSO_2$

D. All the above

**Answer: B**

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10. The ratio between the number of molecules in equal masses of  $CH_4$  and  $SO_2$  is

A. 1 : 1

B. 4:1

C. 1:4

D. 2:1

**Answer: B**



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### Practice Sheet Exercise I Level II Straight Objective Type Questions

1. The density of a gas at STP is 1.5 g/L. Its molecular weight is

A. 22.4

B. 33.6g

C. 33.6

D. 44.8

**Answer: C**

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2. The number of oxygen atoms present in 50 g of calcium carbonate is

A.  $6.023 \times 10^{23}$

B.  $30.1 \times 10^{23}$

C.  $9.035 \times 10^{23}$

D.  $1.20 \times 10^{24}$

**Answer: C**

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3. 8 gm of sulphur is completely burnt to get sulphur dioxide. The number of molecules of  $SO_2$  obtained is

A.  $6 \times 10^{23}$

B.  $3 \times 10^{23}$

C.  $1.5 \times 10^{23}$

D.  $7.5 \times 10^{22}$

**Answer: C**



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4. The density of water is 1g/mL. Assuming that there are no intermolecular spaces between water molecules in liquid water, the volume of a water molecule is

A.  $1.5 \times 10^{-23}$  ml

B.  $6 \times 10^{-23}$  ml

C.  $3 \times 10^{-23}$  ml

D.  $3 \times 10^{-22}$  ml

**Answer: C**



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**List-I (Molecules)**

- A) Glucose
- B) Oxalic acid
- C) Inorganic Benzene
- D) Oxygenated water

**List-II (Empirical formula)**

- 1)  $\text{BNH}_2$
- 2)  $\text{CH}_2\text{O}$
- 3)  $\text{CH}$
- 4)  $\text{CHO}_2$
- 5)  $\text{HO}$

5.

The correct match is

A. 

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
3	5	2	4

B. 

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
2	4	1	5

C. 

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
1	3	2	4

D. 

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
4	2	1	3

**Answer: B**



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6. Assertion: (A): Empirical formula of ethane is  $\text{CH}_3$

Reason (R): Empirical formula of all alkenes is  $\text{CH}_2$

The correct answer is

- A. Both A and R are true and R is the correct explanation of (A)
- B. Both A and R are true and R is not the correct explanation of A.
- C. A is true but R is false
- D. A is false but R is true

**Answer: B**



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7. Assertion A: Empirical formula of glucose or that of acetic acid is  $CH_2O$ .

Reason(R): If percentage composition of elements is same, then empirical formula is same.

The correct answer is

- A. Both A and R are true and R is the correct explanation of (A)
- B. Both A and R are true and R is not the correct explanation of A.
- C. A is true but R is false

D. A is false but R is true

**Answer: A**



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**8. Assertion(A):** Acetylene on additional polymerization gives benzene.

**Reason(R):** The empirical formulae of acetylene and benzene are same

The correct answer is

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

B. Both A and R are true and R is not the correct explanation of A.

C. A is true but R is false

D. A is false but R is true

**Answer: B**



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9. An alkaloid contains 17.28% of nitrogen and its molecular mass is 162.

The number of nitrogen atoms present in one molecule of the alkaloid is

- A. five
- B. four
- C. three
- D. two

**Answer: D**



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10. A compound contains 20% sulphur. The molecular weight of the compound could be

- A. 80
- B. 240
- C. 400



D. 640

**Answer: D**



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### Practice Sheet Exercise I Level II More Than One Correct Answer Type Questions

$1.6.023 \times 10^{22}$  atoms of Hydrogen can make

- A. 0.05 moles of  $H_2$  molecules
- B. 0.1 gms of Hydrogen atoms
- C. 0.1 gram of molecules of Hydrogen
- D. 0.1 gramatoms of Hydrogen

**Answer: A::B::D**



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2. Equal volume of oxygen and ozone at a given temperature and pressure contain equal

- A. number of moles
- B. masses
- C. number of granmatoms
- D. number of respective molecules

**Answer: A::D**



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3. A and B are two elements which form  $AB_2$  and  $A_2B_3$  if 0.18 mole of  $AB_2$  weights 10.6 g and 0.18 mole of  $A_3B_3$  weighs 17.8 g. Then

- A. Atomic weight of A is 21.2
- B. Atomic weight fo B is 21.2
- C. Atomic weight of A is 18.8

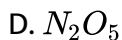
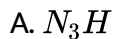
D. Atomic weight of B is 18.8

**Answer: A::D**



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4. Which compound has less percentage of nitrogen by mass than in  $N_2H_4$ ?



**Answer: B::C::D**



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5. 18 gms of glucose contains

- A. 0.6 gram atoms of carbon
- B. 0.6 grammolecules of Hydrogen
- C. 0.6 grammolecules of  $CO_2$
- D. 1.2 gramatoms of Hydrogen

**Answer: A::B::D**



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### Practice Sheet Exercise I Level II Linked Comprehension Type Questions

1. Avogadro's law states that under conditions of constant temp. and pressure equal volume of gases contain equal no. of particles. Experimental investigation shows that at one atmosphere pressure and a temperature of 273 K, one mole of any gas occupies a volume of which is very close to 22.4 lit. Therefore, the number of moles in any gas sample

can be found by comparing its volume at STP with 22.4 lit.

If Avogadro's number is  $6 \times 10^{23}$  molecules then the mass of one atom of oxygen would be

A.  $\frac{16}{3.02}$  amu

B.  $6 \times 10^{-23}$  amu

C. 16 amu

D.  $16 \times 6.02$  amu

**Answer: C**



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2. Avogadro's law states that under conditions of constant temp. and pressure equal volume of gases contain equal no. of particles. Experimental investigation shows that at one atmosphere pressure and a temperature of 273 K, one mole of any gas occupies a volume of which is very close to 22.4 lit. Therefore, the number of moles in any gas sample

can be found by comparing its volume at STP with 22.4 lit.

At STP 40 lit of  $CO_2$  contains

- A. 5.6 mole
- B. 1.786 mole
- C. 7.635 mole
- D. 1.934 mole

**Answer: B**



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3. Avogadro's law states that under conditions of constant temp. and pressure equal volume of gases contain equal no. of particles. Experimental investigation shows that at one atmosphere pressure and a temperature of 273 K, one mole of any gas occupies a volume of which is very close to 22.4 lit. Therefore, the number of moles in any gas sample can be found by comparing its volume at STP with 22.4 lit.

Number of gram atoms of oxygen present in 0.3 gram mole of  $H_2C_2O_4 \cdot 2H_2O$  is

A. 0.3

B. 0.6

C. 1.2

D. 1.8

**Answer: D**



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4. A gaseous hydrocarbon consumed 5 times its volume of oxygen as for combustion. The volume of  $CO_2$  produced in the reaction is thrice the volume of hydrocarbon under the same conditions

How many grams of water is produced by combustion of 0.1 mol of the given hydrocarbon?

A. 7.2 gm

- B. 3.6 gm
- C. 14.4 gm
- D. 1.8 gm

**Answer: A**



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5. A gaseous hydrocarbon consumed 5 times its volume of oxygen as for combustion. The volume of  $CO_2$  produced in the reaction is thrice the volume of hydrocarbon under the same conditions

What is the ratio of molecular weight to empirical formula weight of the hydrocarbon?

- A. 1
- B. 2
- C. 3
- D. 4



Answer: A



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6. Match the following columns

List - I

List - II

A)  $N_2$

P) 40% carbon by mass

B) CO

Q) Empirical formula  $CH_2O$

C)  $C_6H_{12}O_6$

R) Vapour density : 14

D)  $CH_3COOH$

S)  $14N_A$  electrons in a mole



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7. Match the following columns

List - I

List - II

A) Ethyne

P) Empirical formula 'CH'

B) Benzene

Q) 80% carbon by mass

C) Ethane

R) 50% carbon by atomicity

D) Butadiene

S) Two empirical formula units per molecule

T) 10% hydrogen by mass



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1. Rahul Dravid wants to wear  $6.023 \times 10^{21}$  Ag atoms in the form of a ring. His Silver Gold Copper alloy ring consists of 20% of Silver. The mass of the ring is 0.9 x. What is x?



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2. A copper plate of 20 cm x 10 cm is to be plated with silver of 1 mm thickness on both the sides. Number of moles of silver required for plating is (density of silver = 10.8 g m /cc)\_\_\_\_\_



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3. A gaseous hydrocarbon on combustion produces four times its volume of  $CO_2$  by consuming six times its volume of oxygen. What is the ratio of atoms of Hydrogen and carbon in that hydrocarbon?



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4. 0.1 moles of Hydrocarbon on complete combustion produced 17.6 gms of  $CO_2$ . How many Carbon atoms are present in each molecule of the hydrocarbon.



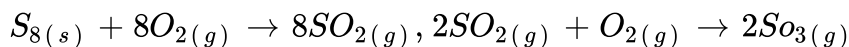
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5. A gaseous paraffin requires five times its volume of oxygen for complete combustion. How many carbon atoms are present in a molecule of that paraffin?



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6. Sulphur trioxide is prepared by the following two reactions:



How many grams of  $SO_3$  are produced from  $1.6g S_8$  ?



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7. How many moles of  $H_2SO_4$  can be reduced to  $SO_2$  by 2 moles of Aluminium?



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



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9. 12 grams of a mixture of sand and calcium carbonate on strong heating produced 7.6 grams of residue. How many grams of sand is present in the mixture?



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10. 2 moles of pure  $KClO_3$  is decomposed to an extent of 66.6%. How many moles of  $O_2$  is released?



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### Practice Sheet Exercise II Level I Straight Objective Type Questions

1. What 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

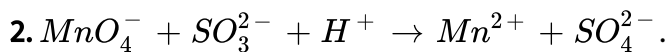
C. +1

D. +6

Answer: B



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The number of  $H^+$  ions involved is

A. 2

B. 6

C. 8

D. 16

**Answer: B**



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

A. 1

B. 3

C. 4

D. 6

**Answer: C**



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4. The oxidation number of V in  $Rb_4[HV_{10}O_{28}]$  is

A. +3

B. +5

C. +7

D. +6

**Answer: B**



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

- A. with iodine to give hydrogen iodide
- 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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6. In  $Br_3O_8$ , oxidation numbers of three bromines are

- A. +6, +4, +6
- B. +6, +2, 7
- C. +8, 0, +8
- D. +4, +4, +8

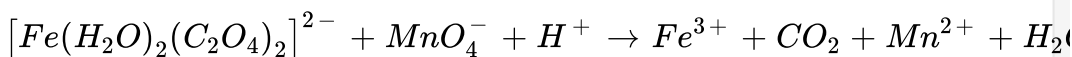


**Answer: A**



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**7.**



In this reaction, number of protons involved in the balanced equation are

A. 10

B. 8

C. 6

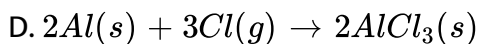
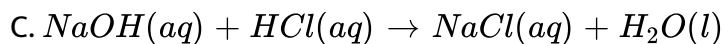
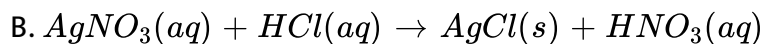
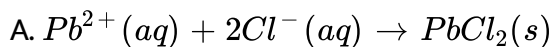
D. 0.04

**Answer: B**



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**8.** Which one of the following reactions is a redox reaction?



**Answer: D**



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**9. Oxidation number of sulphur in caro's acid**

A. +7

B. +6

C. +4

D. +2

**Answer: B**



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10. What is the term for the electrode where oxidation occurs?

- A. anode
- B. cathode
- C. oxidizing agent
- D. reducing agent

**Answer: A**



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### Practice Sheet Exercise II Level II Straight Objective Type Questions

1. 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  $1.68 \times 10^{-3}$  moles of  $K_2Cr_2O_7$  was used for  $3.36 \times 10^{-3}$  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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**2. What does the reducing agent do in an oxidation reduction reaction?**

A. gains electrons from the oxidizing agent

B. loses electrons to the oxidizing agent

C. is always reduced

D. is reduced by the oxidizing agent

**Answer: B**



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3. The oxidation number of iron in  $Fe + (2)(CO)_9$  is

A. +1

B. -9

C. +9

D. 0

**Answer: D**



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4. Oxygen exists in positive oxidation state only in

A. Peroxides

B. Polymers

C. Fluorides

D. Iodides

Answer: C



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

A. Os

B. Ru

C. Both a and b

D. None

**Answer: C**



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7. Given the lead acid battery reaction:



Charge  $\rightarrow$   $\leftarrow$  Discharge

Which species is oxidized during battery discharge?

A.  $SO_4^{2-}$

B.  $H_2O$

C.  $Pb$

D.  $PbO_2$

**Answer: C**



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8. The oxidation number of covalency of sulphur in the sulphur molecule ( $S_8$ ) are

A. 0 and 2

B. +6 and 8

C. 0 and 8

D. +6 and 2

**Answer: A**



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9. The oxidation state of tungsten in  $Na_2W_4O_{13} \cdot 10H_2O$  is ?

A. +12

B. +6

C. 0

D. +8

**Answer: B**



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10. 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. 0.4, 0.5

D. 0.6, 0.5

**Answer: D**



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## Practice Sheet Exercise II Level II More Than One Correct Answer Type Questions

1. The oxidation number of carbon is zero is

A.  $\text{HCHO}$

B.  $\text{CH}_2\text{Cl}_2$

C.  $\text{C}_6\text{H}_{12}\text{O}_6$

D.  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$

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



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2. 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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3. Which of the following reactions involve oxidation reduction?

- A.  $2Rb + 2H_2O \rightarrow 2RbOH + H_2$
- B.  $3Mg + N_2 \rightarrow Mg_3N_2$
- C.  $NH_4Cl + NaOH \rightarrow NaCl + NH_3 + H_2O$
- D.  $4KCN + Fe(CN)_2 \rightarrow K_4[Fe(CN)_6]$

**Answer: A::B**



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**4.** 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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**5.** For the reaction  $2KClO_3 \rightarrow 2KCl + 3O_2$  which statements (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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## Practice Sheet Exercise II Level II Linked Comprehension Type Questions

1. 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 different 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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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 different 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 and -2
- C. -2 and 0
- D. -2 and +1

**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 different 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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4. In the chemical chagne  $aN_2H_4 + bBrO_3^- \rightarrow aN_2 + bBr^- + 6H_2O$ ,

answer the following questions:

The number of electrons lost or gained during the redox change are

A. 8

B. 10

C. 12

D. 6

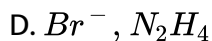
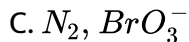
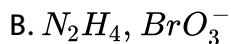
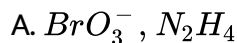
**Answer: C**



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

The species acting as oxidant and reductant respectively are:



**Answer: A**



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1. Match the following columns

List - I

- A) Element showing +8 oxidation state in its compounds
- B) Elements showing -2 oxidation state in its compounds
- C) Element showing +7 as maximum oxidation number in its compounds
- D) Element showing -3 oxidation state in its compounds

List - II

- P) Ruthenium
- Q) Chlorine
- R) Manganese
- S) Sulphur
- T) Nitrogen



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2. Match the following columns

List - I

- A) Oxidation number of chlorine in bleaching powder
- B) Oxidation number of sulphur in thio sulphuric acid
- C) Oxidation number of phosphorous in sodium hypophosphite
- D) Oxidation number of nitrogen in ammonium ion

List - II

- P) -1
- Q) -2
- R) +6
- S) +1
- T) -3



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## Practice Sheet Exercise II Level II Integer Type Questions

1. The oxidation number of carbon in Freon, and hydroge cyanide is +x and +y. What is the value x+y.



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2. The sum of oxidation numbers of all carbon atoms in carbon atoms in carbon suboxide is  $+x$ . What is value of  $x$ .



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3. One mole of hydrazine loses 10 moles of electrons. If all the hydrogen content is present in the product, the oxidation number of hydrogen in product is  $+x$ . What is value of  $x$ .



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4. How many of the following can be used as reducing agents.  
coke, carbon monoxide, hydrogen, potassium, aluminium.



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5. What is the electronegativity value on Pauling scale of the halogen that does not undergo disproportionation.



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6. How many of the following are redox reactions:

- decomposition of magnesite.
- decomposition of potassium chlorate in presence of  $MnO_2$ .....
- decomposition iron
- reaction of  $F_2$  with HBr.
- Reaction of  $AgNO_3$  with KCl to form silver chloride precipitate.



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7. How many of the following are correct statements.

- Valency of an element is always a whole number.
- In neutralisation reaction between sulphuric acid and potassium  $SO_4^{2-}$  and  $K^+$  ion are spectator ions.

-Lead is .....stable in +2 oxidation state due to inert pair effect.

-Thallium salts in +3 oxidation state act as good reducing agents.

–  $2H_2S + SO_2 \rightarrow 3S + 2H_2O$  is disproportionation reaction.

-Fluorine cannot be obtained from fluoride by chemical methods.



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8. When the redox reaction

$Cu_2O + NO_3^- \rightarrow LCu^{++} + NO$  is balanced by ion electron method in acidic medium.

What is the correct coefficient of  $Cu^{++}$



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9. When the redox reaction.

$Cr_2O_7^{--} + C_2H_4O \rightarrow C_2H_4O_2 + Cr^{++}$  is balanced by ion electron method in acidic medium.

What is the correct coefficient of  $H^+$  ions.



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10. When the redox (disproportionation) reaction

$S \rightarrow SO_3^{--} + S^{--}$  is balanced by ion electron method in basic medium.

What is correct co-efficient of  $S^{--}$ .

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### Practice Sheet Exercise Iii Level I Straight Objective Type Questions

1. What volume of  $H_2$  at NTP is required to convert 2.8 g of  $N_2$  into  $NH_3$ ?

A. 2240 ml

B. 2240 ml

C. 6.72 lit

D. 224 lit

**Answer: C**



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2. The amount of Mg in gms to be dissolved in dilute  $H_2SO_4$  to liberate  $H_2$  which is just sufficient to reduce 160 g of ferric oxide is

A. 24

B. 48

C. 72

D. 96

**Answer: C**



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3. The composition of LPG is butane and isobutane. The amount of oxygen that would be required for combustion of 1 kg of LPG will be



approximately.

A. 4.5 Kg

B. 1.8 Kg

C. 2.7 Kg

D. 3.6 Kg

**Answer: D**



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4. X forms an oxide  $X_2O_3$  0.36 grams of X forms 0.56 grams of  $X_2O_3$ . So the atomic weight of X is

A. 36

B. 565

C. 28

D. 43.2

**Answer: D**



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5. 1g of Mg is burnt in a vessel containing 0.5 g of oxygen. The remaining unreacted is

A. 0.25 g of Mg

B. 0.1 g of Mg

C. 0.1 g of  $O_2$

D. 0.75 g of Mg

**Answer: A**



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6. 20 ml of nitric oxide combines with 10 ml of oxygen at STP to give  $NO_2$ .

The final volume will be

A. 30 ml

B. 20 ml

C. 10 ml

D. 40 ml

**Answer: B**



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7. 40 ml of a hydrocarbon undergoes combustion in 260 ml oxygen and gives 160 ml of  $CO_2$ . If all volumes are measured under similar conditions of temperature and pressure, the formula of the hydrocarbon is

A.  $C_3H_8$

B.  $C_4H_8$

C.  $C_6H_{14}$

D.  $C_4H_{10}$

**Answer: D**



**Watch Video Solution**

8. The volume of  $CO_2$  that can be obtained at STP from 60 g. of 70% pure  $MgCO_3$  is

A. 16L

B. 11.2 L

C. 1.12 L

D. 5.6 L

**Answer: B**



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9. 70 g of a sample of magnesite on treatment with excess of HCl gave 11.2 L of  $CO_2$  at STP. The percentage purify of the sample

A. 80

B. 70

C. 60

D. 50

**Answer: C**



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10. 7 g of a sample of sodium chloride on treatment with excess of silver nitrate gave 14.35 g of AgCl. The percentage of NaCl in the sample is

A. 80

B. 50

C. 65.8

D. 83.5

**Answer: D**



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### Practice Sheet Exercise Iii Level Ii Straight Objective Type Questions

1. 18.4g of a mixture of  $CaCO_3$  and  $MgCO_3$  on heating gives 4.0g of magnesium oxide. The volume of  $CO_2$  produced at STP in this process is

A. 1.12 L

B. 4.48 lilt

C. 2.24 L

D. 3.36 L

**Answer: B**



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2. The equivalent weights of S in  $SCl_2$  and  $S_2Cl_2$  are in the ratio

A. 1:2

B. 2:1

C. 1:1

D. 1:4

**Answer: A**



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**3.** Equivalent weights of  $K_2Cr_2O_7$  in acidic medium is

A. 0.245

B. 0.49

C. 1.47

D. 2.96

**Answer: B**



**Watch Video Solution**

4. When Ferrous sulphate acts as reductant, its equivalent weight is

- A. twice that of its molecular weights
- B. equal to its molecular weight
- C. one half of its molecular weight
- D. one -third of its molecular weight

**Answer: B**



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5. What is the mole percentage of  $O_2$  in a mixture of 7g of  $N_2$  and 8g of  $O_2$ ?

- A. 0.25
- B. 0.75
- C. 0.5



D. 0.4

**Answer: C**



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6. One litre of a solution contains 18.9 gm of  $HNO_3$  and one litre of another solution contains 3.2 gm of NaOH. In what volume ratio must these solutions be mixed to obtain a neutral solution?

A. 3:8

B. 8:3

C. 15:4

D. 4:15

**Answer: D**



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7. How many litres of  $CO_2$  at STP will be formed when 100 of  $0.1M H_2SO_4$  reacts with excess of  $Na_2CO_3$ ?

- A. 22.4
- B. 2.24
- C. 0.224
- D. 5.6

**Answer: C**



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8. x grams of calcium carbonate was completely burnt in air. The weight of the solid residue formed is 28 g. What is the value of x (in grams)?

- A. 44
- B. 200
- C. 150

D. 50

**Answer: D**



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9. 10 grams of  $CaCO_3$  is completely decomposed to x and CaO. 'x' is passed into an aqueous solution containing 0.1mole of sodium carbonate.

What is the number of moles of sodium bicarbonate formed? (mol. wts:

$CaCO_3 = 100$ ,  $NaCO_3 = 106$ ,  $NaHCO_3 = 84$ )

A. 0.2

B. 0.1

C. 0.01

D. 10

**Answer: A**



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10. The volume of  $CO_2$  obtained by the complete decomposition of one mole of  $NaHCO_3$  at STP is

- A. 2.4 L
- B. 11.2 L
- C. 44.8 L
- D. 4.48 L

**Answer: B**



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### Practice Sheet Exercise Iii Level Ii More Than One Correct Type Questions

1. In which of the following reactions, no change in gaseous volume occurs when measured at similar T and P?

- A. Combination of  $N_2$  and  $O_2$  to give NO

B. Combination of  $N_2$  and  $H_2$  to form  $NH_3$

C. Combustion of carbon to give  $CO_2$

D. Combustion of carbon monoxide

**Answer: A::C**



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2. One litre of  $CO_2$  is passed over hot coke. The volume becomes 1.4 lit.

The resultant mixture contains.

A. 0.6 lit  $CO_2$

B. 0.6 lit CO

C. 0.8 lit CO

D. 0.8 lit  $CO_2$

**Answer: A::C**



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3. Which relations between equivalent weight (E) and Molecular weight (M) of reactant are correct for the given change?

A.  $FeCl_2$  into  $Fe(OH)_2$ :  $E = \frac{M}{2}$

B.  $Fe_2(SO_4)_3$  into  $Fe^{+2}$ ,  $E = \frac{M}{2}$

C.  $FeSO_4$  into  $Fe_2(SO_4)_3$ ,  $E = \frac{M}{2}$

D.  $K_2MnO_4$  into  $KMnO_4$ :  $E = \frac{M}{2}$

Answer: A::B



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4.  $K_4[Fe(CN)_6]$  is converted into  $CO_3^{-2}$ ,  $Fe^{+3}$  ions and  $NO_3^-$  ions.

Here \_\_\_\_\_

A. N is reduced

B. C is oxidised

C. Iorn is oxidised

$$\text{D. Eq.wt } \frac{\text{Formula wt}}{61}$$

**Answer: B::C::D**



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5.  $4Mg + 10HNO_3 \rightarrow 4Mg(NO_3)_2 + NH_4NO_3 + 3H_2O$ . In this reaction

A. 96 gms magnesium can reduce one mole of  $HNO_3$

B. Equivalent weight of reduced  $HNO_3$  is  $\frac{1}{8}$  of its molecular weight

C. Entire  $HNO_3$  involved in the reaction is reduced

D.  $HNO_3$  is reduced to the best possible extent

**Answer: A::B::D**



**Watch Video Solution**

1. In a reaction vessel,  $100\text{gH}_2$  and  $100\text{ g Cl}_2$  are mixed and suitable conditions are provided for the reaction:  $\text{H}_{2(g)} + \text{Cl}_{2(g)} \rightarrow 2\text{HCl}_{(g)}$

The amount of HCl formed in this reaction (at 100% yield) will be

A. 102.8 g

B. 73 g

C. 36.5 g

D. 142 g

**Answer: A**



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2. In a reaction vessel,  $100\text{gH}_2$  and  $100\text{ g Cl}_2$  are mixed and suitable conditions are provided for the reaction:  $\text{H}_{2(g)} + \text{Cl}_{2(g)} \rightarrow 2\text{HCl}_{(g)}$

The amount of HCl formed (at 90% yield) will be



A. 36.8 g

B. 62.5 g

C. 80g

D. 92.53 g

**Answer: D**



**Watch Video Solution**

3. 50 ml of given  $H_2O_2$  solution is added to excess KI solution in acidic medium. The liberated  $I_2$  requires 20 ml of 0.04 M standard Hypo solution.

Molarity of  $H_2O_2$  solution is

A.  $8 \times 10^{-3} M$

B.  $4 \times 10^{-3} M$

C.  $5 \times 10^{-3} M$

D. None of these

**Answer: A**



**Watch Video Solution**

4. 50 ml of given  $H_2O_2$  solution is added to excess KI solution in acidic medium. The liberated  $I_2$  requires 20 ml of 0.04 M standard Hypo solution.

Weight of  $H_2O_2$  present in 250 ml of given solution is

A. 0.034 g

B. 0.068 g

C. 0.136 g

D. None

**Answer: B**



**Watch Video Solution**

5. 50 ml of given  $H_2O_2$  solution is added to excess KI solution in acidic medium. The liberated  $I_2$  requires 20 ml of 0.04 M standard Hypo solution.

The strength of given 250 m  $H_2O_2$  solution is

A. (a) 0.0272 g/100 cc

B. (b) 0.136 g/100cc

C. (c) 0.544g/100cc

D. (d) None of these

**Answer: A**



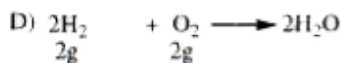
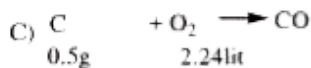
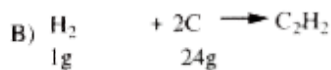
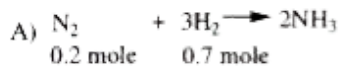
**Watch Video Solution**

**Practice Sheet Exercise Iii Level Ii Matrix Matching Type Questions**

1. Match the following columns

**Column-I (Limiting reagent)**

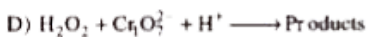
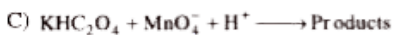
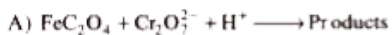
**Column-II**



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**Column-I**

**Column-II**



2.

 View Text Solution

Practice Sheet Exercise Iii Level Ii Integer Type Questions

1. One litre each of  $1M Al_2(SO_4)_3$  and  $1M BaCl_2$  are mixed. What is the molarity of sulphate ions in the resultant solution?



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2. How many moles of  $H_2O_2$  must be present in 2L of its solution, such that 100 ml of the solution can liberate 3.2 grams of oxygen at  $273^\circ C$  and 0.5 atm pressure?



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3. 70 gms of a metal oxide on reduction produced 54 gms of metal. The atomic weight of the metal is 81. What is its valency?



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4. 5.4 grams of a metal is able to produce 0.6 grams of  $H_2$  gas with acid action. What is the equivalent weight of that metal?

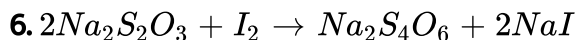


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5. Equivalent weight of a metal chloride is 75.5. How many moles of NaOH is required to completely precipitate one mole of metal hydroxide. Atomic weight of the metal is 120.



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How many equivalents of Hypo is oxidised by one mole of Iodine?



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7. The equivalent mass of an element is 4. Its chloride has vapour density 59.25. Then the valency of the element is\_\_\_\_\_.



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8. Ionisable H atom in  $H_3PO_3$  is  $x$  and in  $H_3PO_2$  is  $y$ . Then ratio of  $x, y$  is



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9. 10 g of a metal carbonate on heating gives 5.6 g of its oxide. The equivalent amount of metal is  $5x$ . What is  $x$ .



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10. The reduction of 1.49 g of a metal oxide required 560 ml of  $H_2$  at STP. If atomic mass of metal is 40, formula of its chloride will be  $MCl_x$  = \_\_\_\_\_.

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### Practice Sheet Exercise Iv Level I Straight Objective Type Questions

1. A mixture of  $K_2C_2O_4$  and  $KHC_2O_4$  required equal volumes of  $0.1M K_2Cr_2O_7$  for oxidation and  $0.1\text{ M NOH}$  for neutralisation is separate titrations. The molar ratio of  $K_2CrO_4$  and  $KHC_2O_4$  in the mixture is

A. 1 : 1

B. 2 : 1

C. 1 : 2

D. 3 : 1

**Answer: B**

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2. An equimolar mixture of  $Na_2C_2O_4$  and  $H_2C_2O_4$  required  $V_1L$  of  $0.1MKMnO_4$  in acidic medium for complete oxidation. The same amount of the mixture required  $V_2L$  of  $0.1\text{ M NaOH}$  for neutralization. The ratio of  $V_1$  to  $V_2$  is

A. 1 : 2

B. 2 : 1

C. 2 : 5

D. 5 : 2

**Answer: C**



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3. What volume at STP of gaseous ammonia will be required to be passed into  $100\text{ ml}$  of  $0.5MH_2SO_4$  to bring down its strength to  $0.25\text{ M}$ ?

A.  $1.560\text{ L}$

B. 1.120 L

C. 1.680 L

D. 2.240 L

**Answer: B**



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4. A mixture containing 0.05 mol of  $K_2Cr_2O_7$  and 0.02 mol of  $KMnO_4$  was treated with excess of KI in acidic medium. The liberated iodine required 2.0 L of  $Na_2SO_3$  solution of titration. Concentration of  $Na_2S_2O_3$  solution was

A.  $0.125\text{molL}^{-1}$

B.  $0.20\text{molL}^{-1}$

C.  $0.25\text{molL}^{-1}$

D.  $0.30\text{molL}^{-1}$

**Answer: B**



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5. The volume of  $0.1\text{ M } AgNO_3$  should be added to  $10.0\text{ ml}$  of  $0.09\text{ M } K_2CrO_4$  to precipitate all the chromate as  $Ag_2CrO_4$  is

A.  $18\text{ ml}$

B.  $9\text{ ml}$

C.  $27\text{ ml}$

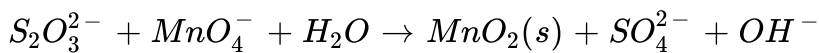
D.  $36\text{ ml}$

**Answer: A**



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6.  $0.1\text{ M } - KMnO_4$  is used for the following titration. How much volume of the solution in  $\text{ml}$  will be required to react with  $0.158\text{ gm}$  of  $Na_2S_2O_3$ ?



- A. 80ml
- B. 26.67 ml
- C. 13.33 ml
- D. 16 ml

**Answer: C**



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7. X gm of  $KHC_2O_4$  requires 100 ml of 0.02M  $KMnO_4$  in acidic medium.

In another experiment, y gm of  $KHC_2O_4$  requires 100 ml of 0.05 M

$Ca(OH)_2$ . The ratio of x and y is

- A. 1:1
- B. 1:2
- C. 2:1

D. 5 : 4

**Answer: B**



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8. 100 mL of  $H_2O_2$  is oxidized by 100 mL of  $1M KMnO_4$  in acidic medium ( $MnO_4^-$  reduced to  $Mn^{+2}$ ) 100 mL of same  $H_2O_2$  is oxidized by v mL of  $1M KMnO_4$  in basic medium ( $MnO_4^-$  reduced to  $MnO_2$ ). Find the value of v:

A. 500

B. 100

C. 100/3

D. 500/3

**Answer: D**



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9. A solution of  $Na_2S_2O_3$  is standardized iodometrically against 0.1262 g of  $KBrO_3$ . This process required 45 mL of the  $Na_2S_2O_3$  solution. What is the strength of the  $Na_2S_2O_3$ ? (K = 39, Br = 80)

A. 0.2 M

B. 0.1 M

C. 0.05 M

D. 0.1 N

**Answer: B**



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10. How much volume of 0.40 M  $Na_2S_2O_3$  would be required to react with the  $I_2$  liberated by adding excess of KI of 50 mL of 0.20 M  $CuSO_4$

A. 12.5 mL

B. 25 mL

C. 50 mL

D. 2.5 mL

**Answer: B**



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### Practice Sheet Exercise Iv Level Ii Straight Objective Type Questions

1. To a 25 ml  $H_2O_2$  solution, excess of acidified solution of potassium iodide was added. The iodine liberated required 20 ml of 0.3 N sodium thiosulphate solution. The volume strength of  $H_2O_2$  solution is

A. 1.344

B. 0.672

C. 2.688

D. 0.896

**Answer: A**



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**2. Phenolphthalein is not a good indicator for titrating**

- A. NaOH against oxalic acid
- B. NaOH against HCl
- C. Ferrous sulphate against  $KMnO_4$
- D. NaOH against  $H_2SO_4$

**Answer: C**



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**3. What volume of  $0.01M K_2Cr_2O_7$  would be required to oxidize Fe(II) in 50 ml of 0.03 M solution of ferrous ammonium sulphate in acidic medium?**



A. 150 ml

B. 75 ml

C. 50 ml

D. 25 ml

**Answer: D**



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4. 40 mL of 0.05 M solution of sodium sesquicarbonate ( $Na_2CO_3 \cdot NaHCO_3 \cdot 2H_2O$ ) is titrated against 0.05 M HCl solution. X ml of HCl solution is used when phenolphthalein is the indicator and y ml of HCl is used when methyl orange is the indicator in two separate titrations. Hence (y-x) is

A. 80mL

B. 30mL

C. 120mL

D. None of these

**Answer: A**



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5. In the mixture of  $NaHCO_3$  and  $NaCO_3$ , volume of a given HCl required is  $x$  ml with phenolphthalein indicator and further  $y$  mL is required with methyl orange indicator. Hence volume of HCl for complete reaction of  $NaHCO_3$  present in the original mixture is

A.  $2x$

B.  $y$

C.  $x/2$

D.  $(y-x)$

**Answer: D**



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6. A 100 ml mixture of  $Na_2CO_3$  and  $NaHCO_3$  is titrated against 1 M HCl. If  $v_1L$  and  $v_2L$  are consumed when phenolphthalein and methyl orange are used as indicators respectively in two separate titrations, which of the following is true for molarities in the original solution.

A. molarity of  $Na_2CO_3 = 20v_1$

B. molarity of  $NaHCO_3 = 10(v_2 - 2v_1)$

C. molarity of  $Na_2CO_3 = 10(v_2 + v_1)$

D. molarity of  $NaHCO_3 = 10(v_2 - v_1)$

**Answer: B**



**Watch Video Solution**

7. A mixture of  $Na_2CO_3$  and  $NaHCO_3$  having a total weight of 100 gm on heating produced 11.2L of  $CO_2$  under STP conditions. The percentage of  $Na_2CO_3$  in the mixture is

A. 0.558

B. 0.442

C. 0.84

D. 0.16

**Answer: D**



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8. 2mol  $FeSO_4$  in acid medium are oxidised by x mole of  $KMnO_4$ , where as 2 mole of  $FeC_2O_4$  in acid medium are oxidized by y mole of  $KMnO_4$ .

The ratio of x and y is

A.  $1/3$

B.  $1/2$

C.  $1/4$

D.  $1/5$

**Answer: A**



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9. The end point of iodometric titrations is detected by adding starch just near end point and not all the beginning of titration. Which statement is not valid for this fact?

- A. Starch form complex with  $I_2$
- B. Due to slow decomposition of complex a diffuse end point is obtained
- C. Iodometric titrations are made in strong alkaline medium where starch is either hydrolysed or decomposed
- D. Iodometric titrations are made in neutral medium where starch is neither hydrolysed nor decomposed.

**Answer: C**



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10. Iodometric titrations are usually performed in neutral or mildly alkaline (pH=8) or weakly acidic solution. Which statement is not valid for this observation?

- A. In strong alkaline solution  $I_2$  disproportionate to  $I^-$  and  $IO^-$
- B. In strong acidic solutions starch used to detect the end point tends to hydrolyse or decompose
- C.  $I^-$  produced during titration tends to be oxidised by dissolved oxygen in acidic medium.
- D. Reducing power of reducing agent is increased in strong acidic medium.

**Answer: D**



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1. When non stoichiometric compound  $Fe_{0.95}O$  is heated in presence of oxygen then it converts into  $Fe_2O_3$ . Which of the following statement is correct?

- A. Equivalent weight of  $Fe_{0.95}O$  is  $\frac{MB}{0.5}$ . Where  $M_B$  is molecular weight of  $Fe_{0.95}O$
- B. The number of moles of  $Fe^{+3}$  and  $Fe^{+2}$  in 1 mole  $Fe_{0.95}O$  are 0.1 and 0.85 respectively
- C. The number of moles of  $Fe^{+3}$ , and  $Fe^{+2}$  in 1 mole of  $Fe_{0.95}O$  are 0.85 and 0.1 respectively.
- D. The % composition of  $Fe^{+2}$  and  $Fe^{+3}$  in the non stoichiometric compound is 89.47% and 10.53 %

Answer: B::D



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2. 40 gm NaOH, 106gm  $Na_2CO_3$  and 84gm  $NaHCO_3$  is dissolved in water and the solution is made 1 lit, 20 ml of this stock solution is titrated with 1 N HCl, hence which of the followign statements are correct?

- A. The burette reading of HCl will be 40 ml, if phenolphthalein is used as indicator from the beginning
- B. The burette reading of HCl will be 60 ml, if phenolphthalein is used as indicator from the beginning.
- C. The burette reading of HCl will be 40 ml, if methy orange is used as indicator after the first end point
- D. The burette reading of HCl will be 80ml, if methyl orange is used as indicator from the very beginning.

**Answer: A::C::D**



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3.  $\begin{array}{c} \text{COOH} \\ | \\ \text{COOH} \end{array}$  and  $\begin{array}{c} \text{COOK} \\ | \\ \text{COOH} \end{array}$  behave as acids as well as reducing agents. Then which of the following are correct statements?

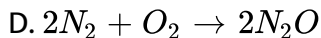
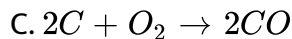
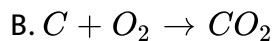
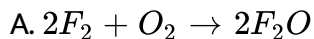
- A. When they have as reducing agents, then their equivalent weights are equal to half of their molecular weights respectively
- B. 100 l of 1N solution of each is neutralized by 100 ml of  $1\text{N Ca(OH)}_2$
- C. 1000 ml of 1N solution of each is neutralized by 1000 ml of  $1\text{Ca(OH)}_2$
- D. 1000 ml 1 M solution of each is neutralized by 20 ml of 2 M of  $\text{KMnO}_4$  in acidic medium

**Answer: A::B::D**



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4. In which of the following reactions, oxygen is an oxidant?

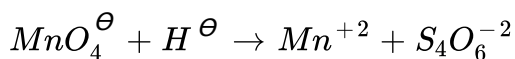


Answer: B::C::D



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



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

B. The above redox reaction with the change of pH from 4 to 10 will

have an effect on the strichiometry of the relation

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  $HSO_4^{\ominus}$

Answer: B::C::D



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6. 18 ml of 1.0 M  $Br_2$  solution undergoes complete disproportionation in basic medium to  $Br^-$  and  $BrO_3^-$ . Then the resulting solution requires 45 ml of  $As^{+3}$  solution to reduce  $BrO_3^-$  to  $Br^-$ .  $As^{+3}$  is oxidised to  $As^{+5}$  which statements are correct?

A.  $E_w(Br_2) = \frac{M}{10}$

B.  $E_w(Br_2) = \frac{5M}{3}$

C. Molarity of  $As^{+3} = 0.4M$

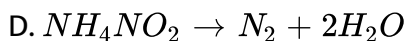
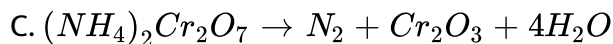
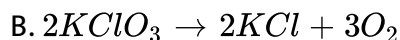
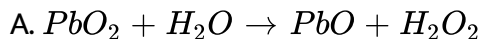
D. Molarity of  $As^{+3} = 0.2M$

Answer: B::C::D



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7. Which of the following relations is /are not intermolecular redox reaction?



Answer: B::C::D



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### Practice Sheet Exercise Iv Level Ii Linked Comprehension Type Questions

1. A sample of  $FeSO_4 \cdot 7H_2O$  crystals has been left open to the air and some of the iron (II) has been converted to iron (III). 4.2 gm of the impure crystals were dissolved in a total  $250cm^3$  water and dilute sulphuric acid.  $25cm^3$  portion of this solution was titrated with a solution of potassium

bicarbonate. The concentration of dichromate (VI) ions in this solution was  $0.1 \text{ mol dm}^{-3}$ . The average volume used was  $23.5 \text{ cm}^3$  of  $0.2 \text{ mol dm}^{-3}$ . The average volume used to  $23.5 \text{ cm}^3$ .

How many moles of  $\text{Fe}^{+2}$  ions would there have been in the  $250 \text{ cm}^3$  of stock solution?

A.  $7.05 \times 10^{-4} \text{ mol}$

B.  $2.35 \times 10^{-4} \text{ mol}$

C.  $1.41 \times 10^{-2} \text{ mol}$

D.  $7.05 \times 10^{-4} \text{ mol}$

**Answer: C**



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2. A sample of  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$  crystals has been left open to the air and some of the iron (II) has been converted to iron (III). 4.2 gm of the impure crystals were dissolved in a total  $250 \text{ cm}^3$  water and dilute sulphuric acid.  $25 \text{ cm}^3$  portion of this solution was titrated with a solution of potassium

bicarbonate. The concentration of dichromate (VI) ions in this solution was  $0.1 \text{ mol dm}^{-3}$ . The average volume used was  $23.5 \text{ cm}^3$  of  $0.2 \text{ mol dm}^{-3}$ . The average volume used to  $23.5 \text{ cm}^3$ .

What mass of  $\text{Fe}^{+2}$  ions should have been present in the 4.2 g of crystals?

A. 0.84 g

B. 0.90 g

C. 0.77 g

D. 0.62 g

**Answer: A**



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3. A sample of  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$  crystals has been left open to the air and some of the iron (II) has been converted to iron (III). 4.2 g of the impure crystals were dissolved in a total  $250 \text{ cm}^3$  water and dilute sulphuric acid.  $25 \text{ cm}^3$  portion of this solution was titrated with a solution of potassium

bicarbonate. The concentration of dichromate (VI) ions in this solution was  $0.1 \text{ mol dm}^{-3}$ . The average volume used was  $23.5 \text{ cm}^3$  of  $0.2 \text{ mol dm}^{-3}$ .

The average volume used to  $23.5 \text{ cm}^3$ .

The percentage purity of the crystal is

A. 0.69

B. 0.72

C. 0.88

D. 0.94

**Answer: D**



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4. 1.00 gm of a mixture having equal number of moles of carbonates of two alkali metals required 44.4 ml of 0.5 N HCl for complete reaction.

Atomic weight of one of the metals is 7.00

The number of moles of each metal carbonate in

A. 0.1

B. 0.0111

C. 0.0055

D. 0.00275

**Answer: C**



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5. 1.00 gm of a mixture having equal number of moles of carbonates of two alkali metals required 44.4 ml of 0.5 N HCl for complete reaction.

Atomic weight of one of the metals is 7.00

The number of moles of each metal carbonate in

A. 0.222

B. 2.22

C. 22.22

D. 0.0222



Answer: D



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### Practice Sheet Exercise Iv Level Ii Matrix Matching Type Questions

1. Given two mixtures: (I)  $\text{NaOH}$  and  $\text{Na}_2\text{CO}_3$  and (II)  $\text{NaHCO}_3$  and  $\text{Na}_2\text{CO}_3$ .

100 ml of mixture I required  $w$  and  $x$  ml of 1 M  $\text{HCl}$  in separate titrations using phenolphthalein and methyl orange indicators while 100 ml of mixture II required  $y$  and  $z$  ml of same  $\text{HCl}$  solution in separate titrations using the same indicators.

#### Column-I (Substance)

- A)  $\text{Na}_2\text{CO}_3$  in mixture I
- B)  $\text{Na}_2\text{CO}_3$  in mixture II
- C)  $\text{NaOH}$  in mixture I
- D)  $\text{NaHCO}_3$  in mixture II

#### Column-II (Molarity in solution)

- P)  $(2w - x) \times 10^{-2}$
- Q)  $(z - 2y) \times 10^{-2}$
- R)  $y \times 10^{-2}$
- S)  $(x - w) \times 10^{-2}$



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### Practice Sheet Exercise Iv Level Ii Integer Type Questions

1. The volume of 0.1 M NaOH will be required to neutralise 100 ml of 0.1 ml  $H_3PO_4$  using methyl red indicator to change the colour from pink (acidic medium) to yellow (basic medium) is  $10^x$ . What is x?



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2. The purity of  $H_2O_2$  in a given sample is 85%. The weight of impure sample of  $H_2O_2$  which required 10 ml of  $M/5KMnO_4$  solution in a titration in acidic medium is 0.1 x. Find x?



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3. 0.4 gm of polybasic acid  $H_nA$  (M.wt = 96) requires 0.5 gm NaOH for complete neutralisation. The number of replacable hydrogen atoms are (all the hydrogens are acidic)



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4. 0.31 gm of an ally Fe+ Cu was dissolved in excen dilute  $H_2SO_4$  and the solution was made up to 100 ml . 20 ml of this soltin required 3 m of  $\frac{N}{30} K_2Cr_2O_7$  solution for exact oxidation. The % purity (in closest value) of Fe in wire is \_\_\_\_\_.



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5. The oxidation state of mobdenum in  $[MO_2O_4(C_2H_4)_2H_2O_2]^{-2}$  is \_\_\_\_\_



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6. 4.48 lit of ammonia at STP is neutralised using 100 ml of a solution of  $H_2SO_4$ , the molarity of acid is



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1. A 2 lit solution contains 0.04 mol of each of  $[CO(NH_3)_5SO_4]Br$  and  $[CO(NH_3)_5Br]SO_4$ . To 1 lit of this solution, excess of  $AgNO_3$  is added. To the remaining solution of excess of  $BaCl_2$  is added. The amounts of precipitated salts, respectively, are

- A. 0.01 mol & 0.01 mol
- B. 0.01 mol & 0.02 mol
- C. 0.02 mol & 0.01 mol
- D. 0.02 mol & 0.02 mol

**Answer: D**



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2. The value of n in the molecular formula Ben  $Al_2Si_6O_{18}$  is \_\_\_\_

- A. 2
- B. 3

C. 4

D. 5

**Answer: B**



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3. Dissolving 120 gm of urea in 100 gm of water gave a solution of density  $1.15 \text{ gmlit}^{-1}$ . The molarity of the solution is

A. 1.78 M

B. 2.50 M

C. 2.05 M

D. 2.22 M

**Answer: C**



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4. To neutralize completely 20 ml of 0.1 M aqueous solution of phosphorus acid, the volume of 0.1 molal aqueous KOH solution required is

- A. 10 ml
- B. 60 ml
- C. 40 ml
- D. 20 ml

**Answer: C**



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5. If we consider that  $\frac{1}{6}$  in place of  $\frac{1}{12}$  mass of carbon is taken to be the relation atomic mass unit, the mass of one mole of substance will

- A. Decrease twice
- B. Increase two fold
- C. remain unchanged

D. be a function of the molecular mass of the substance

**Answer: A**



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6. Density of a 2.05 M solution of acetic acid in water is  $1.02 \text{ g ml}^{-1}$ . The molarity of the solution is

A.  $1.14 \text{ mol kg}^{-1}$

B.  $3.28 \text{ mol kg}^{-1}$

C.  $2.28 \text{ mol kg}^{-1}$

D.  $0.44 \text{ mol kg}^{-1}$

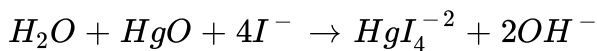
**Answer: C**



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7.  $\text{HgO}$  is analysed by reaction with iodide and then titrating with an acid.

The equivalent mass of  $\text{HgO}$  is



A. molarity of  $\text{Na}_2\text{CO}_3 = 20v_1$

B.  $M/2$

C.  $M/4$

D.  $M/3$

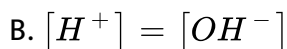
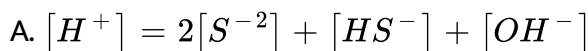
**Answer: B**



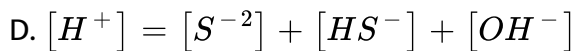
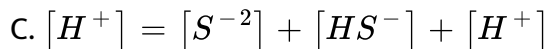
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8. Which question represents charge balance equation for the solution of

$\text{H}_2\text{S}$  in water?







**Answer: A**



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9. The ionic strength of solution containing 0.5 M  $MgSO_4$  0.1M  $AlCl_3$  and 0.2  $(NH_4)_2SO_4$  is

A. 0.75

B. 1.85

C. 3.2

D. 1.5

**Answer: C**



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10. The percentage of  $CH_2O$  in  $CuSO_4 \cdot 5H_2O$  is

- A. zero
- B. about 28.7
- C. about 50
- D. about 40

**Answer: B**



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11. 112% labelled oleum is diluted with sufficient water. The solution on mixing with  $5.3 \times 10^2 \text{ gm } Na_2CO_3$  liberates  $CO_2$ . The volume of  $CO_2$  given out at 1 atm at 273 K will be

- A. 1.12 litres
- B. 1.23 lit
- C. 2.2 lit

D. 37.75 lit

**Answer: D**



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**12.** What is the specific volume of costor or its density is  $956 \text{ kgm}^{-3}$ ?

A.  $1.05 \times 10^{-3} \text{ kgm}^{-3}$

B.  $1.05 \times 10^{-3} \text{ m}^3 \text{ kg}^{-3}$

C.  $1.25 \times 10^{-3} \text{ kg}^{-1}$

D.  $9.56 \times 10^{-3} \text{ kgm}^{-3}$

**Answer: B**



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13. The number of significant figures in each of these given numbers respectively are

(i) 506.20 (ii) 0.003402

A. 4,5

B. 4,4

C. 5,4

D. 5,6

**Answer: C**



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14. Number of atoms of iron present in 100 gm  $Fe_2O_3$  having 20% purity is

A.  $0.2N_A$

B.  $0.25N_A$

C.  $0.5N_A$

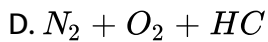
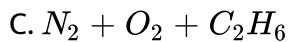
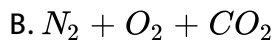
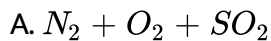
D.  $0.3N_A$

**Answer: B**



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**15. Which mixture is lighter than humid air?**



**Answer: D**



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1. A solid element has specific heat  $1 \text{ J g}^{-1} \text{ K}^{-1}$ . If the equivalent weight of the element is 9. Identify the valency and atomic weight of element.

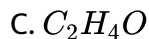
- A. 2,6
- B. 2,37
- C. 9,28
- D. 5,27

**Answer: B**



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2. 12.8 gm of an organic compound containing  $C_1H_1O$  and undergoes combustion to produce 25.56 gm  $CO_2$  and 10.46 gm of  $H_2O$ . What is the empirical formula of compound.



**Answer: C**



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3. Igniting  $MnO_2$  in air converts it quantitatively to  $Mn_3O_4$ . A sample of pyrolusite is of the following composition.  $MnO_2 = 80\%$  and other inert constituents = 15% and rest bearing  $H_2O$ . The sample is ignited to constant weight. What is the % of Mn in the ignited sample.

A. 0.594

B. 0.55

C. 0.568

D. 0.586

**Answer: A**



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4. NaOH and  $Na_2CO_3$  are dissolved in 200 ml aqueous solution. In the presence of phenolphthaleim indicator, 17.5 ml of 0.1 HCl are used to titrated this solution. Now methyl orange is added in the same solution titrated and requires 2.5 ml of the same HCl. Calculate the normality of NaOH &  $NaCO_3$ .

A.  $0.5, \frac{1.5}{200}$

B.  $\frac{1.5}{200}, 0.5$

C. 0.5, 0.5

D. 1.5, 1.5

**Answer: B**



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5. 20 gm of sample  $Ba(OH)_2$  is dissolved in 10 ml of 0.5 N HCl solution, The excess of HCl was titrated with 0.2 NaOH. The volume of NaOH used was 10 ml. Calculate the % of  $Ba(OH)_2$  in the sample.

A. 0.015

B. 2.6

C. 0.034

D. 0.013

**Answer: D**



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6. 1.9 gm of a sample of  $H_2O_2$  solution containing y%  $H_2O_2$  by weight requires y ml of  $KMnO_4$  solution for complete titration under acidic condition. Find the molarity of  $KMnO_4$  solution

A. 0.2 M

B. 0.11 M

C. 0.011 M

D. 0.25 M

**Answer: B**



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7. A sample of pyrolusite ( $MnO_2$ ) weighs 0.5 gm. To this solution 0.594 gm  $As_2O_3$  and a dilute acid are added. After the reaction has stopped  $As^{+3}$  is  $As_2O_3$  is titrated with 45 ml of  $M/50 KMn_4$  solution. Calculate the percentage of  $MnO_2$  in pyrolusite.

A. 0.6225

B. 0.68

C. 0.673

D. 0.666

**Answer: A**



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8. A sample of  $H_2O_2$  is  $x\%$  by mass. If  $x$  ml of  $KMnO_4$  are required to oxidize 1 gm of this  $H_2O_2$  sample, calculate the normality of  $KMnO_4$  solution.

A. 0.46 N

B. 0.5 N

C. 0.6 N

D. 0.65 N

**Answer: C**



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9. 50 ml solution of  $H_2O_2$  was treated with excess KI (s) and the solution was acidified with acetic acid. The liberated  $I_2$  required 40 ml of  $0.5MNa_2S_2O_3$  solution for the end point using starch is indicator. Find the molarity and volume strength of the  $H_2O_2$  solution.

- A. 1.12 gm lit
- B. 2.24 gm/lit
- C. 5.6 gm/lit
- D. None of these

**Answer: B**



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10. The density of a  $3.6 MH_2SO_4$  solution that is 29%  $H_2SO_4$  by mass will be

- A.  $0.212gmML^{-2}$

B.  $0.122 \text{ gm } \text{Ml}^{-1}$

C.  $2.12 \text{ gm } \text{Ml}^{-1}$

D.  $1.22 \text{ gm } \text{Ml}^{-1}$

**Answer: D**



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

1. Equal volumes of 0.1 M KCl and 0.1  $\text{MFeCl}_3$  are mixed with no change in volume, which is/are correct?

A.  $[\text{Fe}^{+3}] = 0.05 \text{ M}$

B.  $[\text{K}^+] = 0.05 \text{ M}$

C.  $[\text{Cl}^-] = 0.2 \text{ M}$

D.  $[\text{Cl}^-] > [\text{K}^+]$

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



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2. When 4 gm of Mg burnt with  $O_2$  form oxide and on dilution of metal oxide form metal hydroxide which statement is/are correct for above series of reaction?

A. Gram quivalent of metal, metal oxide and metal hydroxide are equal

B. Weight of metal oxide is 6.66 gm

C. Weight of metal hydroxide is 9.66 gm

D. Normaility of solutioni in 1 litre volume is  $\frac{14}{42}$

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



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3. Choose the correct match

A. 18ml  $H_2O$  at  $4^\circ C$  contains  $6.023 \times 10^{24}$  electrons

B. 11200 ml of  $CO_2$  at STP contains  $6.023 \times 10^{23}$  oxygen atom.

C. 5600 ml of  $CH_4$  at 273 K and 2 atm contains  $12.04 \times 10^{23}$  hydrogen atom

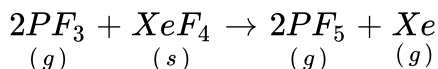
D. 5600 ml of  $CH_4$  at STP contains  $1.505 \times 10^{23}$  methane molecules.

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



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4.  $PF_3$  reacts with  $XeF_4$  to give  $PF_5$



If 100.0 gm of  $PF_3$  and 50.0 gm  $XeF_4$  react, then which of the following statement is true?

A.  $XeF_4$  is the limiting reagent

B.  $PF_3$  is the limiting reagent

C. 1.127 mol of  $PF_5$  are produced

D. 0.382 mol of  $PF_5$  are produced

Answer: A::D



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5. The reaction  $2ClO_{(aq)}^{\ominus} \rightarrow 2Cl_{(aq)}^{\ominus} + 2Cl_{(aq)}^{-}$  is an example of

- A. oxiclatio reaction
- B. Reduction reaction
- C. Disproportionation reaction
- D. Decomposition reaction

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

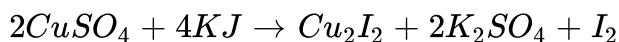


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1. Iodine titration can be iodometric or iodimetric depending on using iodine directly or indirectly is an oxidising agent in the redox titration.

a. Iodimetric titration in which a standard iodine solution is used as an oxidant and iodine is directly or indirectly titrated against a reducing agent. For example.



b. Iodimetric procedures are used for the determination of strength of reducing agent such as thiosulphates, sulphites, arsenites and stannous chloride etc. by titrating them against standard solution of iodine in a burette.



Starch is used as indicator near the end point which forms blue colour complex with  $I_3^-$ . The blue colour disappears when there is not more of free  $I_2$ .

The volume of KI solution used for  $CuSO_4$  will be

A.  $M/8$

B.  $M/4$

C.  $M/2$

D.  $M$

**Answer: D**



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2. Iodine titration can be iodometric or iodimetric depending on using iodine directly or indirectly is an oxidising agent in the redox titration.

a. Iodimetric titration in which a standard iodine solution is used as an oxidant and iodine is directly or indirectly titrated against a reducing agent. For example.



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Starch is used as indicator near the end point which forms blue colour

complex with  $I_3^-$ . The blue colour disappears when there is not more of free  $I_2$ .

When 319.0 gm of  $CuSO_4$  in a solution is related with excess of 0.5 M KI solution, then liberated iodine required 200 ml of 1.0M  $Na_2S_2O_3$  for complete relation. The percentage purity of  $CuSO_4$  in the sample is

- A. 0.1
- B. 0.2
- C. 0.05
- D. None of these

**Answer: C**

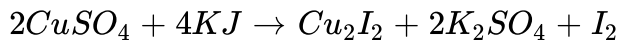


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Starch is used as indicator near the end point which forms blue colour complex with  $I_3^-$ . The blue colour disappears when there is not more of free  $I_2$ .

The volume of KI solution used for  $CuSO_4$  will be

- A. 100 ml
- B. 40 ml
- C. 400 ml
- D. 200 ml

**Answer: D**



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4. Bleaching powder and bleach solution are produced on a large scale and used in several household products. The effectiveness of bleach solution is often measured by iodometry.

25 ml of household bleach solution was mixed with 30 ml of 0.5 M KI and 10 ml of 4 N acetic acid. In the titration of the liberated iodine, 48 ml of 0.25 N  $\text{Na}_2\text{SO}_3$  was used to reach the end point. The molarity of the household bleach solution is

A. 0.48 N

B. 0.96 M

C. 0.24 M

D. 0.024 M

**Answer: C**

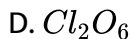
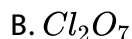
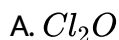


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5. Bleaching powder and bleach solution are produced on a large scale and used in several household products. The effectiveness of bleach solution is often measured by iodometry.

Bleaching powder contains a salt of an oxoacid as one of its components.

The anhydride of that oxoacid is



**Answer: A**



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**Additional Practice Exercise Level II Lecture Sheet Advanced Matrix Matching Type Questions**

1. Match the concentration terms with the factors affecting the concentration.

**Column-I**

- A) Molarity (M)
- B) Molality (m)
- C) Mole fraction (X)
- D) Normality

**Column-II**

- P) Temperature
- Q) Pressure
- R) Dilution
- S) Volume



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2. Experiment determination of molar mass of compounds may be made by the following methods. Match them property.

**Column-I**

- A) Gases
- B) Volatile solids
- C) Non-volatile solids
- D) Solids of low molar mass
- E) Solids of high molar mass such as polymers

**Column-II**

- P) Victor Meyer's method
- Q) Hofmann's method
- R) Duma's method
- S) Ebullioscopy or cryoscopy
- T) Osmotic pressure
- U) Raoult's law



**View Text Solution**

1. The volume (in ml) of 0.10 M  $AgNO_3$  required for complete precipitation of chlorine ions present in 30 ml of 0.01 M solution of  $[Cr(H_2O)_5Cl]Cl_2$  as silver chloride is close to \_\_\_\_\_



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2. A sample of crystalline  $Ba(OH)_2 \cdot xH_2O$  weight 1.578 gm was dissolved in water. The solution required 40 ml of 0.25N  $HNO_3$  for complete relation. Determine the number of molecular of water of crystallisat in base.



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3. Compound  $S_4N_4$  decompose completely into  $S_{X(g)}$  and  $N_{2(g)}$ . If all measurements are made at same P & T each volume of  $S_4N_4$  gives 4.0 volume of gaseous product. The value of X is \_\_\_\_\_



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4. 500 ml of aM and 500 ml of bM solution of a solute are mixed and diluted to 2 litre to prepare a solution of 1.5 M. If a and b are in the ratio 2 : 1, then the value of a is.



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5. A student performs a titration with different buretts and finds titre value of 25.2 ml, 2.25 ml, 25.0 ml. The number of significant figures in the average titre value is.



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### Practice Sheet Advanced Straight Objective Type Question

1. What weight of slaked lime will be required to decompose completely 4 grams ammonium chloride

A. 2.77 g

B. 3.5 g

C. 5.5 g

D. 5.44 g

**Answer: B**



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2. A certain weight of sodium iodine and sodium chloride mixture when treated with sulphuric acid was found to give the same weight (as that of mixture) of sodium sulphate. The percentage composition of NaCl is

A. 18.86

B. 52.23

C. 35.57

D. 71.14

**Answer: D**

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3. How many grams of 83.4% pure sodium sulphate can be produced from 250 g of 95% pure NaCl.

A. 288.2 g

B. 237.5 g

C. 345.4 g

D. 187.2 g

**Answer: C**

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4. To a 25 ml  $H_2O_2$  solution, excess of acidified solution of potassium iodide was added. The iodine liberated required 20 ml of 0.3 N sodium thiosulphate solution. The volume strength of  $H_2O_2$  solution is

A. 0.672

B. 1.344

C. 2.688

D. 0.896

**Answer: B**



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5. 20 CC of hydro carbon were exploded with excess of oxygen. After explosion and cooling a contracting of was noted on addition of KOH another contraction of 40 CC was noted. The molecular formula of hydrocarbon is

A.  $C_2H_6$

B.  $C_2H_4$

C.  $C_2H_2$

D.  $CH_4$

**Answer: C**



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6. 10 ml of a mixture of carbon monoxide, marsh gas and hydrogen exploded with excess of oxygen gave a contraction of 6.5 CC/. There was further contraction of 7 CC when the residual gas was treated with caustic potash. The volume of marsh gas present in original mixture as

A. 5CC

B. 2CC

C. 3CC

D. 4CC

**Answer: B**



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7. On gram of the carbonate of a metal was dissolve din 35 CC 1N HCl.The resulting liquid required 50 CC  $\frac{N}{10}$  caustic soda solution to neutralise it completely. The equivalent weight of metal carbonate is

A. 100

B. 25

C. 53

D. 50

**Answer: D**



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8. A small amount of  $CaCO_3$  completely neutralises 525 ml of  $\frac{N}{10}$  HCl and no acid is left at the end after converting all calcium chloride to  $CaSO_4$ . How much plaster paris  $\left( CaSO_4 \frac{1}{2} H_2O \right)$  can be obtained

A. 1.916 g

B. 5.827 g

C. 7.53 g

D. 3.81 g

**Answer: D**



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9. An element A forms a chloride which contains 29.34% by weight of chloride and is isomorphous with KCl. The atomic weight of A is

A. 85.49

B. 40

C. 23

D. 137.5

**Answer: A**



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10. Air contains 21% oxygen by weight. What weight of air is required to burn 200 g of coal which contains only 80% combustible material

A. 2031.79

B. 1023.5g

C. 426.6g

D. 160g

**Answer: A**



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**Practice Sheet Advanced More Than One Correct Answer Type Question**

1. Peroxy linkage is present in

A.  $CrO_5$



B. Caros' acid

C. Marshall's acid

D. Pernetric acid

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



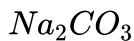
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**2. Pick out correct statements**

A. One gram equivalent of xoygen at STP occupies 5.6 litres

B. The molarity of 10 volume  $H_2O_2$  is 0.89 M

C. Phenolphthalien indulator indicates only half neutralisation of



D. Empirical formula of benczenr in CH

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



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### 3. Pick out correct statements

- A. Equivalent weight of an element will change with valency
- B. In 109%  $H_2SO_4$  labeled oleum the percent of free  $SO_3$  is 60%
- C. Metathesis reaction are redox reaction
- D. Product of volume in ml and normality of solution gives number of milliequivalent of solute

**Answer: A::D**



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### 4. Pick out incorrect statements

- A. The volume of 0.1M  $FeC_2O_4$  solution required to reduce 200 ml of 0.6M  $K_2Cr_2O_7$  in acidic medium is 2400 ml

- B. The volume of  $0.1M\text{Ca}(\text{OH})_2$  required to neutralise  $0.2MH_3\text{PO}_3$  solution of volume  $0.25\text{dm}^3$  is 500 ml
- C. Equivalent weight of sulphate ion is 49
- D. Molality of influenced by change in temperature

**Answer: C::D**



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**5. The correct statements are**

- A. The isotopes of chlorine with mass number 35 and 37 exist in ratio 3:21 if its average atomic mass is 35.5
- B. The mass of one amu is approximately  $1.6 \times 10^{-24}\text{g}$
- C. The number of molecules in 1 ml of gas at STP is called Loschmidt number

D. If  $6.023 \times 10^{21}$  molecules of a solute are present in 100 ml solution

molarity of solution is 0.1 M

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



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### Practice Sheet Advanced Linked Comprehension Type Question

1. Two formulal to calculate number of milli equivalkents (mlQ)

$$\text{Numbr of miliequivalents} = \frac{\text{weight}}{\text{GEW}} \times 1000$$

$$\text{Numbr of milliequivalents} = \text{volume in ml} \times \text{Normality of solution}$$

0.09 grams of dibasic acid neutralise 40 ml of  $\frac{N}{20}$  NaOH solution.

Molecular weight of acid is

A. 90

B. 45

C. 180

D. 60

**Answer: A**



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2. Two formulal to calculate number of milli equivalents (mlQ)

$$\text{Numbr of miliequivalents} = \frac{\text{weight}}{\text{GEW}} \times 1000$$

$$\text{Numbr of milliequivalents} = \text{volume in ml} \times \text{Normality of solution}$$

0.25 grams of pure  $\text{CaCO}_3$  neutralised 25 ml dilue HCl normality of HCl solution is

A. 0.1 N

B. 0.5 N

C. 0.25 N

D. 0.2 N

**Answer: D**



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## Practice Sheet Advanced Matrix Matching Type Question

1. Match the following columns

### Column-I

- A) 22.4 volume  $\text{H}_2\text{O}_2$
- B) 32 g oxygen
- C) 11.2 L  $\text{CO}_2$  at STP
- D) 1 gram equivalent hydrogen at STP

### Column-II

- P) 11.2 litres
- Q)  $9.034 \times 10^{23}$  atoms
- R)  $2 \text{ mole L}^{-1}$
- S)  $9.64 \times 10^{24}$  electron

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## Practice Sheet Advanced Integer Type Question

1. Ammonia is oxidised by oxygen to give nitric oxide and water. The weight of water produced per gram of nitric oxide is  $0.1 \times xg$ . What is value of d.

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2. One gram limestone is heated and quicklime so formed is dissolved in one litre of water. The normality of solution is  $0.01 \times x$ . What is value of  $x$ .



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