



CHEMISTRY

RESONANCE ENGLISH

MOLE CONCEPT

Physical Chemistry Stoichiometry

1. A partially dried clay mineral contains 8 % d water. The original sample contained 12 % water and 45 % silica.

The % if silica in the partially dried sample is nearly:

A. 50 %

B. 49 %

C. 55 %

D. 47 %

Answer: 4

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2. Molality : It is defined as the moles of the solute present in 1 kg of the solvent . It is denoted by m .

$$\text{Molality}(m) = \frac{\text{Number of moles of solute}}{\text{Number of kilograms of the solvent}}$$

let w_A grams of the solute of molecular mass m_A be present in w_B grams of the solvent, then:

$$\text{Molality}(m) = \frac{w_A}{m_A \times w_B} \times 1000$$

Relation between mole fraction and molality:

$$\begin{aligned} X_A &= \frac{n}{N+n} \text{ and } X_B = \frac{N}{N+n} \\ \frac{X_A}{X_B} &= \frac{n}{N} = \frac{\text{Moles of solute}}{\text{Moles of solvent}} = \frac{w_A \times m_B}{w_B \times m_A} \\ \frac{X_A \times 1000}{X_B \times m_B} &= \frac{w_A \times 1000}{w_B \times m_A} = m \text{ or } \frac{X_A \times 1000}{(1 - X_A)m_B} = m \end{aligned}$$

If the mole fraction of a solute is changed from $\frac{1}{4}$ to $\frac{1}{2}$ in the 800 g of solvent then the ratio of molality will be:

A. 1: 3

B. 1: 4

C. 2: 3

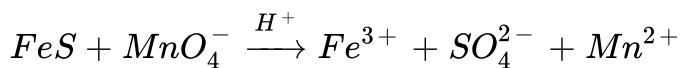
D. 1: 2

Answer: 1



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3. In the balanced equation



the stoichiometric coefficients of FeS and MnO_4^- are in the ratio :

A. 8: 5

B. 5: 8

C. 9: 5

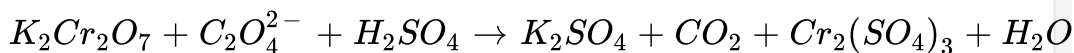
D. 5: 9

Answer: 4



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4.



In above reaction, identify the elements which do not undergo change in their oxidation state :

A. C

B. $S \& C$

C. $K, O, S \& H$

D. $C \& O$

Answer: 3



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5. From the mixture of 4 moles $Ca_3(PO_4)_2$ and 5 moles of P_4O_{10} and 6 moles of H_3PO_3 all the phosphorus atoms are removed then moles of P_4 molecule formed from all these atoms is

A. 8.5

B. 17

C. 34

D. 10

Answer: A



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6. The density of liquid (mol.wt. = 70) is 1.2gmL^{-1} . If 2mL of liquid contains 35 drops, the number of molecules of liquid in one drop are:

A. $\left(\frac{1.2}{35}\right)N_A$

B. $\frac{1}{1.2} \left(\frac{1}{35} \right)^2 N_A$

C. $\frac{1.2}{(35)^2} N_A$

D. $1.2 N_A$

Answer: 3



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7. Sulphur exist in different allotropic forms like S_2 , S_6 and S_8 etc. If equal moles of these three forms are taken in separate containers, then the ratio of number of atoms present in them respectively is :

A. 1 : 3 : 4

B. 1 : 1 : 1

C. 12 : 4 : 3

D. 4 : 3 : 1

Answer: A



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8. Two samples of HCl of $1.0M$ and $0.25M$ are mixed. Find volumes of these samples taken in order to prepare $0.75MHCl$ solution. Assume no water is added.

(I) $20mL$, $10mL$ (II) $100mL$, $50mL$

(III) $40mL$, $20mL$ (IV) $50mL$, $25mL$

A. $20ml$, $10ml$

B. $100ml$, $60ml$

C. $50ml$, $20ml$

D. $50ml$, $35ml$

Answer: 1



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9. Equivalent weight of $KHC_2O_4 \cdot 3NaHC_2O_4$ in reaction with acidic $KMnO_4$ is (M = Molar mass)

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

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

C. M

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

Answer: 1



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10. The vapour density of a mixture containing equal number of moles of methane and ethane at STP is

A. 11.5

B. 11.0

C. 23

D. 12.0

Answer: A



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11. The temperature at which molarity of pure water is equal to its molality is :

A. $273K$

B. $298K$

C. $277K$

D. None

Answer: 3

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12. A compound has the molecular formula X_4O_6 . If 10g of X_4O_6 has 5.72g X , atomic mass of X is:

A. 32amu

B. 27amu

C. 42amu

D. 98amu

Answer: 1

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13. Equal masses of oxygen, hydrogen and methane are taken in a container in identical conditions. Find the ratio of their moles.

A. 1: 16: 2

B. 1: 16: 1

C. 16: 1: 1

D. 16: 2: 1

Answer: 1



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14. Number of electron in 1.8mL of $\text{H}_2\text{O}(l)$

A. 6.02×10^{23}

B. 3.011×10^{23}

C. 0.6022×10^{23}

D. 60.22×10^{23}

Answer: 1

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15. What is the molarity of H_2SO_4 solution that has a density 1.84 g/cc at $35^\circ C$ and contains 98% by weight?

A. 4.18M

B. 8.14M

C. 18.4M

D. 18M

Answer: 3

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16. How many gram ions of SO_4^{-2} are present in 1 gram molecule of $K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$?

A. 2

B. 3

C. 1

D. 4

Answer: D



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17. Which of the following contains the same number of molecules ?

A. $1g$ of O_2 , $2g$ of SO_2

B. $1g$ of CO_2 , $1g$ of N_2O

C. $112ml$ of O_2 at STP , $224ml$ of He at $0.5atm$ and $273K$

D. All of these

Answer: 4

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18. If the density of water is 1 g cm^{-3} then the volume occupied by one molecule of water is approximately

A. $3 \times 10^{-23} \text{ mL}$

B. $6 \times 10^{-22} \text{ mL}$

C. $3 \times 10^{-21} \text{ mL}$

D. $9 \times 10^{-23} \text{ mL}$

Answer: 1

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

A. $\frac{4}{5}$

B. $\frac{5}{4}$

C. $\frac{3}{4}$

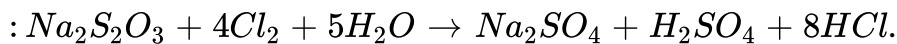
D. $\frac{5}{3}$

Answer: 1



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20. In the section



the equivalent weight of $Na_2S_2O_3$ will be : (M = molecular weight of $Na_2S_2O_3$)

A. $M/4$

B. $M/8$

C. $M/1$

D. $M/2$

Answer: 2

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21. Chlorophyll, the green colouring matter of plants responsible for photosynthesis, contains 2.68 % of magnesium by mass. Calculate the number of magnesium atoms in 2.00g of chlorophyll.

A. 1.345×10^{21}

B. 1.345×10^{20}

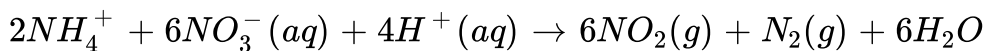
C. 13.45×10^{21}

D. 1.345×10^{23}

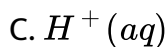
Answer: A

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22. In the reaction



the reducing agent is



Answer: 1



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23. 6 litre of mixture of methane and propane on complete combustion gives 7 litre of CO_2 . Find out the composition of the mixture ?

- A. 5.5lit, 0.5 lit.
- B. 4.5 lit, 1.5 lit
- C. 3.5 lit, 1.5 lit
- D. None of these

Answer: A

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24. Carbon occurs in nature as a mixture of ^{12}C and ^{13}C . The average atomic of carbon is 12.011. What is the % abundance of ^{12}C in nature?

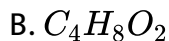
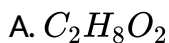
- A. 98.9 %
- B. 60.9 %
- C. 32.9 %
- D. 1.4 %

Answer: 1



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25. In a compound Carbon = 52.2 % , Hydrogen = 13 % , Oxygen = 34.8 % are present vapour density of the compound is 46. Calculate molecular formula of the compound ?



Answer: 4



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26. Calculate the weight of 90 % pure sulphuric acid to neutralize 5g caustic soda.

A. 19.19

B. 6.81

C. 11.11

D. None of these

Answer: B



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27. 6g of a hydrocarbon on combustion in excess of oxygen produces 17.6g of CO_2 and 10.8g of H_2O . The data illustrates the law of :

A. conservation of mass

B. multiple proportions

C. constant proportions

D. reciprocal proportions

Answer: 1



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28. ' a ' g KHC_2O_4 are required to reduce 100 mL of 0.02 M KMnO_4 in acid medium and ' b ' g KHC_2O_4 neutralises 100 mL of 0.05 M Ca(OH)_2 then :

A. $a = b$

B. $2a = b$

C. $a = 2b$

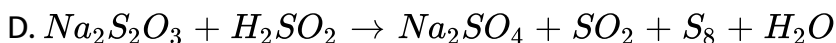
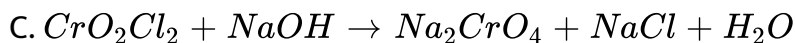
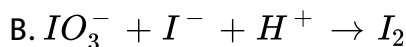
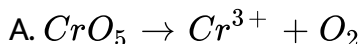
D. None of these

Answer: 2



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29. Which of the following reactions represents disproportionation ?

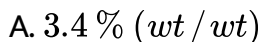


Answer: 4



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30. A fresh H_2O_2 solution is labelled 11.2V. This solution has the same concentration as a solution which is



B. 3.4 % (*vol / vol*)

C. 3.4 % (*wt / vol*)

D. None of these

Answer: 3



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31. In which of the following compound, oxidation state of '*S*' is other than the +6

A. peroxomonosulphuric acid (Caro's acid)

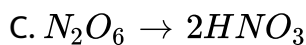
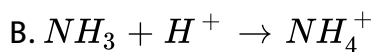
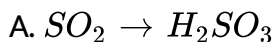
B. peroxodisulphuric acid (Marshall's acid)

C. pyrosulphuric acid (oleum)

D. sodium thiosulphate (hypo)

Answer: 4

32. Valency factor of the following compounds will be same in neutralisation -



D. A and C have same valency factor

Answer: 4

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

- A. Oxidation
- B. Reduction
- C. Disproportionation
- D. Neutralisation

Answer: 3

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34. How may millilitres of a $9NH_2SO_4$ solution will be required to neutralize completely $20mL$ of a $3.6NNaOH$ solution ?

- A. $18.0mL$
- B. $8.0mL$
- C. $16.0mL$
- D. $80.0mL$

Answer: 2



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35. One atom of an element x weight $6.643 \times 10^{-23}g$. Number of moles of atom in 20 kg is :

A. 4

B. 40

C. 100

D. 500

Answer: 4



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36. Rearrange the following (I to IV) in the order of increasing masses:

(I) 0.5mole of O_3

(II) 0.5 gm atmo of oxygen

(III) 3.011×10^{23} molecules of O_2

5.6 litre of CO_2 at 1 atm and 273 K

A. $II < IV < III < I$

B. $II < I < IV < III$

C. $IV < II < III < I$

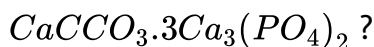
D. $I < II < III < IV$

Answer: A



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37. What percentage of oxygen is present in the compound



A. 23.3 %

B. 45.36 %

C. 41.94 %

D. 17.08 %

Answer: 3



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38. What is the empirical formula of vanadium oxide if 2.74g of the metal oxide contains 1.53g of metal ?

A. V_2O_3

B. VO

C. V_2O_5

D. V_2O_7

Answer: 3



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39. A gaseous mixture of H_2 and CO_2 gas contains 66 mass % of CO_2 . What is the vapour density of the mixture ?

A. 6.1

B. 5.4

C. 2.7

D. 10.8

Answer: C



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40. Suppose two elements X and Y combine to form two compounds XY_2 and X_2Y_3 . 0.05 mole of XY_2 weighs 5 g while 3.011×10^{23} molecules of X_2Y_3 weigh 85 g. The atomic masses of X and Y are respectively :

A. 20, 30

B. 30, 40

C. 40, 30

D. 80, 60

Answer: 3



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41. A mixture of O_2 and gas "Y" (mol. Mass 80) in the mole ratio a: b has a mean molecular mass 40. What would be mean molecular mass

, if the gases are mixed in the ratio $b : a$ under identical conditions? (

Assume that gases are non-reacting):

A. 40

B. 48

C. 62

D. 72

Answer: 4



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42. 1.44 gram of titanium (Ti) reacted with excess of O_2 and produced x gram of non-stoichiometric compound $Ti_{1.44}O$. The value of x is :

A. 2

B. 1.77

C. 1.44

D. None of these

Answer: B



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43. $0.607g$ of a silver salt of tribasic organic acid was quantitatively reduced to $0.37g$ of pure Ag. What is the molecular mass of the acid ?

A. 207

B. 210

C. 531

D. 324

Answer: 2



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44. The percentage by volume of C_3H_8 in a gaseous mixture of C_3H_8 , CH_4 and CO is 20. When 100mL of the mixture is burnt in excess of O_2 the volume of CO_2 produced is :

A. 90mL

B. 160mL

C. 140mL

D. None of these

Answer: 3



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45. Concentrated HNO_3 is 63 % HNO_3 by mass and has a density of 1.4g/mL . How many millilitres of this solution are required to prepare 250 mL of a 1.20M HNO_3 solution ?

A. 18.0

B. 21.42

C. 20.0

D. 14.21

Answer: 2



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46. 100mL of H_2SO_4 solution having molarity $1M$ and density $1.5\frac{\text{g}}{\text{mL}}$ is mixed with 400mL of water. Calculate final molarity of H_2SO_4 solution, if final density is $1.25\frac{\text{g}}{\text{mL}}$:

A. $4.4M$

B. $0.145M$

C. $0.52M$

D. $0.227M$

Answer: 4



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47. 2 mole of N_2H_4 loses 16 mole of electron is being converted to a new compound X. Assuming that all of the N appears in the new compound. What is the oxidation state of 'N' in X ?

A. -1

B. -2

C. $+2$

D. $+4$

Answer: 3



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48. 6×10^{-3} mole $K_2Cr_2O_7$ reacts completely with 9×10^{-3} to give XO_3^- and Cr^{3+} . The value of n is:

A. 1

B. 2

C. 3

D. None of these

Answer: 1



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49. Hydrazine reacts with KIO_3 in presence of HCl as

$$N_2H_4 + IO_3^- + 2H^+ + Cl^- \rightarrow ICl + N_2 + 3N_2 + 3H_2O$$
The equivalent masses of N_2H_4 and KIO_3 respectively are :

A. 8 and 53.5

B. 16 and 53.5

C. 8 and 35.6

D. 8 and 87

Answer: 1



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50. 3.4g sample of H_2O_2 solution containing $x\%$ H_2O_2 by weight requires x mL of a $KMnO_4$ solution for complete oxidation under acidic condition. The normality of $KMnO_4$ solution is

A. 1

B. 0.5

C. 0.4

D. 0.2

Answer: 3



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51. How many of the prefixes are correctly matched with their multiples :

(i) pico (p) $- 10^{-12}$ (ii) tera(T) $- 10^{12}$ (iii) giga (G) $- 10^9$

(iv) nano (n) $- 10^{-9}$ (v) mega(M) $- 10^6$ (vi) micro

(μ) $- 10^{-6}$

(vii) centi(cm) $- 10^{-1}$ (viii) deci(D) $- 10$ (ix) milli

(m) $- 10^{-3}$

A. 5

B. 6

C. 7

D. 8

Answer: 3

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Inorganic Chemistry Periodic Table Periodicity

1. A partially dried clay mineral contains 8 % d water. The original sample contained 12 % water and 45 % silica.

The % if silica in the partially dried sample is nearly:

- A. s — block, group 2, period 6, $6s^2$
- B. p — block, group 13, period, 5, $5s^2 5p^4$
- C. d — block, group 7, period 7, $7s^2$
- D. f — block, group 3, period 6, $6s^2$

Answer: 3

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2. Molality : It is defined as the moles of the solute present in 1 kg of the solvent . It is denoted by m .

$$\text{Molality}(m) = \frac{\text{Number of moles of solute}}{\text{Number of kilograms of the solvent}}$$

let w_A grams of the solute of molecular mass m_A be present in w_B grams of the solvent, then:

$$\text{Molality}(m) = \frac{w_A}{m_A \times w_B} \times 1000$$

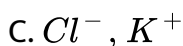
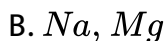
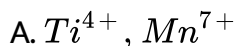
Relation between mole fraction and molality:

$$X_A = \frac{n}{N+n} \text{ and } X_B = \frac{N}{N+n}$$

$$\frac{X_A}{X_B} = \frac{n}{N} = \frac{\text{Moles of solute}}{\text{Moles of solvent}} = \frac{w_A \times m_B}{w_B \times m_A}$$

$$\frac{X_A \times 1000}{X_B \times m_B} = \frac{w_A \times 1000}{w_B \times m_A} = m \text{ or } \frac{X_A \times 1000}{(1 - X_A)m_B} = m$$

If the mole fraction of a solute is changed from $\frac{1}{4}$ to $\frac{1}{2}$ in the 800 g of solvent then the ratio of molality will be:

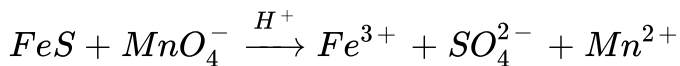


D. P^{5+} , P^{3+}

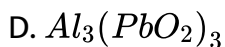
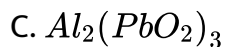
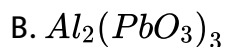
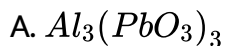
Answer: D

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3. In the balanced equation



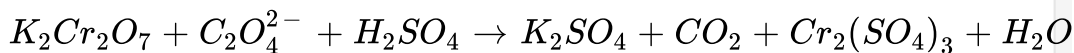
the stoichiometric coefficients of FeS and MnO_4^- are in the ratio :



Answer: 2

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4.



In above reaction, identify the elements which do not undergo change in their oxidation state :

A. Potassium permanganate

B. Potassium magnate

C. Potassium metamagnate

D. Potassium magnite

Answer: 2



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5. From the mixture of 4 moles $Ca_3(PO_4)_2$ and 5 moles of P_4O_{10} and 6 moles of H_3PO_3 all the phosphorus atoms are removed then moles of P_4 molecule formed from all these atoms is

- A. Sodium dihydrogen phosphite
- B. Sodium dihydrogen phosphide
- C. Sodium hydrogen phosphate
- D. Sodium dihydrogen phosphate

Answer: 4



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6. The density of liquid (mol.wt. = 70) is 1.2gmL^{-1} . If 2mL of liquid contains 35 drops, the number of molecules of liquid in one drop are:

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

Answer: 3



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7. Sulphur exist in different allotropic forms like S_2 , S_6 and S_8 etc. If equal moles of these three forms are taken in separate containers, then the ratio of number of atoms present in them respectively is :

A. EA of A^+

B. EA of A^{2+}

C. IE of A^{2+}

D. None of these

Answer: 1



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8. Two samples of HCl of $1.0M$ and $0.25M$ are mixed. Find volumes of these samples taken in order to prepare $0.75MHCl$ solution.

Assume no water is added.

(I) $20mL$, $10mL$ (II) $100mL$, $50mL$

(III) $40mL$, $20mL$ (IV) $50mL$, $25mL$

A. The atomic number of Al is smaller than that of Mg.

B. the atomic size of Al is less than that of Mg.

C. Penetration of s — subshell electrons in case of Mg is greater than that of p — subshell in Al

D. Mg has incompletely filled s — orbital.

Answer: 3



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9. Equivalent weight of $KHC_2O_4 \cdot 3NaHC_2O_4$ in reaction with acidic $KMnO_4$ is ($M =$ Molar mass)

A. N, O

B. B, Be

C. Al, Ga

D. Cl, F

Answer: 1

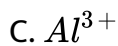


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10. The vapour density of a mixture containing equal number of moles of methane and ethane at STP is

A. Li^+

B. Mg^{2+}

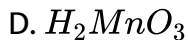
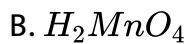


Answer: 3



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11. The temperature at which molarity of pure water is equal to its molality is :

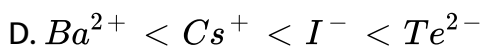
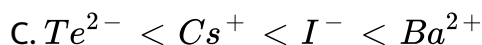
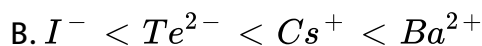
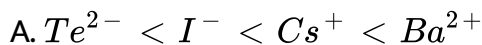


Answer: 1



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12. A compound has the molecular formula X_4O_6 . If 10g of X_4O_6 has 5.72g X , atomic mass of X is:



Answer: 1



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13. Equal masses of oxygen, hydrogen and methane are taken in a container in identical conditions. Find the ratio of their moles.

- A. The properties of elements are the periodic functions of their atomic numbers.
- B. non-metallic elements are lesser in number than metallic elements.
- C. the first ionisation energies of elements along a period do not vary in a regular manner with increase in atomic number.
- D. for transition elements the d – subshells are filled with electrons monotonically with increase in atomic number.

Answer: 4



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14. Number of electron in 1.8mL of $\text{H}_2\text{O}(l)$

A. Atomic number

B. Aximuthal quantum number

C. Principal quantum number

D. Atomic mass

Answer: 2



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15. What is the molarity of H_2SO_4 solution that has a density 1.84 g/c c at $35^\circ C$ and contains 98% by weight?

A. 1^{st} group, s – block

B. 2^{nd} group, s – block

C. 5^{th} group, d – block

D. 7^{th} group, d – block

Answer: 4

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16. How many gram ions of SO_4^{-2} are present in 1 gram molecule of $K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$?

A. $Sc^{3+} [Ne] 3s^2 3p^6$ zero group

B. $Fe^{2+} [Ar] 3d^6$ 8^{th} group

C. $Cr [Ar] 3d^5 4s^1$ 6^{th} group

D. All of the above

Answer: 1

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17. Which of the following contains the same number of molecules ?

A. 0.72, 1.60

B. 1.60, 1.60

C. 0.72, 0.72

D. 1.60, 0.72

Answer: 1



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18. If the density of water is 1 g cm^{-3} then the volume occupied by one molecule of water is approximately

A. V

B. Ti

C. Sc

D. Mn

Answer: 4

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

A. $K > Na > Li$

B. $Be > Mg > Ca$

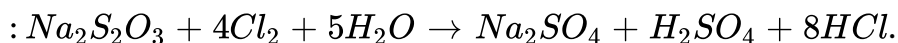
C. $B > C > N$

D. $Ge > Si > C$

Answer: 2

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20. In the section



the equivalent weight of $Na_2S_2O_3$ will be : (M = molecular weight of $Na_2S_2O_3$)

A. $I_{Mg} = II_{Na}$

B. $I_{Na} > I_{Mg}$

C. $II_{Mg} > II_{Na}$

D. $II_{Na} > II_{Mg}$

Answer: 4



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21. Chlorophyll, the green colouring matter of plants responsible for photosynthesis, contains 2.68 % of magnesium by mass. Calculate the number of magnesium atoms in 2.00g of chlorophyll.

A. Na

B. B

C. Al

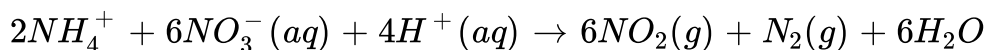
D. Mg

Answer: 4

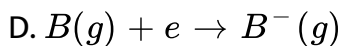
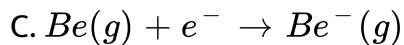
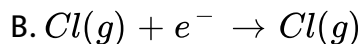
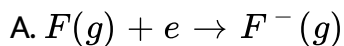


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22. In the reaction



the reducing agent is



Answer: 3



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23. 6 litre of mixture of methane and propane on complete combustion gives 7 litre of CO_2 . Find out the composition of the mixture ?

A. $Fe^+ < Fe^{2+} < Fe^{3+}$ – size

B. $Fe^+ < Fe^{2+} < Fe^{3+}$ – ionisation energy

C. $B < Be < C$ –

D. $N < O < F$ – ionisation energy

Answer: 2

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24. Carbon occurs in nature as a mixture of ^{12}C and ^{13}C . The average atomic of carbon is 12.011. What is the % abundance of ^{12}C in

nature?

A. 4

B. 3

C. 2

D. 1

Answer: 2



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25. In a compound Carbon = 52.2 % , Hydrogen = 13 % , Oxygen = 34.8 % are present vapour density of the compound is 46.

Calculate molecular formula of the compound ?

A. The atomic number of fluorine is less than that of chlorine

B. fluorine being the first member of the family behaves in an unusual manner.

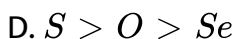
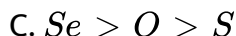
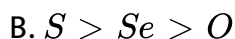
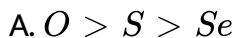
- C. chlorine can accommodate an electron better than fluorine by utilising its vacant $3d$ – orbital
- D. small size, high electron density and an increased electron repulsion makes addition of an electron to fluorine less favourable than that in the case of chlorine in isolated stage.

Answer: 4



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26. Calculate the weight of 90 % pure sulphuric acid to neutralize 5g caustic soda.



Answer: 2



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27. $6g$ of a hydrocarbon on combustion in excess of oxygen produces $17.6g$ of CO_2 and $10.8g$ of H_2O . The data illustrates the law of :

A. O

B. O^+

C. O^{2+}

D. O^{2-}

Answer: 3



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28. 'a' g KHC_2O_4 are required to reduce 100 mL of 0.02 M $KMnO_4$ in acid medium and 'b' g KHC_2O_4 neutralises 100 mL of 0.05 M $Ca(OH)_2$ then :

A. Cl, F

B. O, S

C. O, F

D. S, Cl

Answer: A



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29. Which of the following reactions represents disproportionation ?

A. Only electronegativity

B. Only electron affinity

C. Electron affinity and ionization energy

D. Ionic potential and electronegativity

Answer: 3



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30. A fresh H_2O_2 solution is labelled 11.2V. This solution has the same concentration as a solution which is

A. CO

B. SnO_2

C. ZnO

D. SiO_2

Answer: 1



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31. In which of the following compound, oxidation state of ' S ' is other than the $+6$

A. $F > N > C > Si > Ga$ – non-metallic character

B. $F > Cl > O > N$ – oxidising property

C. $S > Se > Te > O$ – electron affinity value

D. All of these

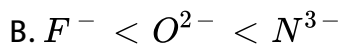
Answer: 4



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32. Valency factor of the following compounds will be same in neutralisation -

A. $N < Be < B$

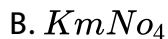
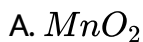


Answer: 2



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



D. None of these

Answer: 2

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34. How may millilitres of a $9NH_2SO_4$ solution will be required to neutralize completely $20mL$ of a $3.6NNaOH$ solution ?

- A. electron affinity of $A^+(g)$
- B. electron affinity of $A(g)$
- C. ionisation energy of $A^+(g)$
- D. ionisation energy of $A^{2+}(g)$

Answer: 1

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35. One atom of an element x weight $6.643 \times 10^{-23}g$. Number of moles of atom in 20 kg is :

- A. Generally the radius trend and the ionization energy trend across a period are opposites.
- B. metallic and covalent radii of potassium are 2.3\AA and 2.03\AA respectively.
- C. Amongst Li^- , Be^- and C^- , Li^- is least stable ion.
- D. Atomic and ionic radii of Niobium and Tantalum are almost same

Answer: 3



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36. Rearrange the following (I to IV) in the order of increasing masses:

(I) 0.5mole of O_3

(II) 0.5 gm atmo of oxygen

(III) 3.011×10^{23} molecules of O_2

5.6 litre of CO_2 at 1 atm and 273 K

- A. Energy absorbed when an electron is added to an isolated atom in the gaseous state
- B. Energy released when an electron is added to an isolated atom in the gaseous state
- C. Energy required to take out an electron from an isolated gaseous atom
- D. Power of an atom to attract an electron to itself.

Answer: 2



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37. What percentage of oxygen is present in the compound $CaCCO_3 \cdot 3Ca_3(PO_4)_2$?

A. $x = \frac{y + z}{2}$

B. $z = \frac{x - y}{2}$

C. $z = \frac{x^2 - y^2}{2}$

D. $z = 2x + y$

Answer: 1



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38. What is the empirical formula of vanadium oxide if 2.74g of the metal oxide contains 1.53g of metal ?

A. in the long form of periodic table, the number of period indicates the value of principal quantum number.

B. There are four d – block series comprising of total 40 elements in the long form of periodic table.

C. s – block, d – block and f – block elements are metals.

D. All p – block elements are non – metal.

Answer: 4

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39. A gaseous mixture of H_2 and CO_2 gas contains 66 mass % of CO_2 . What is the vapour density of the mixture ?

- A. that oxide will be neutral in nature in which element will be in its highest oxidation state.
- B. that oxide will be highest acidic in nature in which element will be in its highest oxidation state.
- C. the oxide will be amphoteric in nature in which element will be in its highest oxidation state.
- D. that oxide will be highly basic in nature in which element will be in its highest oxidation state.

Answer: 2



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40. Suppose two elements X and Y combine to form two compounds XY_2 and X_2Y_3 . 0.05 mole of XY_2 weighs 5 g while 3.011×10^{23} molecular of X_2Y_3 weigh 85 g. The atomic masses of X and Y are respectively :

- A. Ionisation energies of elements decrease along the period.
- B. Ionisation energies of the IIA group elements are less than that of the corresponding III A group elements.
- C. Ionisation energies of group 15 elements are less than that of the corresponding group 16 elements.
- D. Ionisation energy of Ga is greater than Al.

Answer: 4



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41. A mixture of O_2 and gas "Y" (mol. Mass 80) in the mole ratio a: b has a mean molecular mass 40. What would be mean molecular mass, if the gases are mixed in the ratio b: a under identical conditions? (Assume that gases are non- reacting):

- A. atomic radius
- B. type of electron to be removed
- C. the valence shell electron configuration
- D. all of these

Answer: 1



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42. 1.44 gram of titanium (Ti) reacted with excess of O_2 and produced x gram of non-stoichiometric compound $Ti_{1.44}O$. The value of x is :

- A. $IE(I)$ of $Be > IE(I)$ of B but $IE(II)$ of $Be < IE(II)$ of B
- B. $IE(I)$ of $Be < IE(I)$ of B but $IE(II)$ of $Be < IE(II)$ of B
- C. $IE(II)$ of $O > IE(II)$ of N
- D. $IE(I)$ of $Mg > IE(I)$ of Al

Answer: 2



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43. 0.607g of a silver salt of tribasic organic acid was quantitatively reduced to 0.37g of pure Ag. What is the molecular mass of the acid ?

- A. $Na > Mg > Al > Si$

B. $Mg > Na > Al > Si$

C. $Al > Mg > Na > Si$

D. $Si > Al > Na > Mg$

Answer: 1



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44. The percentage by volume of C_3H_8 in a gaseous mixture of C_3H_8 , CH_4 and CO is 20. When $100mL$ of the mixture is burnt in excess of O_2 the volume of CO_2 produced is :

A. $B > C > N > F$

B. $C > B > N > F$

C. $F > N > C > B$

D. $F > N > B > C$

Answer: 3



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45. Concentrated HNO_3 is 63 % HNO_3 by mass and has a density of $1.4g/mL$. How many millilitres of this solution are required to prepare 250 mL of a $1.20M HNO_3$ solution ?

- A. Oxide of aluminium (Al_2O_3) and arsenic (As_2O_3) are amphoteric.
- B. Oxide of chlorine (Cl_2O_7) is less acidic than oxide of nitrogen (N_2O_5).
- C. Oxide of carbon (CO_2) is more acidic than oxide of silica (SiO_2).
- D. The correct increasing order of basic character of various oxides is $H_2O < CuO < MgO < CaO$.

Answer: B



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46. 100mL of H_2SO_4 solution having molarity $1M$ and density $1.5\frac{\text{g}}{\text{mL}}$ is mixed with 400mL of water. Calculate final molarity of H_2SO_4 solution, if final density is $1.25\frac{\text{g}}{\text{mL}}$:

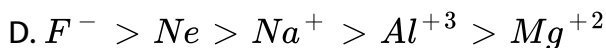
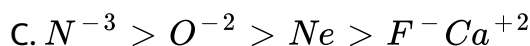
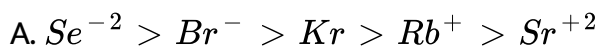
- A. relatively smaller effective nuclear charge
- B. relatively smaller size of their atoms
- C. relatively smaller penetration effect of inner orbitals
- D. all of the above

Answer: B



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47. 2 mole of N_2H_4 loses 16 mole of electron is being converted to a new compound X. Assuming that all of the N appears in the new compound. What is the oxidation state of 'N' in X?



Answer: 1



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48. 6×10^{-3} mole $K_2Cr_2O_7$ reacts completely with 9×10^{-3} to give XO_3^{-} and Cr^{3+} . The value of n is:

A. Fe

B. K

C. Ba

D. N

Answer: 1



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49. Hydrazine reacts with KIO_3 in presence of HCl as



equivalent masses of N_2H_4 and KIO_3 respectively are :

A. it forms an basic oxide

B. It belongs to II A group

C. It belongs to IV period

D. It forms an acidic oxide

Answer: 4

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50. 3.4g sample of H_2O_2 solution containing $x\%$ H_2O_2 by weight requires x mL of $KMnO_4$ solution for complete oxidation under acidic condition. The normality of $KMnO_4$ solution is

- A. directly proportional to effective nuclear charge
- B. directly proportional to square of effective nuclear charge
- C. inversely proportional to effective nuclear charge
- D. inversely proportional to square of effective nuclear charge

Answer: 4

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51. How many of the prefixes are correctly matched with their multiples :

- (i) pico (p) – 10^{-12} (ii) tera(T) – 10^{12} (iii) giga (G) – 10^9
 (iv) nano (n) – 10^{-9} (v) mega(M) – 10^6 (vi) micro (μ) – 10^{-6}
 (vii) centi(cm) – 10^{-1} (viii) deci(D) – 10 (ix) milli (m) – 10^{-3}

A. Cl^- , P^{3-} , Ar Isoelectronic

B. Size of Mo = size of W Lanthanide contraction

C. IP of ' Be ' > IP of ' B ' Penetration effect

D. Size of Ne > size of F Due $\rightarrow comp \leq teoctetofNe$

Answer: 4



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1. A partially dried clay mineral contains 8 % d water. The original sample contained 12 % water and 45 % silica.

The % of silica in the partially dried sample is nearly:

A. 4

B. 8

C. 7

D. 6

Answer: A



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2. Molality : It is defined as the moles of the solute present in 1 kg of the solvent . It is denoted by m.

$$\text{Molality}(m) = \frac{\text{Number of moles of solute}}{\text{Number of kilograms of the solvent}}$$

let w_A grams of the solute of molecular mass m_A be present in w_B grams of the solvent, then:

$$\text{Molality}(m) = \frac{w_A}{m_A \times w_B} \times 1000$$

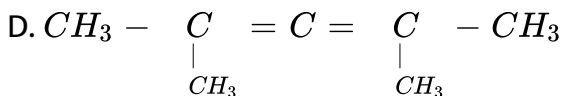
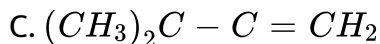
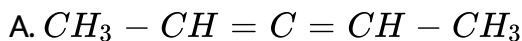
Relation between mole fraction and molality:

$$X_A = \frac{n}{N+n} \text{ and } X_B = \frac{N}{N+n}$$

$$\frac{X_A}{X_B} = \frac{n}{N} = \frac{\text{Moles of solute}}{\text{Moles of solvent}} = \frac{w_A \times m_B}{w_B \times m_A}$$

$$\frac{X_A \times 1000}{X_B \times m_B} = \frac{w_A \times 1000}{w_B \times m_A} = m \text{ or } \frac{X_A \times 1000}{(1 - X_A)m_B} = m$$

If the mole fraction of a solute is changed from $\frac{1}{4}$ to $\frac{1}{2}$ in the 800 g of solvent then the ratio of molality will be:

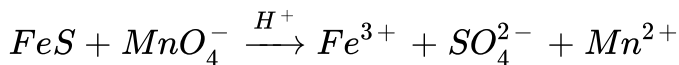


Answer: 4



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3. In the balanced equation



the stoichiometric coefficients of FeS and MnO_4^- are in the ratio :

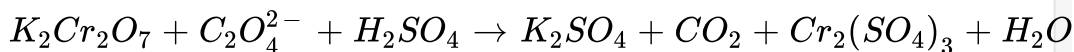
- A. 3 – Ethylpenta–1, 4 – diene
- B. 20 Ethylhex–1 – en – 4 – yne
- C. 2 – (2 – Chloroethyl)pentanenitrile
- D. 2, 2 – Dichlorohexan–4 – ol

Answer: 4

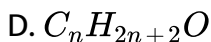
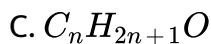
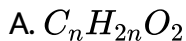


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4.



In above reaction, identify the elements which do not undergo change in their oxidation state :



Answer: 4



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5. From the mixture of 4 moles $Ca_3(PO_4)_2$ and 5 moles of P_4O_{10} and 6 moles of H_3PO_3 all the phosphorus atoms are removed then moles of P_4 molecule formed from all these atoms is

A. Chain isomers

B. Postion isomers

C. Functional isomers

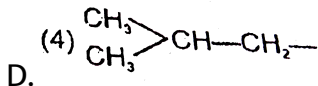
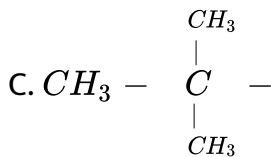
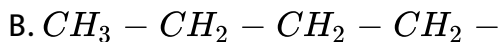
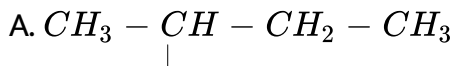
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Answer: 3



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6. The density of liquid (mol.wt. = 70) is 1.2 gmL^{-1} . If 2 mL of liquid contains 35 drops, the number of molecules of liquid in one drop are:



Answer: 4



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7. Sulphur exist in different allotropic forms like S_2 , S_6 and S_8 etc. If equal moles of these three forms are taken in separate containers, then the ratio of number of atoms present in them respectively is :

- A. 1 – Bromo – 2 – chlorocyclopropane
- B. (Trans) – 2 – Methyl hex – 3 – ene
- C. 2 – Methyl butanal
- D. 2, 2, 4 – Trimethyl hexane

Answer: 2

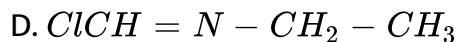
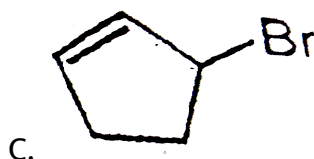
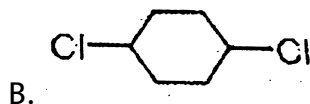
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8. Two samples of HCl of $1.0M$ and $0.25M$ are mixed. Find volumes of these samples taken in order to prepare $0.75MHCl$ solution.

Assume no water is added.

(I) 20mL, 10mL (II) 100mL, 50mL

(III) 40mL, 20mL (IV) 50mL, 25mL



Answer: 3



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9. Equivalent weight of $\text{KHC}_2\text{O}_4 \cdot 3\text{NaHC}_2\text{O}_4$ in reaction with acidic KMnO_4 is (M = Molar mass)

A. Neutral $FeCl_3$

B. Ammonical $AgNO_3$

C. 2, 4 – DNP

D. $NaHCO_3$ solution

Answer: 2



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10. The vapour density of a mixture containing equal number of moles of methane and ethane at STP is

A. 0

B. 1

C. 2

D. 4

Answer: 2



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11. The temperature at which molarity of pure water is equal to its molality is :

- A. Conformational isomers or identical
- B. Configurational diastereomer
- C. Configurational enantiomers
- D. Constitutional isomers

Answer: 2



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12. A compound has the molecular formula X_4O_6 . If 10g of X_4O_6 has 5.72g X , atomic mass of X is:

- A. 2 – Formyl – 3 – aminobutane dioic acid
- B. 2 – Amino – 3 – formylbutane dioic acid
- C. 3 – Amino – 2, 3 – dicarboxypropanal
- D. None of the above

Answer: 2



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13. Equal masses of oxygen, hydrogen and methane are taken in a container in identical conditions. Find the ratio of their moles.

- A. 2
- B. 3

C. 4

D. 5

Answer: 3



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14. Number of electron in 1.8mL of $\text{H}_2\text{O}(l)$

A. A meso compound has chiral centres but does not exhibit optical activity.

B. If a molecule is dissymmetric, it rotate the plane of plane polarized light.

C. A meso compound is optically inactive because the rotation caused by any molecule is cancelled by an equal and opposite

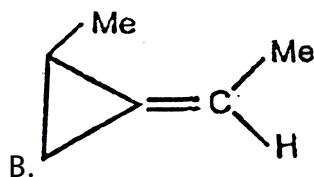
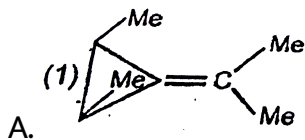
rotation caused by another molecule that is the mirror image of the first.

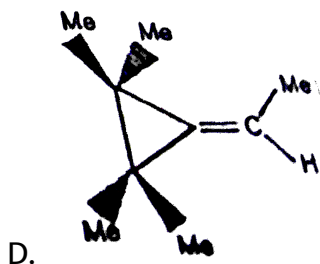
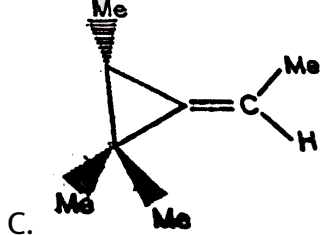
D. The two diastereomers have same structure formula but different physical and chemical properties

Answer: 3

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15. What is the molarity of H_2SO_4 solution that has a density 1.84 g/cc at $35^\circ C$ and contains 98% by weight?

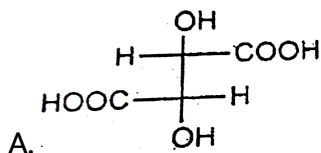


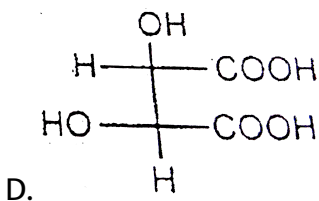
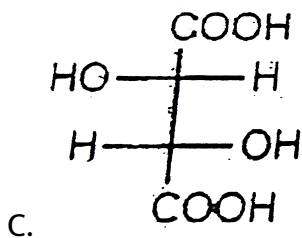
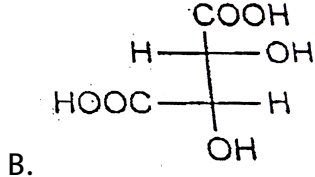


Answer: 4

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16. How many gram ions of SO_4^{-2} are present in 1 gram molecule of $K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$?

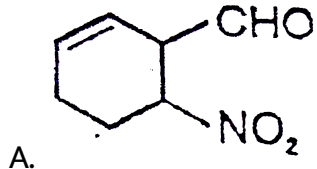




Answer: 2

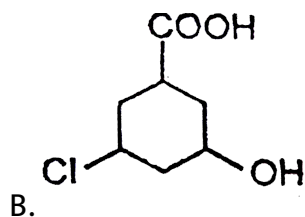
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17. Which of the following contains the same number of molecules ?



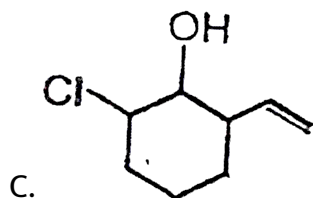
2 - Nitrocyclohex-5 - ene-1 -

carbaldehyde

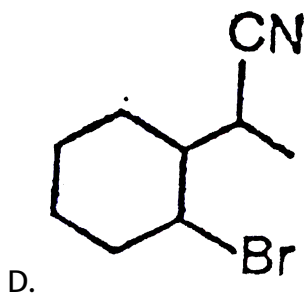


5 - Chloro-3 - hydroxycyclohexane-1 -

carboxylic acid



2 - Ethenyl-6 - chlorocyclohexanol



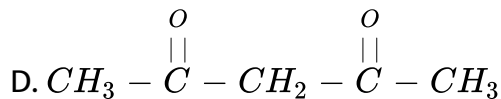
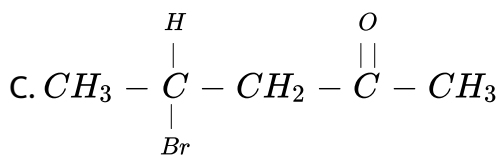
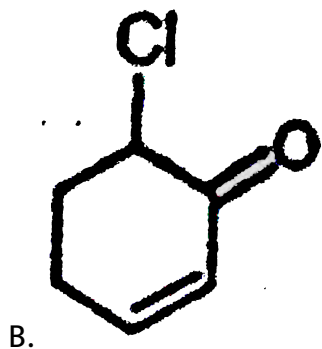
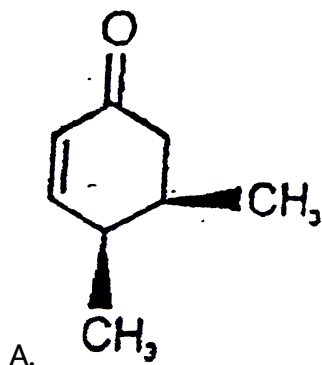
2 - (2 - bromocyclohexyl)propanenitrile

Answer: 4



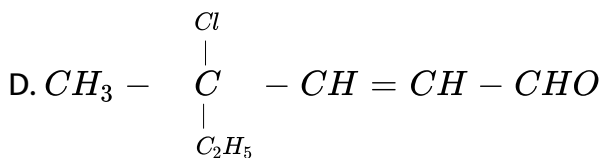
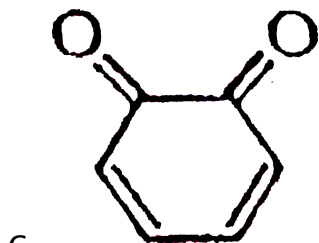
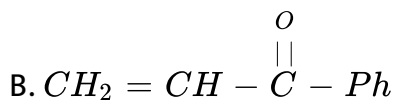
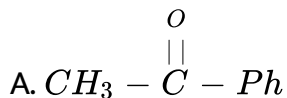
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18. If the density of water is 1 g cm^{-3} then the volume occupied by one molecule of water is approximately



Answer: 2

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

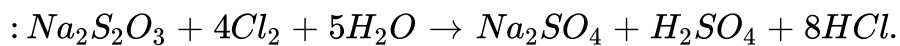


Answer: 1

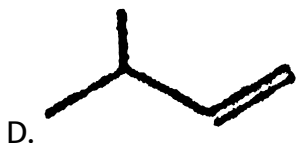
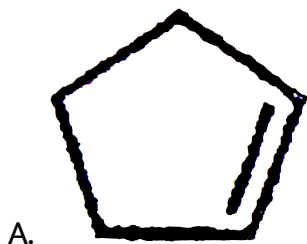


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20. In the section



the equivalent weight of $Na_2S_2O_3$ will be : (M = molecular weight of $Na_2S_2O_3$)



Answer: 3



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21. Chlorophyll, the green colouring matter of plants responsible for photosynthesis, contains 2.68 % of magnesium by mass. Calculate the number of magnesium atoms in 2.00g of chlorophyll.

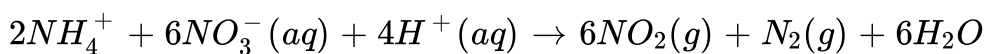
- A. Bis (Chloroacetic anhydride)
- B. Bis(Chloroethanoic anhydride)
- C. Chloroethanoic anhydride
- D. 1 – Chloroethanoyloxy– 2 – chloroethenone

Answer: 3



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22. In the reaction



the reducing agent is

A. NaHCO_3

B. Tollen's reagent

C. NaOI followed by H^+

D. NaOH

Answer: 3



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23. 6 litre of mixture of methane and propane on complete combustion gives 7 litre of CO_2 . Find out the composition of the mixture ?

A. The reactant and the products in the above reaction have (*S*) configuration.

B. In this reaction no bond to the chiral centre is broken so there is retention of configuration in the product.

- C. Reactant and product both can be distinguished by $NaHCO_3$ or Lucas reagent
- D. All are correct.

Answer: D



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24. Carbon occurs in nature as a mixture of ^{12}C and ^{13}C . The average atomic of carbon is 12.011. What is the % abundance of ^{12}C in nature?

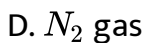
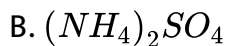
- A. Carbyl amine test
- B. Iodoform test
- C. Fehling solution test
- D. Hinsberg test

Answer: 4



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25. In a compound Carbon = 52.2 % , Hydrogen = 13 % , Oxygen = 34.8 % are present vapour density of the compound is 46. Calculate molecular formula of the compound ?

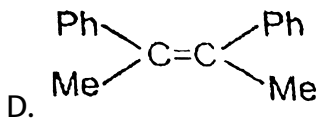
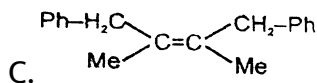
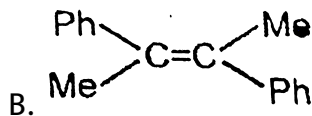
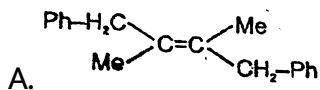


Answer: 2



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26. Calculate the weight of 90 % pure sulphuric acid to neutralize 5g caustic soda.

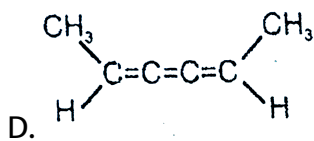
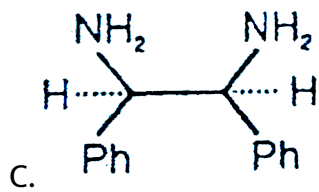
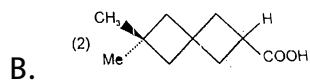
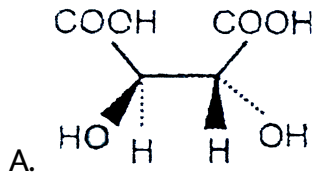


Answer: 2



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27. 6g of a hydrocarbon on combustion in excess of oxygen produces 17.6g of CO_2 and 10.8g of H_2O . The data illustrates the law of :



Answer: 1

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