



CHEMISTRY

JEE (MAIN AND ADVANCED) CHEMISTRY

REVISION EXERCISE

ALKALI METALS

1. (A) : Alkali metals are very soft and they can be cut with knife

(R) : Alkali metals have weak interatomic forces

- A. Both A and R are correct and R is the correct explanation of A .
- B. Both A and R are correct but R is not the correct explanation of A.
- C. A is True but R is False
- D. R is True but A is False .

Answer: B



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2. The statements regarding the compounds of sodium are

(i) The mixture of NaOH and CaO is used as decarboxylating agent

(ii) aq. NaOH reacts with silicon to form water glass

A. only (i) is correct

B. only (ii) is correct

C. both (i) and (ii) are correct

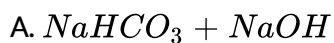
D. both (i) and (ii) are wrong

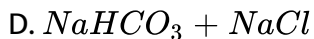
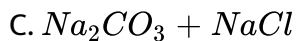
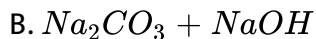
Answer: C



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3. Which of the following pair cannot exist together in solution ?



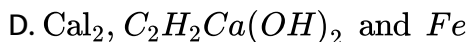
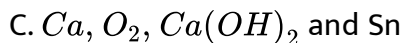
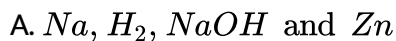


Answer: A



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4. When a substance 'A' reacts with water it produces combustible gas B and a solution of a substance 'C' in water . A has no reaction with the solution of 'C' When another substance 'D' reacts with this solution of 'C' it also produces the same gas 'B' even on reaction with dilute sulphuric acid at room temperature . Here A,B,C and D or respectively.

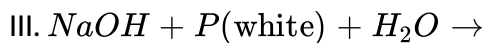
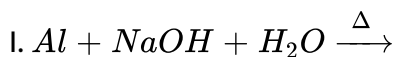


Answer: A



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5. Consider the following reactions :



The correct set of reactions which gives gaseous product is :

A. I, II and III

B. Only I and II

C. Only I and III

D. Only II and III

Answer: A



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6. Alkali metals are so named because

- A. of their large atoms sizes
- B. of their oxides give strong bases in water
- C. of their high reactivity in air
- D. of their colours imparted in bunsen flame

Answer: B



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7. Sodium metal preserved under kerosine. This is to prevent

- A. Volatility of metal
- B. reactivity in air
- C. reactivity with chlorine
- D. metallic luster

Answer: B



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8. The following are statements regarding sodium carbonate

i) The formula of washing soda is $Na_2CO_3 \cdot 10H_2O$

ii) Black ash is a mixture of $CaCO_3 + Na_2S$

iii) The principle involved in the preparation of Na_2CO_3 by Solvay process is very low solubility of $NaHCO_3$.

A. i and iii are correct

B. i and ii are correct

C. ii and iii are correct

D. all are correct

Answer: A



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9. Read the following statements

i) Crystal of NaOH are deliquescent

ii) The by product formed in Solvay process is $CaCl_2$

iii) $NaHCO_2$ is a mild antiseptic for skin infection

A. i and iii are correct

B. i and ii are correct

C. only iii are correct

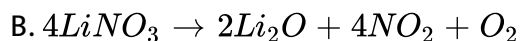
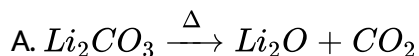
D. all are correct

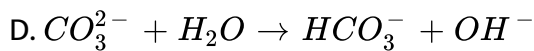
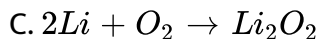
Answer: D



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10. Wrong reaction of the following



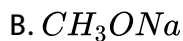


Answer: C



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11. Solid sodium hydroxide is reacted with carbon monoxide under pressure, what is the product obtained ?



Answer: C



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12. Which halide has highest melting point

A. NaCl

B. NaBr

C. NaF

D. NaI

Answer: C



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13. A sodium of sodium in liquid ammonia is blue due to the presence of

A. Na atoms

B. ammonium ions

C. Solvated Na^+ ions

D. solvated electrons

Answer: D



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14. The element that readily reacts directly with nitrogen to form nitride

A. Li

B. Na

C. K

D. Rb

Answer: A



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15. Metallic sodium can be stored in

A. Kerosene

B. Ethanol

C. Dilute acid

D. Water

Answer: A



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16. Which lithium halide is soluble in pyridine?

A. LiBr

B. LiF

C. LiCl

D. LiI

Answer: C



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17. Which of the following is used as a table salt for domestic purpose ?

A. NaCl

B. Na_2CO_3

C. NaHCO_3

D. NaNO_3

Answer: A



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18. $\text{Na}_2\text{O}_3 \cdot 10\text{H}_2\text{O} \xrightarrow{373\text{K}} \text{A} \xrightarrow{>373\text{K}} \text{B}.$

'A' in the above reactions is

A. Washing soda

B. Monohydrate of Na_2CO_3

C. Octahydrate of Na_2CO_3

D. Soda ash

Answer: B



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19. The following are some statements about oxides of alkali metals

- i) The basic nature and solubility of these oxides increases from Li to Cs
- ii) The stability of superoxide of IA group elements increases down the group due to increase in lattice energy
- iii) KO_2 is orange red coloured and paramagnetic

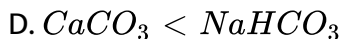
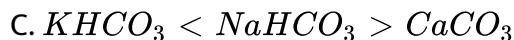
- A. only ii is correct
- B. i and iii are correct
- C. ii and iii are correct
- D. all are correct

Answer: D



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20. Which of the following are arranged in increasing order of solubilities ?



Answer: B



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21. The following some statments about IA group elements

- i) The redioactive IA group element is Fr
- ii) Alkali metals donot occurs in free state because of their high reactivity
- iii) The most abundant alkali metal in the earth is Na

A. only ii correct

B. i and are correct

C. All are correct

D. i and iii are correct

Answer: C



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22. The compound of which alkali metal gives crimsonred l'm flame test ?

A. Li

B. Na

C. K

D. Rb

Answer: A



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23. The following are the statements regarding NaOH i) It is prepared by Castner-Kelner process ii) The cathode in the outer compartments in mercury cathode method is Hg

- A. both (i) and(ii) are correct
- B. only (i) is correct
- C. only (ii) is correct
- D. both (i) and (ii) are wrong

Answer: A



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24. Match the following

List-I

List-II

- | | |
|---------------|--------------------------|
| (A) $NaOH$ | (I) Antacid |
| (B) $NaHCO_3$ | (II) Food preservative |
| (C) $NaNO_2$ | (III) Mercerising cotton |
| (D) $NaNO_3$ | (IV) Fertiliser |

- A. $\begin{matrix} A & B & C & D \\ I & II & III & IV \end{matrix}$
- B. $\begin{matrix} A & B & C & D \\ III & I & IV & II \end{matrix}$
- C. $\begin{matrix} A & B & C & D \\ III & I & II & IV \end{matrix}$
- D. $\begin{matrix} A & B & C & D \\ I & III & II & IV \end{matrix}$

Answer: C



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ALKALI EARTH METALS

1. Both Be and Al become passive on reaction with concentrated. nitric acid due to

- A. The non-reactive nature of the metal
- B. The non-reactive nature of the acid
- C. The formation of an inert layer of oxide on the surface of the metals
- D. Formation of active layer of oxide on the surface of metals

Answer: C



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2. Ca, Sr and Ba generally form ionic compounds because of ?

- A. Their high lattice energies
- B. Low lattice energies
- C. Their Large sizes
- D. Their high ionisation energies

Answer: C



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3. Alkaline earth metal compounds are less soluble in water than the corresponding alkali metal compounds because the alkaline earth metals have

- A. Lower lattice energies
- B. Higher ionization energies
- C. Higher covalent character
- D. Higher ionic character

Answer: C



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4. Which of the following salts becomes plaster hydrated ?

- A. $CaCO_3$
- B. $MgSO_4$
- C. $CaSO_4$
- D. $ZnCO_3$

Answer: C



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5. $Be_{(g)} \rightarrow Be_{(g)}^+, \Delta H = \quad \times \quad \text{kJ/mol}$. In the reaction

$Be_{(g)} \rightarrow Be_{(g)}^{+2}, \Delta H$ is approximately in kJ/mol

A. $2x$

B. $3x$

C. x

D. $1.5x$

Answer: B



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6. Calcium carbonate is available in nature in the form of

A. Chalk

B. Marble

C. Pumice stone

D. All the above

Answer: D



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7. The first ionization energies of alkaline earth metals are higher than those of the alkali metals. This is because

- A. There is an increase in the nuclear charge of the alkaline earth metals
- B. There is decrease in the nuclear charge of the alkaline earth metals
- C. There is no change in the nuclear charge
- D. There is an increase in nuclear charge of alkali metals

Answer: A



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8. The following are the statements regarding polarising power of IIA group cations

i) Be always forms covalent compounds due to high polarising power of

Be^{+2} ions

ii) Be always form covalent compounds due to low polarising power of

Be^{+2} ions

iii) Polarising power of IIA cations decreases from Be^{+2} ion to Ba^{+2} ion

The correct combination is

A. i and ii are correct

B. ii and iii are correct

C. iii and i are correct

D. i,ii,iii are correct

Answer: C



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9. Which of the following is true

- i) Be is not affected by dry air
- ii) Be is amphoteric metal
- iii) Be has a maximum covalency Four

A. , ii are correct

B. i,ii,iii, are correct

C. ii,iii, are correct

D. i,iii, are correct

Answer: B



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10. The decreasing order of second ionisation potential of K, Ca, Ba is

A. $K > Ca > Ba$

B. $Ca > Ba > K$

C. $Ba > K > Ca$

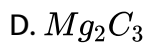
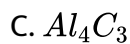
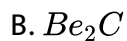
D. $K > Ba > Ca$

Answer: A



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11. Acetylide among the following is



Answer: A



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12. The ion having highest mobility in aqueous solution is

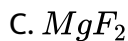
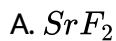


Answer: A



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13. Which of the following has the lowest melting point ?

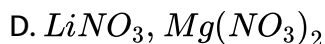
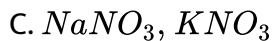
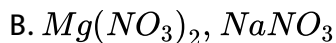
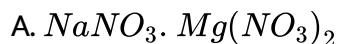


Answer: C



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14. X and Y are metal nitrates. X on heating liberates O_2 only but Y on heating liberates NO_2 and O_2 X and Y are respectively



Answer: A



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15. Which of the following crystalline substance has the highest degree of hydration ?

- A. Blue vitriol
- B. Epsom salt
- C. Washing soda
- D. Gypsum

Answer: C



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16. Which of the following about Be is not correct?

- A. Be has a high charge / size ratio
- B. Be^{+2} has high hydration energy
- C. Be forms $BeSO_4$ which is soluble in water
- D. Be does not show diagonal relationship with Al

Answer: D



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17. Which of the following alkaline earth metal oxides shows a coordination number four?

- A. BeO
- B. MgO
- C. SrO
- D. CaO

Answer: A



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18. Which one of the following statements is correct

- A. Beryllium exhibits a coordination number of six
- B. Chlorides of both beryllium and aluminium have bridged chloride structure in solid phase

C. $B_2H_6 \cdot 2NH_3$ is known as 'inorganic benzene'.

D. Boric acid is protonic acid.

Answer: B



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19. Gypsum is heated to $190^\circ C$. The percentage loss in its weight is

A. 26.4%

B. 15.7 %

C. 20.9 %

D. 36 %

Answer: C



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20. The following are some statements related to IIA group metals

I) The reaction with water increases from Be to Ba

II) The ionic nature of hydrides decreases from Be to Ba

III) The thermal stability of the peroxides increases with increase in cationic size

IV) The solubility of halides increases from Mg to Ba
The correct statements are of

A. I and III

B. II and IV

C. I, II and III

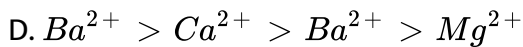
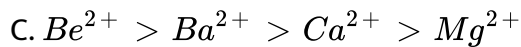
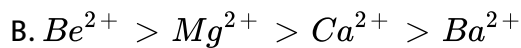
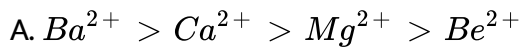
D. I, III and IV

Answer: C



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21. The correct order of ability to form complexes is

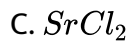
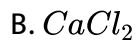
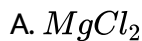


Answer: B



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22. Among the following which is extensively hydrated



Answer: A



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23. To a clear solution of compound (X), a solution of $BaCl_2$ is added and a heavy white precipitate is formed which does not dissolve in dil. HCl.

The compound (X) is

- A. A nitrate
- B. A bromide
- C. A sulphate
- D. A carbonate

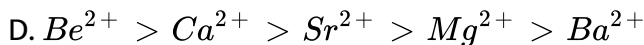
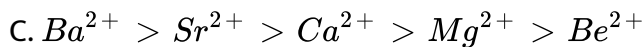
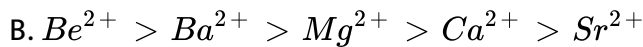
Answer: C



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24. The decreasing order of hydration enthalpies of alkaline earth metal ions is





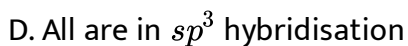
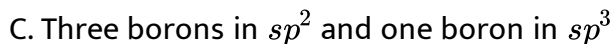
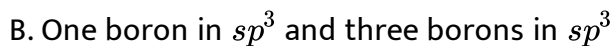
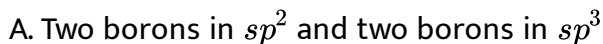
Answer: A



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ELEMENTS OF BORON FAMILY

1. The hybridisation of boron in borax is



Answer: A



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2. Which reacts with acids as well as alkalies?

A. Mg

B. Si

C. Al

D. Cu

Answer: C



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3. The densest element of IIIA group is

A. Tl

B. Al

C. Ga

D. B

Answer: A



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4. The statements regarding 'B' and Al are

- i) Boron is a bad conductor of heat and electricity
- ii) Aluminium hydrides are stable
- iii) Maximum covalency of Boron is 4

The correct statements are

A. Only I is correct

B. I and III are correct

C. All are correct

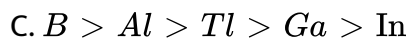
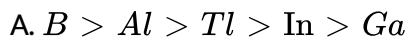
D. III is only correct

Answer: B



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5. The correct order of melting points of IIIA group elements is



Answer: A



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6. The IIIA group element that does not displace hydrogen from hydrochloric acid is

A. B

B. Al

C. both B and Al

D. Tl

Answer: A



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7. Which of the following does not undergo hydrolysis ?

A. BCl_3

B. BBr_3

C. BF_3

D. BI_3

Answer: C



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8. The maximum number of atoms present in the same plane in diborane molecule is

- A. 2
- B. 6
- C. 4
- D. 3

Answer: B



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9. Diborane does not liberate H_2 gas with

- A. H_2O
- B. KOH
- C. NH_3 at $120^\circ C$
- D. NH_3 at $200^\circ C$

Answer: C



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10. The statements regarding Diborane are

- i) Diborane contains 2-centred-3-electron bonds
- ii) B-H bond is formed by $sp^3 - s$ overlapping
- iii) It contains two coplanar BH_2 groups

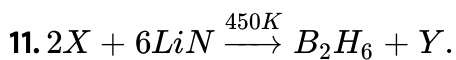
The correct statements in above are

- A. i and ii are correct
- B. ii and iii are correct
- C. i and iii are correct
- D. ii is only correct

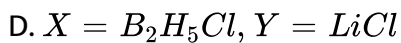
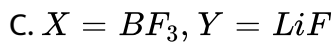
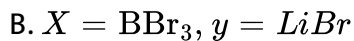
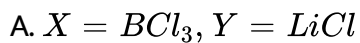
Answer: B



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The compounds, X and Y are



Answer: C



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12. Hydrogen gas is liberated when aluminium is treated with

A) Boiling water B) Dilute HCl (or) H_2SO_4

C) NaOH (or) KOH D) conc. H_2SO_4

A. All the above

B. only A, B and C

C. Only B, C and D

D. only B and D

Answer: B



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13. Which of the following is weakest Lewis acid ?

A. BF_3

B. BCl_3

C. BBr_3

D. BI_3

Answer: A



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14. Aluminium reacts with concentrated H_2SO_4 to liberate SO_2 gas. In this process, the element in H_2SO_4 that has changed its oxidation state is

A. H

B. S

C. O

D. none

Answer: B



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15. Slippery nature of orthoboric acid is due to

A. The presence of hydrogen bonds

B. The presence of covalent bonds

C. Electron deficient nature

D. The layers held by van der Waals forces

Answer: D



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16. In the reaction between boron and sodium hydroxide to liberate hydrogen gas, boron acts as

- A. an oxidizing agent
- B. a reducing agent
- C. a precipitating agent
- D. a deoxidizer

Answer: B



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17. Specify the co-ordination geometry around and hybridisation of N and B atoms in a 1:1 complex of BF_3 and NH_3

A. N: tetrahedral, sp^3 , B : tetrahedral, sp^3

B. N: pyramidal, sp^3 , B : pyramidal, sp^3

C. N: pyramidal, sp^3 , B: planar, sp^3

D. N: pyramidal, sp^3 , B : tetrahedral, sp^3

Answer: A



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18. The hybridisation of boron and oxygen atoms in a molecule of boric acid are respectively

A. sp^3 and sp^2

B. sp^2 and sp^3

C. sp^2 and sp^2

D. sp^3 and sp^3

Answer: B



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19. Strongest oxidant among the following is

A. B^{+3}

B. Al^{3+}

C. Ga^{+3}

D. Tl^{+3}

Answer: D



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20. Electronegativity of aluminium is 1.5. Electro negativity of thallium is

A. 1.5

B. 1.8

C. 1.0

D. 4.0

Answer: B



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21. The aqueous solution of $AlCl_3$ contains Al^{+3} ions because

A. Its higher hydration energy compensates its high ionisation energy

B. Its higher ionisation energy compensates its higher hydration energy

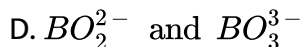
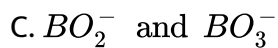
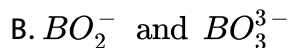
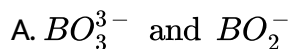
C. Its hydration energy is same as its ionisation energy

D. Al is amphoteric

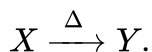
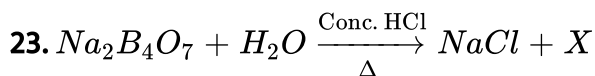
Answer: A

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22. Formulae of metaborate and borate ions respectively are



Answer: B

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The product Y in the reaction is

A. Crystalline B

B. Amorphous B

C. B_2O_3

D. H_3BO_3

Answer: B



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24. The products formed when boron trichloride is reduced with lithium aluminium hydride are

A. B_2H_6 and HCl

B. B_2H_6 and $AlCl_3$

C. BCl_3 and $AlCl_3$

D. B_2H_6 , $AlCl_3$ and $LiCl$

Answer: D



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25. Hot and concentrated solution of borax is treated with hydrochloric acid to give A and B. "B" on strong heating undergoes dehydration to give C. then "C" is

- A. An acidic oxide
- B. A basic oxide
- C. An amphoteric oxide
- D. Salt of a strong acid and strong base

Answer: A



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26. Some statements about the structure of diborane are given below

- (A) Studies have confirmed that four hydrogens of diborane are one type and remaining two are of another type
- (B) Diborane contains two coplanar BH_2 groups

(C) Diborane is a planar molecule

(D) Boron of diborane undergoes sp^2 hybridization The correct statements above are

A. Only A, B, C

B. Only A and B

C. Only B, C, D

D. All are correct

Answer: A



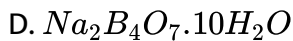
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27. In Borax bead test, which compound of the bead reacts with basic radical to form metaborate ?

A. B_2O_3

B. Na_2BO_3

C. $Na_2B_4O_7$



Answer: B



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28. Which of the following is a correct match?

- 1) Orthoboric acid - HBO_2
- 2) Metaboric acid - $\text{H}_6\text{B}_4\text{O}_7$
- 3) Pyroboric acid - H_3BO_3
- 4) Tetraboric acid - $\text{H}_2\text{B}_4\text{O}_7$

A. 1

B. 2

C. 3

D. 4

Answer: D



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29. The colour developed for Co^{2+} basic radical in borax bead test is

- A. green
- B. violet
- C. yellow
- D. blue

Answer: D



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30. In the formation of B-H-B bridge in diborane, the orbitals involved in overlapping are

- A. 1 s orbital of 'H' atom and one of the each sp^3 hybrid orbital of Boron atoms containing one electron each

- B. orbital of 'H' atom and one of the each vacant hybrid orbital of Boron atoms
- C. 1s orbital of 'H' atom and vacant orbital of one Boron and orbital of another boron containing one electron
- D. 1s orbital of 'H' atom and vacant orbital and orbital containing single electron of the same Boron atom

Answer: C



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ELEMENTS OF CARBON FAMILY

1. Some statements are given regarding IVA group elements

A) Order of Electronegativity :

$C > Si = Ge = Sn$ B) Order of Ionisation potential :

$C > Si > Ge > Pb > Sn$

C) Order of Melting point :



Correct orders of the above

A. A only

B. A,B only

C. B,C only

D. A,B,C

Answer: D



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2. The element with the least density among IVA group elements is

A. Diamond carbon

B. Silicon

C. Tin

D. Lead

Answer: B



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3. Silica is insoluble

A. HF

B. NaOH

C. KOH

D. HNO_3

Answer: D



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4. SiO_2 is solid while CO_2 is a gas at ordinary temperature. Explain.

- A. SiO_2 contains weak vander Waal attraction while CO_2 contains strong covalent bonds
- B. Solid SiO_2 has a three dimensional net work structure whereas CO_2 contains discrete molecules.
- C. Both contain strong covalent bonds
- D. Both contain weak vander Waal attraction

Answer: B



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5. The hybrid orbitals with 33.33% s-character are involved in the bonding of one of the crystalline allotropes of carbon. The allotrope is
- A. Carbon black
- B. Graphite
- C. Diamond

D. Gas carbon

Answer: B



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6. CO_2 is used for extinguishing fire because

- A. It has relatively high critical temperature
- B. In solid state, it is called dry ice
- C. It is neither combustible nor a supporter of combustion
- D. It is colourless gas

Answer: C



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7. Correct statements regarding silicones are

- a) They are used in the preparation of water proof clothes.
- b) They are organo silicon compounds.
- c) They are used in the preparation of grease and lubricants.
- d) They are used in paints and enamels.

A. a, b, c only

B. b, c, d only

C. a, b, d only

D. a, b, c, d

Answer: D



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8. Strongest oxidant among the following is

A. C^{+4}

B. Pb^{+4}

C. Si^{+4}

D. Ge^{+4}

Answer: B



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9. The allotropic forms of carbon showing conductivity are

A. Diamond

B. Diamond and Lamp balck

C. Gas carbon, petroleum coke and graphite

D. Gas carbon and animal charcoal

Answer: B



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10. L_1 is the length between two adjacent carbon atoms in a layer and L_2 is the length in-between two layers of graphite. The approximate ratio between L_1 and L_2

A. 1 : 1

B. 2 : 5

C. 5 : 2

D. 1 : 5

Answer: B



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11. Which of the following decomposes steam to form dioxide and dihydrogen gas ?

A. Sn

B. C

C. Si

D. Ge

Answer: A



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12. An acidic flux among the following is

A. CaO

B. MgO

C. SiO_2

D. CaH_2

Answer: C



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13. What is the covalency of silicon in H_2SiF_6 ?

A. 2

B. 4

C. 6

D. 8

Answer: C



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List -1

List -2

A) IVA group

1) Amorphous

14. B) Tridymite

2) Crystalline form of silica

C) Lubricant

3) ns^2np^2

4) Diamond

A. a)

A	B	C	D
2	4	3	5

B. b)

A	B	C	D
2	3	5	4

C. c)

A	B	C	D
4	2	3	5

D. d)

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

Answer: C



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15. Incorrect statement regarding CO_2 is

A. Cardice is the solid CO_2

B. Dry ice is used as refrigerant

C. CO_2 is used in making urea

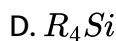
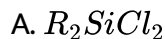
D. CO_2 is insoluble in water.

Answer: D



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16. Among the following substituted silanes the one which will give rise to cross linked silicone polymer on hydrolysis is



Answer: B



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17. Silicones are used as water proof materials because they have

A. hydrophobic alkyl groups

B. hydrophilic alkyl groups

C. strong Si - O bonds

D. Weak Si - O bonds

Answer: A



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18. When some of Si^{+4} in frame work silicates are replaced by Al^{+3} and an additional metal ion, it results in the formation of

- A. Zeolites
- B. Silicones
- C. Disilicates
- D. Glass

Answer: A



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19. The main common constituent of producer gas and water gas is

A. N_2

B. CO

C. CO_2

D. H_2

Answer: B



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20. The structure and hybridisation of $Si(CH_3)_4$ is ,

A. bent, sp

B. trigonal, sp^2

C. octahedral, sp^2d

D. tetrahedral, sp^3

Answer: D



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21. CO_2 and N_2 are non-supporters of combustion. However, for putting out fires CO_2 is preferred to N_2 because CO_2

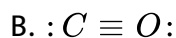
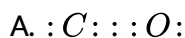
- A. Does not burn
- B. Forms non-combustible products with burning substances
- C. Is denser than nitrogen
- D. Is more reactive gas.

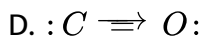
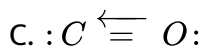
Answer: A



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22. Which of the following does not represent the correct resonance structure of carbon monoxide





Answer: D



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23. $PbCl_4$ exists, but $PbBr_4$ and PbI_4 do not. This is because of

A. Inability of bromine and iodine to oxidise Pb^{2+} to Pb^{4+}

B. Bromide and iodide are bigger in size

C. More electropositive character of Br_2 and I_2

D. Chlorine is a gas, but bromine is a liquid and iodine is a solid .

Answer: A



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24. Two tetravalent elements A and B form dioxides. Both react with NaOH to form similar salts. $\angle OAO$ is 180° . $\angle OBO$ is $109^\circ 28'$. Both are acidic in nature. A and B are respectively

- A. C and S
- B. S and Si
- C. C and Si
- D. Si and C

Answer: C



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25. Mark the oxide which is amphoteric in character

- A. CO_2
- B. SiO_2
- C. SnO_2

D. CaO

Answer: C



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26. Which of the following halides is least stable and has doubtful existence ?

A. CCl_4

B. GeI_4

C. SnI_4

D. PbI_4

Answer: D



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27. Example of crystalline solid .

A. Gas carbon

B. Charcoal

C. Coal

D. Graphite .

Answer: D



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28. In the penultimate shells, correct configurations of group 14 elements

A. Doublet in C, octet in Si

B. Doublet in C, doublet in Si

C. Octet in C, octet in Si

D. Octet in C, doublet in Si

Answer: A



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29. False among the following

- A. C forms monoxide
- B. C forms dioxide
- C. Si forms monoxide
- D. Si forms dioxide

Answer: A



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30. Carbon can not expand its valency beyond 4, because

- A. it has only 4 electrons

- B. it has only 4 shell
- C. it lacks valence p-orbitals
- D. it lacks valence d-orbitals

Answer: B



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GENERAL ORGANIC CHEMISTRY

1. The bond between carbon atom (1) and carbon atom (2) in compound

$N \equiv \overset{1}{C} - \overset{2}{C}H = CH_2$ involves the hybridization 1) sp and sp ? 2) sp and sp^2 ?

A. sp^2 and sp^2

B. sp^3 and sp

C. sp and sp^2

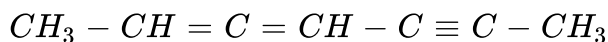
D. sp and sp

Answer: C



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2. The ratio of the number of sp , sp^2 and sp^3 orbitals in the compound is



A. 1 : 1 : 1

B. 2 : 2 : 1

C. 3 : 2 : 2

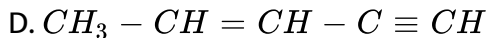
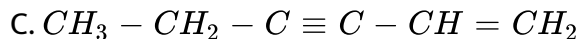
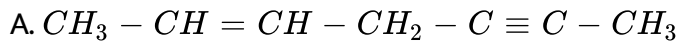
D. 3 : 3 : 4

Answer: D



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3. Which compound given below has sp^3 , sp^2 and sp orbitals in the ratio of 6:3:2



Answer: A



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4. The ratio of the number of sp, sp² and sp³ carbons in the compound given below is $H_2C = C = CH - CH_3$

A. 1:2:1

B. 2:1:1

C. 1:1:2

D. 1:2:3

Answer: A

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5. How many “methyl groups” are present in 2,3-dimethyl-4-ethyl heptane

A. 2

B. 8

C. 4

D. 5

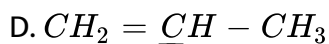
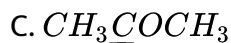
Answer: D

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6. In which of the following species is the underlined carbon having sp^3 hybridisation ?

A. $CH_3\underline{C}OOH$

B. $CH_3\underline{C}H_2OH$

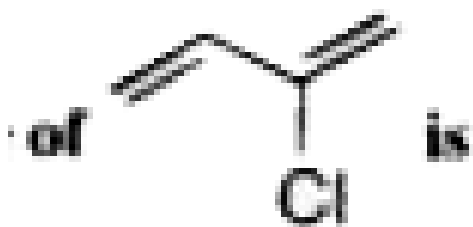


Answer: B



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7. Give the IUPAC name of



is

A. iso prene

B. 2- chloroprene

C. 2-methyl-1,3-butadiene

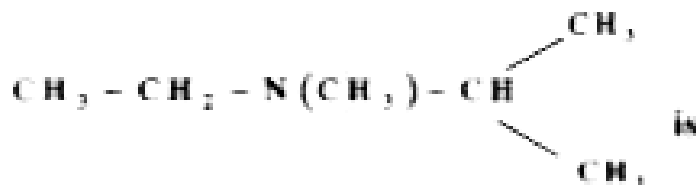
D. 2-chloro-1,3-butadiene

Answer: D



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8. IUPAC name of the compound



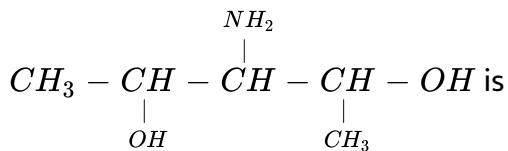
- A. a. N-ethyl-N-methyl isopropane
- B. b. N-ethyl-N-methyl amino propane
- C. c. N-ethyl-N-methyl-1-amino propane
- D. d. N-ethyl-N-methyl-2-propanamine

Answer: D



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9. IUPAC name of compound



- A. 3 - amino , 1 - methyl , 2 - hydroxy , - 1 - butanol
- B. 3 - amino - 4 - hydroxy - 2 - pentanol
- C. 3 - amino - 1 - methyl - 1, 3 - butanediol
- D. 3 - amino - 2, 4 - pentanediol

Answer: D



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10. $\text{CH}_3 - \text{CH}_2 - \text{CO} - \overset{\text{CN}}{\text{CH}} - \text{COOH}$ The IUPAC name of the compound is

- A. 3 - Ketonic - 2 - cyano pentanoic acid
- B. cyanoketohexanoic acid

C. 3 - oxo - 2 - cyano pentanoic acid

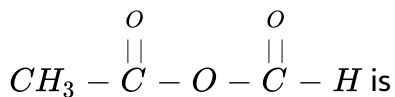
D. 2 - cyano - 3 - oxo - pentanoic acid

Answer: D



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11. The correct IUPAC name of



A. Acetyl methanoate

B. Keto ethanoate

C. Ethoxy methanoate

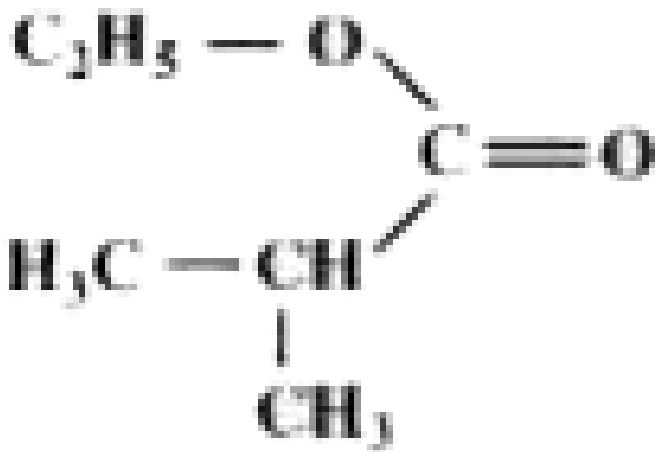
D. Formyl ethanoate

Answer: D



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12. The IUPAC name of

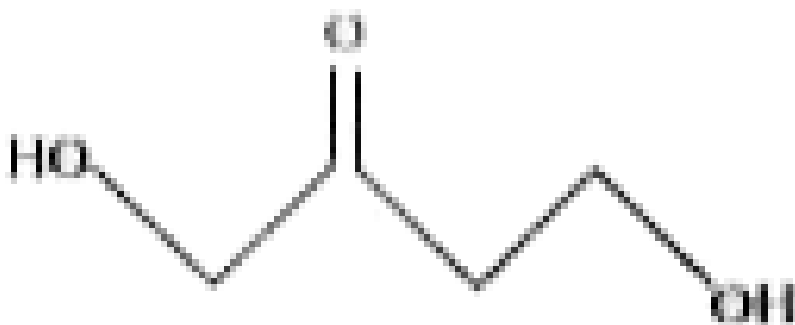


- A. Ethoxy methanone
- B. Ethoxy propanone
- C. Ethyl-2-methyl propanoate
- D. 2-methyl ethoxy propanone

Answer: C



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IUPAC

13.

name is

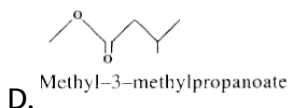
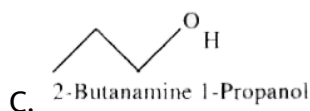
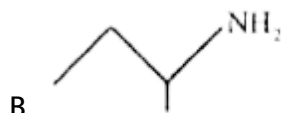
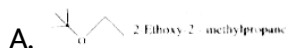
- A. 3-hydroxy butanoic acid
- B. 4-methyl-2-oxo-1,4 butane diol
- C. 1,4 dihydroxy - 2-butanone
- D. 1,4 dihydroxy - 2-pentanone

Answer: C



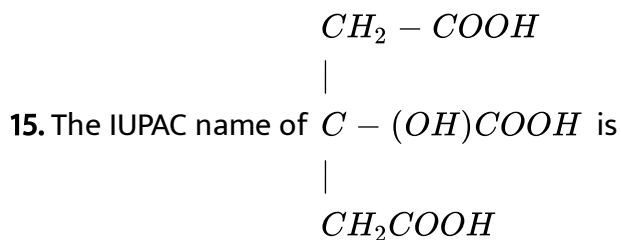
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14. Which of the following structures is not correctly named according of IUPAC ?



Answer: D

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A. 2-hydroxy-1,2,3-propanetricarboxylic acid

B. 3-hydroxy-1,2,3-pentane trioic acid

C. 3-carboxy-3-hydroxy-1,5-pentandioic acid

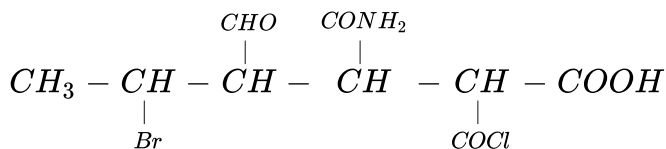
D. 1,2,3 - tri carboxy-2-propanol

Answer: A



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16. The IUPAC name of the given compound



A. 2-Bromo-4-carbamoyl-5-chloroformyl-3 - formyl hexanoic acid

B. 5-Bromo-3-carbamoyl-2-chloroformyl- 4 - formyl hexanoic acid

C. 4-Formyl-2-chloroformyl-3-carbamoyl - 5 - bromo hexanoic acid

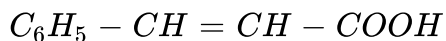
D. 2-Chloroformyl-3-carbamoyl-4-Formyl -5 bromo hexanoic acid

Answer: B



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17. IUPAC name of the compound having the formula



- A. 3-benzyl propanoic acid
- B. 3-phenyl propanoic acid
- C. 3-benzyl-2-propenoic acid
- D. 3-phenylprop-2-enoic acid

Answer: D



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18. The IUPAC name of the compound $CH_2(OH)CH(NH_2)COOH$ is

- A. 3-Amine-2-hydroxy propanoic acid
- B. 1-Hydroxy-2-amino propan-3-oic acid
- C. 3-Amino-2-hydroxy propanoic acid
- D. 1-Amino-2-hydroxy propanoic acid

Answer: C



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19. The IUPAC name of $CH_3CH_2OCH_2\overset{\overset{O}{\parallel}}{C}-H$ is

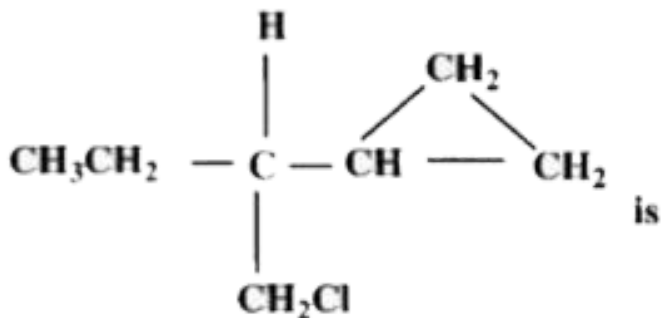
- A. Formyl methyl ethyl ether
- B. Ethyl aldo methyl ether
- C. 2-Ethoxyformate
- D. 2- Ethoxyethanal

Answer: D



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20. The correct IUPAC name of



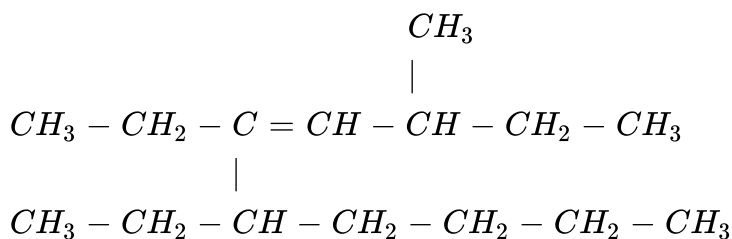
- A. 1-Chloro-2-butyl cyclo propane
- B. 1-Chloro-2-cyclopropyl butane
- C. 1-Chloro methyl-1-ethyl cyclo propane
- D. 3-Chloro methyl-1,2-methylene pentane

Answer: B



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21. Correct IUPAC name of



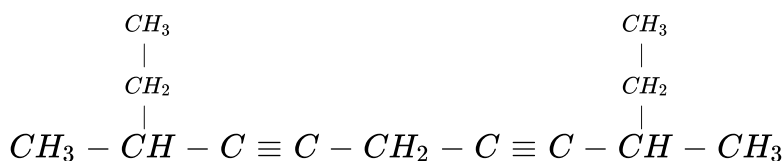
- A. 5,6 - Diethyl - 3 - methyldec - 4- ene
- B. 5,6 - Diethyl - 8 - methyldec - 6 - ene
- C. 6 - Butyl - 5 - ethyl - 3- methyl oct - 4- ene
- D. 2,4,5 - Triethy -3- nonene

Answer: A



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22. The correct IUPAC name of



A. 2, 8 - Diethyl - 3, 6 - nonadiyne

B. 1,5 -secondary butyl - 1, 4 - pentadiyne

C. 1,8 - dimethyl - 4, 7 - undecadiyne

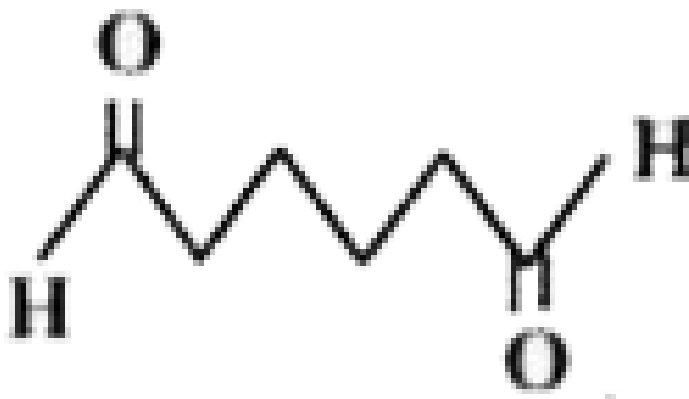
D. 3,9 - dimethyl - 4, 7 - undecadiyne

Answer: D



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23. Write IUPAC name of



A. 5 - Formylpentaneal

B. Hexanedial

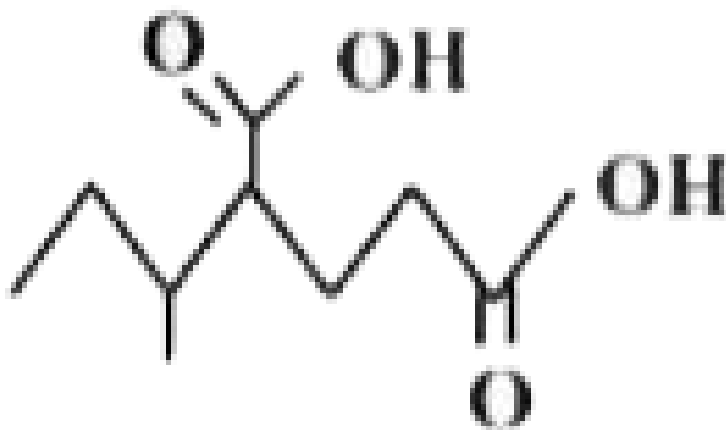
C. Hexanol

D. 2 - Methylhexeneal

Answer: B



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24.

IUPAC

name is

A. 4- Carboxy - 5- methyl heptanoic acid

B. 1,3 Dicarboxy , 4 - methyl hexane

C. 4-(1-Methyl propyl) - pentane dioicacid

D. 2-(1- Methylpropyl) - 1,5 - pentane dioicacid

Answer: D



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25. The IUPAC name of $Ph - \overset{\overset{O}{||}}{C} - CH_2 - CH_2 - CH_3$ is

- A. Phenyl propyl ketone
- B. 4 - Phenyl - 4 - butanone
- C. 1 - Phenyl - 1 - butanone
- D. 1 - Oxo - 1- butyl benzene

Answer: C



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26. The IUPAC name of $CH_3 - \overset{\overset{O}{||}}{C} - O - CH_2 - CH = CHCH_3$

A. 1- acetyloxy - 2 - butane

B. 4 - acetoxy 2 - butane

C. 2 - butenylethanoate

D. methy-2 - butanoate

Answer: C



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27. The IUPAC name of $\begin{array}{c} CH = CH \\ | \qquad | \\ CHO \quad NH_2 \end{array}$ is

A. 1-amino-2-propenol

B. 1-amino-2-formylethene

C. 3-aminopropenal

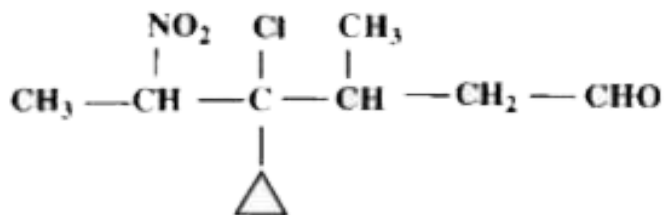
D. 1-oxo-3-propenamine

Answer: C



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28. IUPAC name of



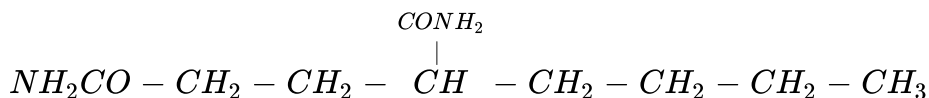
- A. 3-chloro-3-cyclopropyl-2-methyl-4-nitro hexanal
- B. 1-formyl-2-methyl-3-chloro-3 - cyclopropyl 4-nitro pentane
- C. 4-chloro -4-cyclopropyl-3-methyl-5-nitro hexanal
- D. 3-chloro-3-cyclopropyl-2-nitro-4-methyl hexanal

Answer: C



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29. The IUPAC name of compound



- A. 1,3-Dicarbamoylheptane
- B. 4-Carbamoyloctane
- C. 2-n-Butylpentanediamide
- D. 2-n-Butylpentanediaminoketone 30.

Answer: C



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30. The IUPAC name of the given compound



- A. Ethyl 1-butenate
- B. Ethyl-2-butenate

C. Ethyl propenoate

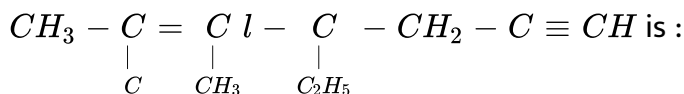
D. Propene ethyl methanoate

Answer: B



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31. The IUPAC name of



A. 6-Chloro-4-ethyl-5-methyl-5-hepten-1-yne

B. 5-Methyl-4-ethyl-6-chloro-5-hepten-1-yne

C. 6-Chloro-4-ethyl-5-methyl-1-hepten-5-yne

D. 2-Chloro-4-ethyl-3-methyl-hept-2-ene-6-yne

Answer: D



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32. The IUPAC name of the given structure $(CH_3)_2CH - CH(CH_3)_2$ is

A. 2,2-Dimethyl butane

B. Isohexane

C. 2,3-Dimethyl butane

D. Di isohexane

Answer: C



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33. The IUPAC name of the given structure $(CH_3)_4C$ is

A. Dimethyl propane

B. Tertiary butane

C. Neopentane

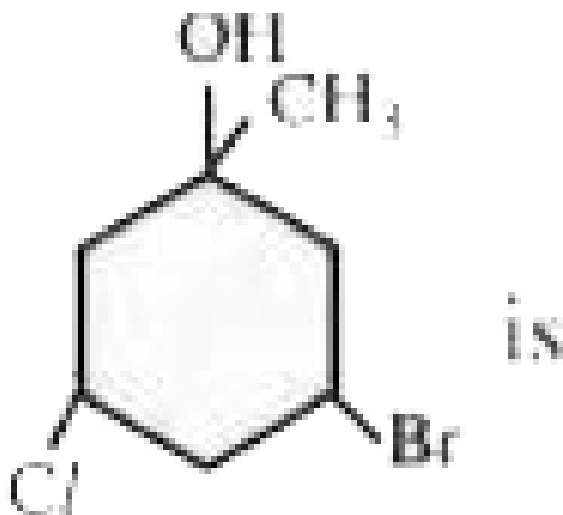
D. Neobutane

Answer: A



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34. The IUPAC name of the given compound



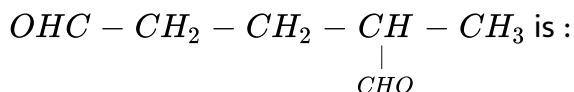
- A. 3-Bromo-5-chloro-1-methyl cyclohexanol
- B. 5-Bromo-3-chloro-1-methyl cyclohexanol
- C. 1-Bromo-5-chloro-3-methyl-3-cyclohexanol
- D. 5-Bromo-1-chloro-3-methyl-3- cyclohexanol

Answer: A



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35. The IUPAC name of the compound



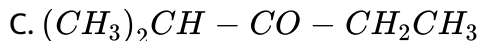
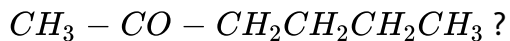
- A. 2-Formyl pentanal
- B. 2-Methyl pentanedial
- C. 2,4-Diformyl butane
- D. 1,3 - Diformyl butane

Answer: B



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36. Which organic structure among the following is not an isomer of the compound



Answer: B



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37. The total number of isomers (containing benzene ring) of molecular formula C_7H_8O is :

A. 2

B. 3

C. 4

D. 5

Answer: D



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38. The number of geometrical isomers of



A. 2

B. 4

C. 6

D. 8

Answer: D



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39. Number of isomers for the compound with the molecular formula



A. 3

B. 4

C. 5

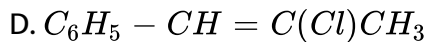
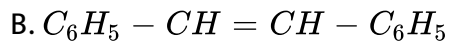
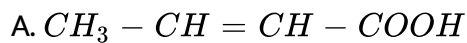
D. 6

Answer: D



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40. In which compound, cis-trans nomenclature cannot be used ?



Answer: D



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41. A similarity between optical and geometrical isomerism is that

- A. each forms equal number of isomers for a given compound
- B. if in a compound, one is present then so is the other
- C. both are included in stereoisomerism
- D. they have no similarity

Answer: C



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42. $OHC - (CHOH)_4 - CH_2OH$ has a primary alcoholic group at

- A. 1st carbon
- B. 2nd carbon
- C. 6th carbon

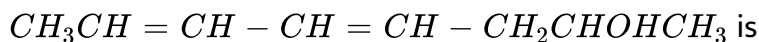
D. 4th carbon

Answer: C



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43. The number of isomers (geomctrical and optical) possible for the compound with the structure



A. 2

B. 4

C. 6

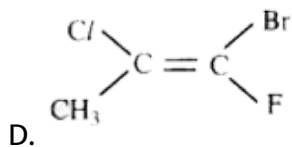
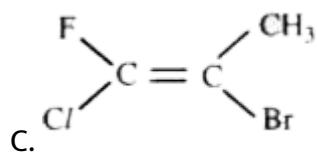
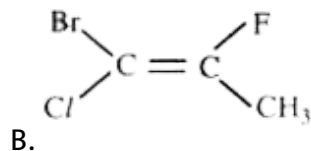
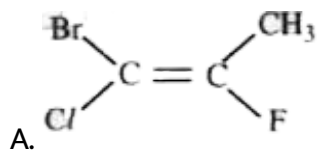
D. 8

Answer: B



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44. The correct structure for (E) 1-bromo-1-chloro-2-fluoropropene is



Answer: A



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45. Which of the following does not show geometrical isomerism ?

A. 1,2-dichloro-1-pentene

B. 1,3 - dichloro - 2 - pentene

C. 1,1 - dichloro - 1 - pentene

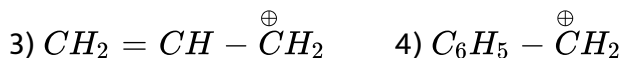
D. 1,4 - dichloro - 2 - pentene

Answer: C



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46. Consider the following carbocations :



Stability of these carbonions in decreasing order is

A. $4 > 3 > 2 > 1$

B. $4 > 3 > 1 > 1$

C. $3 > 4 > 2 > 1$

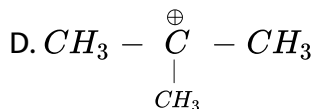
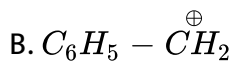
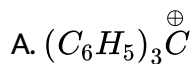
D. $3 > 4 > 1 > 2$

Answer: A



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47. Which among the following carbocations is most stable :



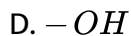
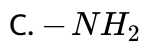
Answer: A



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48. Which of the following has no-I power

A. CN

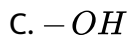
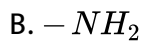
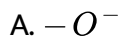


Answer: C



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49. $+R$ power is not possessed by given groups



Answer: D



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50. Propylene containssigma andpi bonds

A. 8,1

B. 5,1

C. 8,2

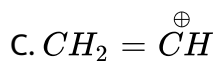
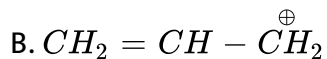
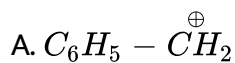
D. 5,2

Answer: A



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51. Which one of the following is vinyl carbocation



D. All of these

Answer: C



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52. Correct IUPAC name of



is

A. 2,4,6-cycloheptatriene

B. 1,3,5-cycloheptatriene

C. symmetrical heptatriene

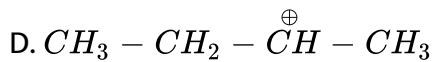
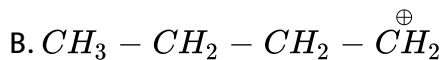
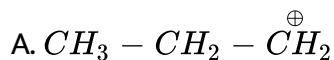
D. Heptacyclocotriene

Answer: B



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53. Which among the following carbocations is most stable :

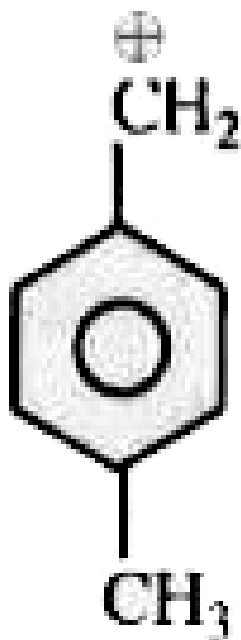


Answer: D

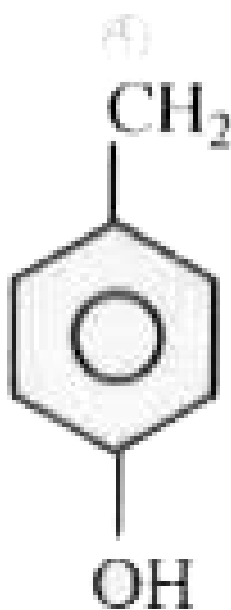


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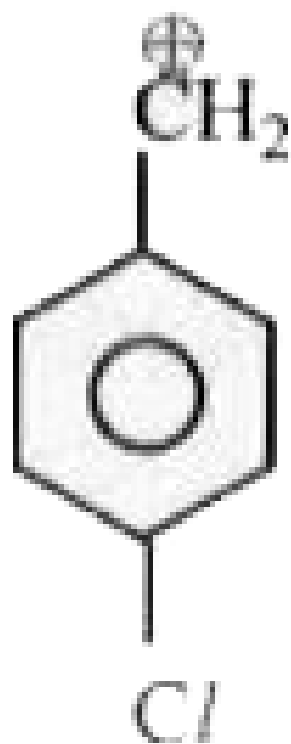
54. Which carbocation is the most stable ?



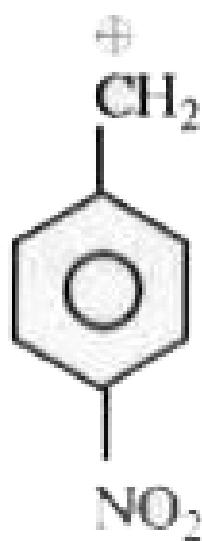
A.



B.



C.

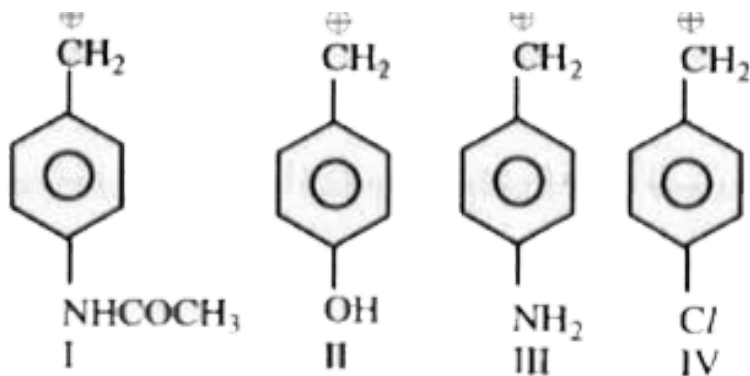


D.

Answer: D

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55. Arrange stability of the given carbocations in creasing order



A. $I > II > III > IV$

B. $III > II > I > IV$

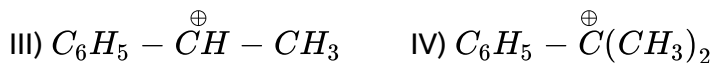
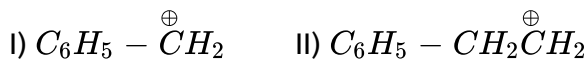
C. $IV > I > II > III$

D. $II > III > I > IV$

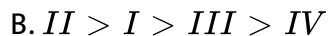
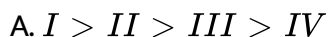
Answer: B

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56. Consider the following carbocations



The correct sequence of stabilities is :



Answer: B



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57. Benzoic acid mixed with naphthalene can be purified by

A. Treating the mixture with hot water

- B. Sublimation
- C. Treating the mixture with cold water
- D. Dissolving the mixture in benzene

Answer: D



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58. Lassaigne's solution is boiled with HNO_3 before testing for halogens because

- A. Silver halides are insoluble in HNO_3
- B. Na_2S and $NaCN$ are decomposed by HNO_3
- C. Ag_2S is soluble in HNO_3
- D. $AgCN$ is soluble in HNO_3

Answer: A



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59. Turpentine oil can be purified by:

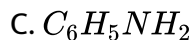
- A. Steam distillation
- B. Vacuum distillation
- C. Simple distillation
- D. Fractional distillation

Answer: A



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60. For which of the following compounds the Lassaigne's test of nitrogen will fail?



D. CH_3CONH_2

Answer: B



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61. If 0.02 g of a volatile compound on heating displaces 11.2 ml of dry air at STP, the molecular weight of the compound is

A. 20

B. 30

C. 40

D. 50

Answer: C



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62. Kjeldahl's method cannot be used for the estimation of nitrogen in

- A. Pyridine
- B. Nitro compounds
- C. Azo compounds
- D. All the three above

Answer: D



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63. Sugar containing an impurity of common salt can be purified by crystallisation from

- A. Benzene
- B. Ether
- C. Alcohol
- D. Water

Answer: A



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64. The total number of cyclic isomers possible for a hydrocarbon with the molecular formula C_4H_6 is

A. 2

B. 5

C. 6

D. 8

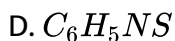
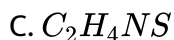
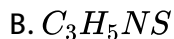
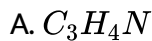
Answer: B



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65. A compound has C, H, N & S. The weight percentages of C & H are 41.37 and 5.75 respectively. On Kjeldahlising, the ammonia obtained from 1.01 g

of the substance was neutralised by 11.6 ml of 1N HCl. In Carius method 0.2066 g of the substance gave 0.5544 g of $BaSO_4$. The molecular formula of the compound is



Answer: B



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ACYCLIC HYDROCARBONS

1. Hydrolysis of Carbide , we get methane

A. Calcium

B. Beryllium

C. Aluminium

D. Both Be and Al

Answer: D



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2. Which of the following reactions can be used to prepare methane?

A. Decarboxylation of sodium acetate

B. Kolbe's electrolysis

C. Wurtz reaction

D. Hydrogenation of alkenes

Answer: A



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3. Methyl magnesium iodide reacts with ethyl alcohol to produce

- A. Ethane
- B. Methane
- C. Propane
- D. Ether

Answer: B



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4. The volume of methane at N.T.P. formed from 8.2 g. of sodium acetate by fusion with soda lime is

- A. 10 lit
- B. 11.2 lit
- C. 5.6 lit
- D. 2.24 lit

Answer: D



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5. What hydrocarbon is formed as byproduct during the chlorination of methane? Explain.

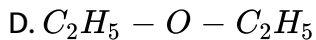
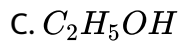
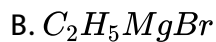


Answer: A



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6. Which of the following reacts with water to give ethane ?



Answer: B



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7. What is the minimum quantity (in grams) of methyl iodide required for preparing one mole of ethane by Wurtz reaction ?

(Atomic weight of iodine = 127)

A. 142

B. 568

C. 326

D. 284

Answer: D



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8. Aromatisation of n-hexane gives

A. Benzene

B. Toluene

C. Methane

D. A mixture of octanes

Answer: A



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9. The reaction $C_8H_{18} \rightarrow H_4H_{10} + C_2H_4 + CH_4 + C$ represents

A. Synthesis

B. Isomerisation

C. Cracking

D. Catalytic oxidation

Answer: C



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10. Reaction of alkanes with halogen is explosive in case of

A. F_2

B. Cl_2

C. Br_2

D. I_2

Answer: A



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11. Which of the following hydrocarbons is a liquid at room temperature ?

A. Ethene

B. Ethane

C. Hexane

D. Butane

Answer: C



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12. Cracking is a process in which

A. Petrol is produced by cracks on the surface of wax

B. Combustion of petrol is carried out

C. Compounds of high molecular mass are converted into compounds
of lower molecular mass

D. None of the statements is correct.

Answer: C



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13. Which of the following reagents can be employed for isomerisation of n-butane?

A. HI/P

B. $Al_2Cl_6 / HCl_{(g)}$

C. $LiAlH_4$

D. None

Answer: B



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14. The reaction $CH_3 - CH_2 - CH_2 - CH_3 \xrightarrow[AlCl_3]{HCl \text{ Gas}}$

$CH_3 - \underset{\substack{| \\ CH_3}}{CH} - CH_3$, is an example of

- A. Isomerisation
- B. Polymerisation
- C. Cracking
- D. Dehydrogenation

Answer: A



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15. Iodination of alkane is carried out in the presence of

- A. Alcohol
- B. NHO_3 or HIO_3
- C. Any reducing agent

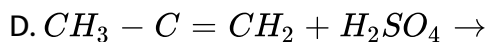
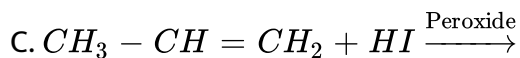
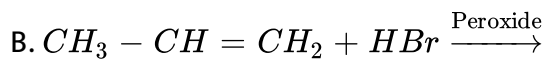
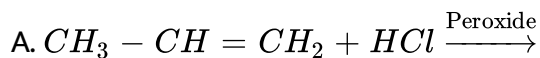
D. Benzene

Answer: B



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16. In which of the following reactions, anti Markownikoff's rule is observed?



Answer: B



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17. The Kolbe's electrolysis proceeds via

- A. Nucleophilic substitution mechanism
- B. Electrophilic addition mechanism
- C. Free radical mechanism
- D. Electrophilic substitution mechanism

Answer: C



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18. Which of the following statements is correct?

- A. C-D bond is slightly weaker than C-H bond
- B. C-D bond is slightly stronger than C-H bond
- C. Both C-H & C-D bonds are equally strong

D. Replacement of D in C-D by Cl is faster than the replacement of H in C-H

Answer: B



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19. Propene + $HBr \xrightarrow{C_6H_5COOOCO-C_6H_5}$ A. A is ?

A. n-Propyl bromide

B. Isopropyl bromide

C. Allyl bromide

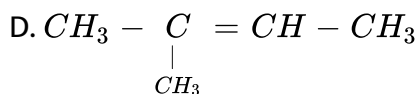
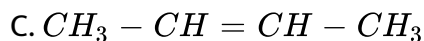
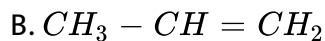
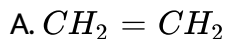
D. $C_6H_5COOOCOC_6H_5$

Answer: A



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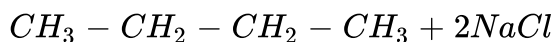
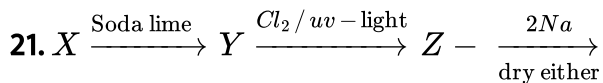
20. Addition of Br, takes place readily with



Answer: D



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Then X, Y and Z include

A. Sodium ethanoate, ethane and ethyl chloride

B. Sodium propanoate, ethane and methyl chloride

C. Sodium butanoate, ethane and ethyl chloride

D. Sodium propanoate, ethane and ethyl chloride

Answer: D



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22. n - Propyl chloride and isopropyl chloride mixture is subjected to the Wurtz reaction, which one of the following compounds is not formed

A. hexane

B. 2, 5-dimethyl hexane

C. 2, 3 - dimethyl butane

D. 2 - methyl pentane

Answer: B



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23. Addition of HBr to propene gives 2 - bromo propane, this reaction is initiated by



Answer: A



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24. A gaseous mixture containing two hydro carbons X & Y of volume 44.8 lit (STP) when passed through ammonical Cu_2Cl_2 has suffered a reduction in volume of about 11.2 lit. If remaining volume is due to Y, X is

A. Butyne-2

B. Ethene

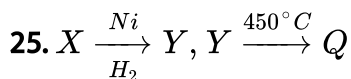
C. Ethane

D. Propyne

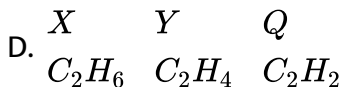
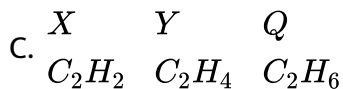
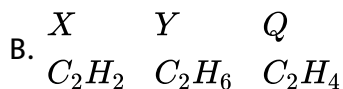
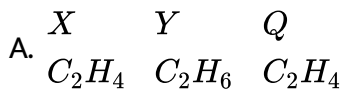
Answer: D



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Here X,Y and Q are gaseous hydrocarbons, then X, Y and Q respectively are



Answer: B



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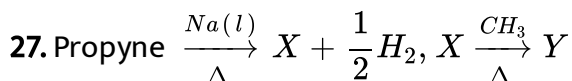
26. Anti Markownikoff's addition of HBr is not observed in

- A. 1 - butene
- B. 1 - pentene
- C. Propane
- D. 2 - butene

Answer: D



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Which of the following reagents can be used to distinguish Y from propyne?

- A. $NH_4OH + AgNO_3$ (or) cold alk $KMnO_4$
- B. $NH_4OH + Cu_2Cl_2$ (or) Br_2 / CCl_4

C. Cold alk, $KMnO_4$ (or) Br_2 / CCl_4

D. $NH_4OH + AgNO_3$ (or) $NH_4OH + Cu_2Cl_2$

Answer: D



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28. The common method used to prepare ethane is X, while ethene and ethyne is Y. Now, X and Y respectively are

A. decarboxylation , Wurtz reaction

B. Kolbe's electrolysis , Sabatier reaction

C. Kolbe's electrolysis , dehydrohalogenation

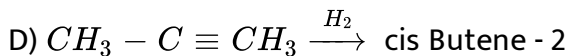
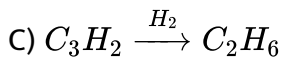
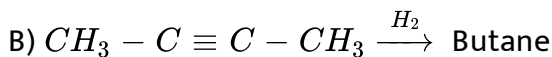
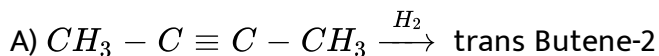
D. Kolbe's electrolysis , decarboxylation

Answer: C



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29. Lindlar's catalyst cannot be used to carry out the following process



A. A only

B. A, B and D only

C. A, B and C only

D. A, C and D only

Answer: C



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30. Ethene on ozonolysis yields X. To prepare successive homologue of X, which of the following should be subjected to ozonolysis?

A. Butene - 1

B. Hexene - 3

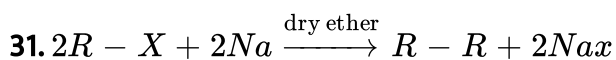
C. Butyne - 2

D. Butene - 2

Answer: D



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Which of the following alkanes is not obtained by Wurtz reaction ?

A. Methane

B. Ethane

C. Propane

D. Butane

Answer: A



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32. Ozonolysis products of 3,4-dimethyl hept-3-ene are

- A. 2-butanone and 3-pentanone
- B. Butanone and 2-pentanone
- C. 3-butanone and 2-pentanone
- D. Butanal and 2-pentanone

Answer: B



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33. Benzaldehyde and propionaldehyde are the ozonolysis products of

- A. 2-phenylbut-2-ene
- B. 2-phenylbut-1-ene
- C. 1-phenylbut-1-ene
- D. 1-phenylbut-2-ene

Answer: C



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34. Ozonolysis products of 2-ethylbut-1-ene are

- A. Methanal and 3-pentanone
- B. Methanal and 2-pentanone
- C. Ethanal and 2-butanone
- D. Ethanal and 3-pentanone

Answer: A



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35. IUPAC name of the alkene which contains three C-C, eight C-H σ bonds are one $C - C\pi$ bond and gives two moles of an aldehyde of molar mass 44u on ozonolysis

- A. 3-Hexene
- B. 2-Butene
- C. 2-pentene
- D. 1-Butene

Answer: B



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36. IUPAC name of the alkene which gives a mixture of ethanal and pentan-3-one as ozonolysis products

- A. 2-Ethylpent-2-ene
- B. 3-ethylpent-3-ene
- C. 2-Ethylpent-3-ene
- D. 3-Ethylpent-2-ene

Answer: D

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37. Number of moles of oxygen required for the combustion of hexyne and toluene respectively are

A. 8 and 9

B. $\frac{17}{2}$ and 8

C. $\frac{17}{2}$ and 9

D. 9 and $\frac{17}{2}$

Answer: C

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38. $CH_3C \equiv C - CH_3 \xrightarrow[Ni]{H_2} P \xrightarrow{KMnO_4 / H^+} Q$. Here Q is

A. Alkane

B. Alkene

C. Aldehyde

D. Carboxylic acid

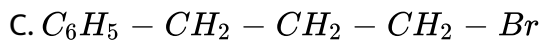
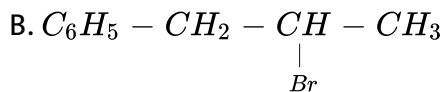
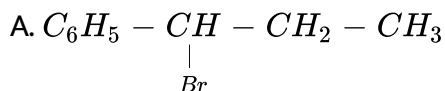
Answer: D



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39. Product of addition of HBr on the alkene

$C_6H_5 - CH = CH - CH_3$ is



Answer: A



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1. $x \xrightarrow[\text{boil}]{\text{dil. } H_2SO_4} Y \xrightarrow[\Delta]{\text{Zn dust}} Q$ where if 1 made Y on ozonolysis yields three moles of ethane - 1, 2-dial, X and Q respectively are

- A. Napthalen : Phenol
- B. Benzene sulphonic acid : Nitrobenzene
- C. Benzene sulphonic acid : Phenol
- D. Phenol : Toluene

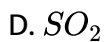
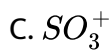
Answer: C



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2. Active species involved in the process $C_6H_6 \rightarrow C_6H_5SO_3H$ is

- A. SO_3
- B. HSO_4^-

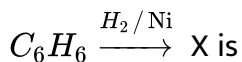


Answer: A



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3. Number of $\sigma sp^2 - sp^2$ bonds present in a molecule of X in the process



A. 6

B. 3

C. 12

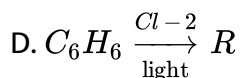
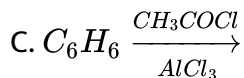
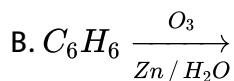
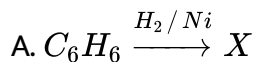
D. Zero

Answer: D



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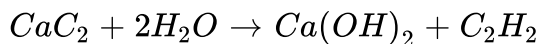
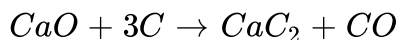
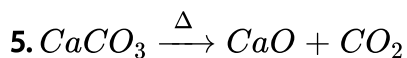
4. In which of the following reactions, aromatic character is retained ?



Answer: C



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The weight of $CaCO_3$ needed for the preparation of 2.24 lit of Acetylene gas under S.T.P conditions is

A. 10 g

B. 20 g

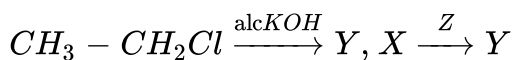
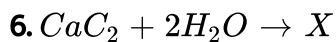
C. 5 g

D. 2 g

Answer: A



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In this reaction the reagent 'Z' is

A. Ni / H_2

B. $LiAlH_4$

C. $H_2 - Pd + BaSO_4$

D. $(Zn - Hg) + conc. HCl$

Answer: C



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7. C_6H_6 easily shown

- A. Ring fission reaction since it is unstable
- B. Addition reactions since it is saturated
- C. Electrophilic substitution reactions due to stable ring
- D. Nucleophilic substitution reactions due to stable ring

Answer: C



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8. The correct arrangement for decreasing order of electrophilic Substitution reactions of

I) Toluene II) Benzene

III) Phenol IV) Chlorobenzene

A. $I > II > III > IV$

B. $IV > I > II > III$

C. $III > I > II > IV$

D. $II > IV > III > I$

Answer: C



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LIST - 1

(Conversion)

A) Benzene \rightarrow
Cyclohexane

B) Ethylene \rightarrow
Formaldehyde

C) Acetylene \rightarrow
Ethylene

D) Benzene \rightarrow Toluene

LIST - 2

(Process involved)

1) Hydration

2) Controlled
hydrogenation

3) Hydrogenation

4) Ozonolysis

5) Alkylation

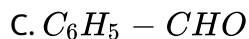
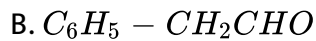
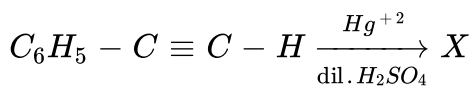
- A. $\begin{array}{cccc} A & B & C & D \\ 5 & 4 & 1 & 2 \end{array}$
- B. $\begin{array}{cccc} A & B & C & D \\ 1 & 2 & 3 & 4 \end{array}$
- C. $\begin{array}{cccc} A & B & C & D \\ 3 & 4 & 2 & 5 \end{array}$
- D. $\begin{array}{cccc} A & B & C & D \\ 4 & 3 & 2 & 1 \end{array}$

Answer: C



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10. What 'X' in the following reaction ?

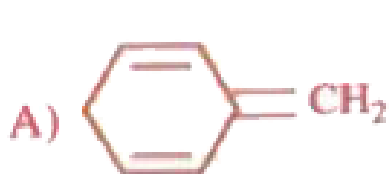


Answer: A



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11. Among the following compounds, which are not aromatic ?



A. A,B and C

B. A , C and D

C. A , B and D

D. C and D

Answer: B



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12. Ozonolysis of one mole of benzene gives

- A. One mole glyoxal and two moles methyl glyoxal
- B. three moles of glyoxal
- C. one mole methylglyoxal and two moles glyoxal
- D. three moles of methyl glyoxal

Answer: B



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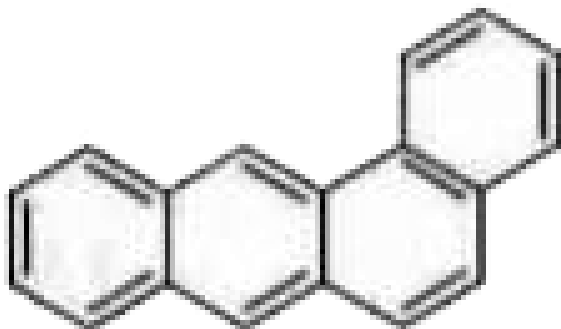
13. Ethyl benzene with Br_2 in the presence of $FeBr_3$ gives

- A. Phenyl bromoethane
- B. o and p-bromotoluenes
- C. o and p-bromo ethyl benzenes
- D. Mixture of all these

Answer: C



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is

14. Name of

- A. a. 1,2 - benzpyrene
- B. b. 1,2,5,6 - Dibenzanthracene
- C. c. 3 - methyl cholanthrene
- D. d. 1, 2 - benzanthracene

Answer: D



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15. n - Butyl benzene on oxidation with $KMnO_4$ gives

- A. Benzoic acid
- B. Butanoic acid
- C. Benzyl alcohol
- D. Benzaldehyde

Answer: B



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16. Which of the following is correct regarding aromatic nature ?

- A) Benzene
- B) Cyclopropane anion
- C) Cyclopentadienyl cation
- D) Cycloheptatrienyl anion

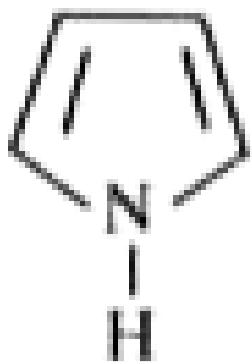


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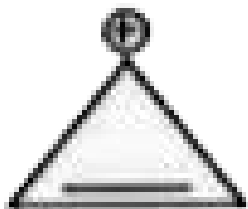
17. Which of the following is not an aromatic compound ?



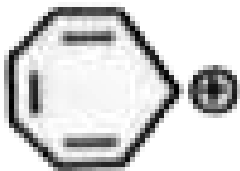
A.



B.



C.



D.

Answer: A



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18. Regarding Benzene some statements are given

- A) It is aromatic
- B) It burns with smoky and sooty flame
- C) It can't decolourise Br_2 water
- D) It mainly participates in electrophilic substitution reactions

A. Both 'A' and 'B' are correct

B. Both 'B' and 'C' are correct

C. Both 'C' and 'D' are correct

D. All are correct

Answer: D



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19. Sodium benzoate gives Benzene on being heated with 'X'. Phenol gives Benzene on being heated with 'Y'. 'X' and 'Y' are respectively,

- A. Sodalime and copper
- B. Zn dust and NaOH
- C. Soda lime and Zn dust
- D. NaOH and Zn dust

Answer: C



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20. The major product in the reaction of benzene with n-propyl chloride in the presence of anhydrous $AlCl_3$

- A. n-propyl benzene
- B. Isopropyl benzene
- C. Toluene
- D. Ter.butyl benzene

Answer: B



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21. Cyclohexene adds one mole of H_2 , where the enthalpy of hydrogenation is $-119.6 \text{ kJ mol}^{-1}$. The enthalpy of cyclohexatriene is about

- A. $-119.6 \text{ kJ mol}^{-1}$
- B. $-203.3 \text{ kJ mol}^{-1}$
- C. $-239.2 \text{ kJ mol}^{-1}$
- D. $-358.8 \text{ kJ mol}^{-1}$

Answer: D



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22. Number of delocalised electrons in C_6H_6 molecule is

A. 9

B. 6

C. 4

D. 3

Answer: B



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STOICHIOMETRY

1. Hydrogen combines with oxygen to form H_2O in which 16 g of oxygen combine with 2g of hydrogen . Hydrogen also combines with carbon to form CH_4 in which 2 g of hydrogen combine with 6 g of carbon . If carbon and oxygen combine together then they will do show in the ratio of

A. 6: 16 or 12: 32

B. 6: 18

C. 1: 2

D. 12: 24

Answer: A



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2. n g of substance X reacts with mg of substance Y to form p g of substance R and q g of substance S . This reaction can be represented as ,

$X + Y = R + S$. The relation which can be establish in the amounts of the reactants and the products will be

A. $n - m = p - q$

B. $n + m = p + q$

C. $n = m$

D. $p = q$

Answer: B



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

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

A. 1.8×10^{22}

B. 1.8×10^{23}

C. 1.2×10^{21}

D. 6×10^{23}

Answer: A



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4. Two elements X and Y have atomic weight of 14 and 16 . They form a series of compounds , A , B , C with fixed mass of X , Y is present in the ratio 1 : 2 : 3 : 4 : 5 . If the compound A has 28 parts by weight of X and 16 parts by weight of Y , then the compound C will have 28 parts by weight of X and

A. 32 parts by weight of Y

B. 48 parts of weight of Y

C. 64 parts by weight of Y

D. 80 parts of weight of Y

Answer: B



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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 number of molecules in one litre of water is (density of water = 1g/mL)

A. $6 \times 10^{23} / 22.4$

B. 3.33×10^{25}

C. 3.33×10^{23}

D. 3.33×10^{24}

Answer: B



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7. 48 g of Mg contains the same number of atoms as 160 g of another element . The atomic mass of the element is

A. 24

B. 320

C. 80

D. 40

Answer: C



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8. The number of water molecules in a drop of water weighing 5 mg is

A. 6.023×10^{72}

B. 3.0125×10^{21}

C. 1.67×10^{20}

D. 1.67×10^{21}

Answer: C



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9. The mass of 1.5×10^{20} molecules of a substance is 20 mg . The molar mass of substance is

A. 20 g

B. 40 g

C. 80 g

D. 80 a.m.u

Answer: C



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10. If 0.5 mol of $BaCl_2$ is mixed with 0.2 mol of Na_3PO_4 the maximum number of moles of $Ba_3(PO_4)_2$ that can be formed is

A. 0.7

B. 0.5

C. 0.30

D. 0.10

Answer: D



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11. 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)_____

A. 1.2×10^{24}

B. 2.24×10^{24}

C. 1.2×10^{13}

D. 2.4×10^{23}

Answer: A



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12. Bell metal contains 80% copper . The mass of Bell metal which contain 1.5×10^{20} atoms of copper is (Cu = 64)

A. 2 mg

B. 20 mg

C. 40 mg

D. 12.8 mg

Answer: B



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13. The ratio between the number of atoms in equal volumes of oxygen and ozone under the same conditions is

A. 3 : 2

B. 2 : 3

C. 1 : 1

D. 1 : 2

Answer: B



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14. If 0.740 g of O_3 reacts with 0.670 g of NO , how many gram of NO_2 will be produced ?

A. 0.71 g

B. 0.74 g

C. 0.68 g

D. 0.81 g

Answer: A



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15. 1 mole of each of $Ca(OH)_2$ and H_3PO_4 are allowed to react under dilute conditions . The maximum number of moles of $Ca_3(PO_4)_2$ formed is

A. 1

B. $1/2$

C. $1/3$

D. 3

Answer: C



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16. The mass of 1.5×10^{26} molecules of a substance is 16 kg . The molecular mass of the substance is

A. 64 g

B. 64 a.m.u.

C. 16 a.m.u.

D. 32 a.m.u.

Answer: B



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17. One atom of mercury has a mass of 333×10^{-24} g . Its atomic weight is

A. 200 a.m.u.

B. 200 g

C. 180

D. 333×10^{-24} g

Answer: A



Watch Video Solution

18. The element 'A' and 'B' combine together to give two compounds A_2B_3 and AB_2 . The weight of 0.2 mole of A_2B_3 is 26 gm. The weight of 0.3 mole of AB_2 is 24 g m. Then the atomic weight of A and B respectively

A. 15 , 20

B. 20 , 25

C. 20 , 30

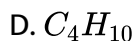
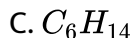
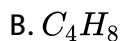
D. 25 , 30

Answer: C



Watch Video Solution

19. 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



Answer: D



Watch Video Solution

20. 0.2 mole of an alkane on complete combustion gave 26.4g of CO_2 .

The molecular weight of alkane is

A. 16

B. 30

C. 44

D. 58

Answer: C



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21. 0.4g of a compound on complete combustion gave 56ml of CO_2 at 760mm and $0^\circ C$. The percentage of carbon in the compound is

A. 50

B. 60

C. 27.5

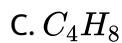
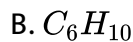
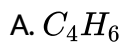
D. 7.5

Answer: D



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22. 10ml of an alkane on complete combustion gave 40ml of CO_2 under the same conditions. The formula of the alkane is

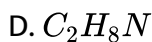
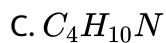
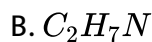
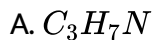


Answer: D



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23. A compound on analysis was found to contain 53.33 % C , 15.5 % H , and the rest nitrogen . The formula of the compound is

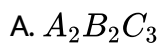


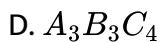
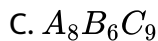
Answer: B



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24. The relative number of atoms of different elements in a compound are as follows , A = 1.33 , R = 1 and C = 1.5 . The empirical formula of the compound is





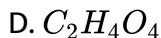
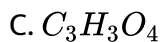
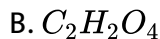
Answer: C



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25. 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



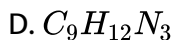
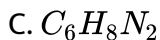
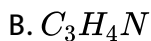
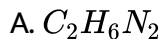
Answer: B



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26. In a compound C , H and N atoms are present in 9: 1: 3.5 by weight .

Molecular weight of compound is 108. Molecular formula of compound is

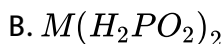


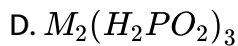
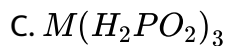
Answer: C



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27. The formula of metal phosphite is $MHPO_3$, the formula of the metal hypophosphite is





Answer: B



Watch Video Solution

28. 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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29. One mole of N_2H_4 loses 10 moles of electrons to form a new compound X . Assuming that all the nitrogen appears in the new compound , the oxidation state of nitrogen in X is (there is no change in the oxidation number of hydrogen)

A. -1

B. -3

C. $+3$

D. $+5$

Answer: C



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

A. 16 L

B. 11.2 L

C. 1.12 L

D. 5.6 L

Answer: B



Watch Video Solution

31. If 5 ml of methane is completely burnt the volume of oxygen required and the volume of CO_2 formed under the same conditions are

A. 5 ml , 10 ml

B. 10 ml , 5 ml

C. 5 ml , 15 ml

D. 10 ml , 10 ml

Answer: A



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32. 4g of mixture of Na_2CO_3 and $NaHCO_3$ on heating liberates 448 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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33. 200ml of pure oxygen is subjected to electric discharge, 15% of oxygen is converted into ozone. The volume of ozonized oxygen is

A. 20 ml

B. 30 ml

C. 190 ml

D. 80 ml

Answer: C



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34. 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

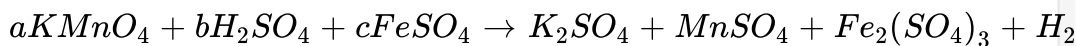
D. 50

Answer: C



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35.



. In this unbalanced stoichiometric equation the values of a , b and c respectively are

A. 2, 8, 10

B. 1, 4, 10

C. 2, 10, 8

D. 2, 8, 16

Answer: A



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

A. 0 and -1

B. -1 and -2

C. -2 and 0

D. -2 and $+1$

Answer: B



Watch Video Solution

37. Calculate the oxidation number of iron in Fe_3O_4 ?

A. $1/2$

B. $2/6$

C. $8/3$

D. $3/2$

Answer: C



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38. In the reaction

$Cr_2O_7^{2-} + 14H^+ + 6I^- \rightarrow 2Cr^{3+} + 3H_2O + I_2$ Which element is reduced?

A. H

B. Cr

C. O

D. I

Answer: B



Watch Video Solution

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

A. 1.6

B. 0.8

C. 3.2

D. 0.4

Answer: D



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40. 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



Watch Video Solution

41. 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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42. 1 lit of oxygen and 3 lit of SO_2 at STP are reacted to produce sulphur trioxide. Then the ratio of between volume of sulphur trioxide and that of sulphur dioxide after reaction and weight of SO_3 formed (in grams) respectively are

A. 1: 2, 7.14 gms

B. 2: 1, 14.28 gms

C. 1: 1, 7.14 gms

D. 1: 1, 14.28 gms

Answer: C



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43. Number of moles of electrons shared in the formation of a dioxygen molecule .

A. 2

B. 4

C. $4 \times 1.6 \times 10^{-24}$

D. $4 \times 6 \times 10^{-23}$

Answer: C

 [Watch Video Solution](#)

44. The charge present on one mole of azide ion (in Faradays)

A. 1

B. 2

C. 3

D. 6

Answer: A

 [Watch Video Solution](#)

45. On heating 4.9 g of $KClO_3$, it shows a weight loss of 0.384 g . What percentage of $KClO_3$ has decomposed ?

A. 83.6 %

B. 75 %

C. 41.8 %

D. 20 %

Answer: D



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46. 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. 55.8 %

B. 44.2 %

C. 84 %

D. 16 %

Answer: D



Watch Video Solution

47.7 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



Watch Video Solution

48. 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 lit

C. 2.24 L

D. 3.36 L

Answer: B



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49. 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. 0.2

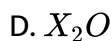
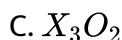
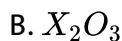
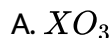
D. 0.4

Answer: A



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50. 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



Answer: A



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51. 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



Watch Video Solution

52. 0.8 mole of a mixture of CO and CO_2 requires exactly 40 g of NaOH in solution for complete conversion of all the CO_2 into Na_2CO_3 . How many more moles of NaOH would it require for conversion into Na_2CO_3 . If the mixture is completely oxidised to CO_2 ?

A. 80 gm

B. 60 gm

C. 40 gm

D. 20 gm

Answer: B



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53. A sample of calcium carbonate ($CaCO_3$) has the following percentage composition : Ca = 40 % C = 12 % , O = 48 % . If the law of constant proportions is true , then the weight of calcium in 4 g of a sample of calcium carbonate from another source will be

A. 0.016 g

B. 0.16 g

C. 1.6 g

D. 16 g

Answer: C

[Watch Video Solution](#)

54. 8 g of sulphur is burnt to form SO_2 which is oxidised by chlorine water . The solution is treated with $BaCl_2$ solution . The amount of

$BaSO_4$ precipitated is

- A. 1 mole
- B. 0.5 mole
- C. 0.25 mole
- D. 0.125 mole

Answer: C



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55. 0.2 gram -mole of an unsaturated hydrocarbon on complete combustion produces 26.4 g of CO_2 . The molecular weight of the hydrocarbon is

- A. 42
- B. 88
- C. 46

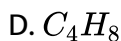
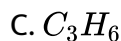
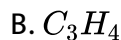
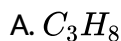
D. 30

Answer: A



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56. 10 ml of a gaseous hydrocarbon is mixed with excess of oxygen and burnt . The gases are then cooled back . The reduction in volume was 25 ml . When the gases are passed into caustic potash , there is a further reduction in volume of 30 ml . If all volumes are measured under the laboratory conditions , the hydrocarbon is



Answer: C



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57. 0.72 gm of an oxide of a metal M on reduction with H_2 gave 0.64 g of the metal . The atomic weight of the metal is 64 . The empirical formula of the compound is

A. MO

B. M_2O

C. MO_2

D. M_2O_3

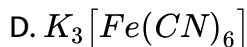
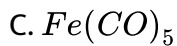
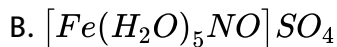
Answer: B



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58. In which of the following compounds transition metal is in zero oxidation state ?

A. $[Co(NH_3)_6]Cl_3$



Answer: C



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59. How many moles of acidified $FeSO_4$ can be completely Oxidised by one mole of $KMnO_4$

A. 10

B. 5

C. 6

D. 2

Answer: B



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60. A mixture of MgO and Mg weighing 10 g is treated with excess of dil HCl . Then 2.24 lit of H_2 gas was liberated under STP conditions . The mass of MgO present in the sample is

A. 2.4 g

B. 7.6 g

C. 8 g

D. 2 g

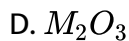
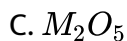
Answer: B



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61. Two oxide of metal M have 27.6 % and 30 % oxygen by weight. If the formula of the first oxide is M_3O_4 what is the formula of second oxide?

A. MO



Answer: D



Watch Video Solution

62. 5 g of a sample of magnesium carbonate on treatment with excess of dilute hydrochloric acid gave 1.12 L of CO_2 at STP . The percentage of magnesium carbonate in the mixture is

A. 42

B. 40

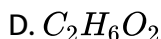
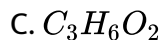
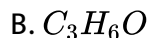
C. 84

D. 80

Answer: C

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63. 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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64. A mixture of methane and ethylene in the volume ratio $x : y$ has a total volume of 30 ml . On complete combustion it gave 40 ml of CO_2 . If the ratio had been $y : x$, instead of $x : y$, what volume of CO_2 could have been obtained ?

A. 50 ml

B. 100 ml

C. 25 ml

D. 75 ml

Answer: A



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65. Four grams of hydrocarbon (C_xH_y) on complete combustion gave 12grams of CO_2 . What is the empirical formula of the hydrocarbon ?
($C = 12, H = 1$)

A. CH_3

B. C_4H_9

C. CH

D. C_3H_8

Answer: D



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66. One litre of a mixture of CO and CO_2 is passed over red hot coke when the volume increased to 1.6 L under the same conditions of temperature and pressure . The volume of CO in the original mixture is

A. 400 ml

B. 600 ml

C. 500 ml

D. 800 ml

Answer: A



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67. Which of the following compounds have same empirical formula ?

a) formaldehyde b) Glucose

c) Sucrose d) Acetic acid

A. only a , b

B. only b , c

C. a, b , d

D. a ,b , c

Answer: C



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68. The volume of oxygen needed for the complete combustion of 25 ml of C_xH_y is

A. x ml

B. $\left(x + \frac{y}{4}\right)$ ml

C. $25\left(x + \frac{y}{4}\right)ml$

D. $5\left(x + \frac{y}{4}\right)ml$

Answer: C



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69. $2H_2O_2 \rightarrow 2H_2O + O_2$. This reaction is

A. Decomposition

B. Combination

C. Disproportionation reactions

D. Both 1) and 3)

Answer: C



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70. The units , nanometer , fermi , angstrom and attometre , arranged in decreasing order are expressed as

- A. Angstrom , nanometre , fermi, attometre
- B. Fermi , attometre , angstrom , nanometre
- C. Nanometre , angstrom , fermi , attometre
- D. Attometre , angstrom , fermi , nanometre

Answer: C



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71. Which of the following has higher mass

- A. one mole of electrons
- B. one mole of silver
- C. one mole of rhombic sulphur
- D. one mole of chloroform

Answer: C



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72. One mole ion which has two moles of charge

A. sulphate

B. nitrate

C. nitrite

D. phosphate

Answer: A



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73. 10 g of hydrofluoric acid gas occupies 5.6 lit of volume at STP . If the empirical formula of the gas is HF , then its molecular formula in the gaseous state will be

A. HF

B. H_2F_2

C. H_3F_3

D. H_4F_4

Answer: B



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74. One mole of N_2H_4 loses 10 moles of electrons to form a new compound X . Assuming that all the nitrogen appears in the new compound , the oxidation state of nitrogen in X is (there is no change in the oxidation number of hydrogen)

A. -1

B. -3

C. $+3$

D. $+5$

Answer: C



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75. The oxide of a metal contains 40% of oxygen. The valency of metal is 2.

What is the atomic weight of metal?

A. 24

B. 12

C. 40

D. 36

Answer: A



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76. The pair of compounds having metals in their highest oxidation state is

A. MnO_2 and CrO_2Cl_2

B. $[FeCl_4]^-$ and Co_2O_3

C. $[Fe(CN)_6]^{3-}$ and $[Cu(CN)_4]^{2-}$

D. $[NiCl_4]^{2-}$ and $[CoCl_4]^{2-}$

Answer: C



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77. What quantity (in mL) of a 45% acid solution of a mono-protic strong acid must be mixed with a 20% solution of the same acid to produce 800 mL of a 29.875 % acid solution ?

A. 330

B. 316

C. 320

D. 325

Answer: B



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STATES OF MATTER

1. The centre of the Sun consists of gases whose average molecular weight is 2 . If the density of the gases is $2.73 \times 10^3 \text{ kg/ m}^3$ at a pressure of $1.12 \times 10^9 \text{ atm}$, the temperature at the centre of the Sun is (assuming ideal behaviour)

A. $10^8 K$

B. $10^6 C$

C. $10^7 K$

D. $10^9 K$

Answer: D



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2. One litre of a gas weighs 4g at 300 K and 1 atm. If the pressure is reduced to 0.75 atm, the temperature at which one litre of the same gas weighs 2g is

A. 600 K

B. 900 K

C. 450 K

D. 800 K

Answer: D



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3. Two identical vessels are filled with 44g of Hydrogen and 44g of carbon dioxide at the same temperature. If the pressure of CO_2 is 2 atm, the pressure of Hydrogen is

A. 1 atm

B. 44 atm

C. 2 atm

D. 22 atm

Answer: D



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4. 0.2 g of a gas 'x' occupy a volume of 440 ml . If 0.1 g of CO_2 gas occupy a volume of 320 ml at the same temperature and pressure , then the gas 'x' could be

A. C_4H_{10}

B. NO_2

C. O_2

D. SO_2

Answer: D



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5. N_2 gas is present in one litre flask at a pressure of 7.6×10^{-10} mm of Hg. The number of N_2 gas molecules in the flask at 0°C are

A. 2.68×10^9

B. 2.68×10^{10}

C. 1.34×10^{28}

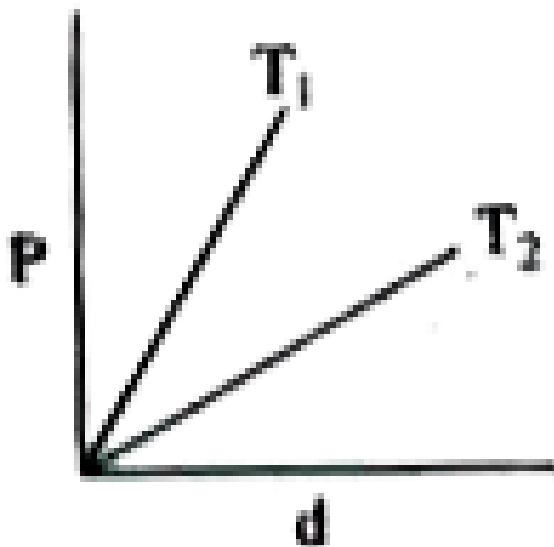
D. 2.68×10^{22}

Answer: C



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6. Diagram shows a graph between pressure and density for an ideal gas at two temperatures T_1 and T_2 which is correct



A. $T_1 > T_2$

B. $T = T_2$

C. $T_1 < T_2$

D. None

Answer: B



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7. 2gm of hydrogen is present in a closed vessel at S.T.P. If the same quantity of another gas 'X' when introduced into the vessel the pressure becomes 1.5 atm. The gas 'X' would be

A. CH_4

B. SO_2

C. He

D. O_2

Answer: C



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8. An open vessel at $27^\circ C$ is heated until $2/5$ th of the air in it has expelled . Assuming the volume of the vessel remains constant , the temperature to which the vessel has been heated is

A. $477^\circ C$

B. $227^{\circ}C$

C. $377^{\circ}C$

D. $500^{\circ}C$

Answer: B



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9.4 grams of an ideal gas occupies 5.6035 litres of volume at 546 K and 2 atm, pressure. What is its molecular weight ?

A. 4

B. 16

C. 32

D. 64

Answer: B



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10. An open bulb containing air at 19°C was cooled to a certain temperature at which the number of moles of the gaseous molecules increased by 25% . The final temperature is

A. -39.4°C

B. 233.6°C

C. 39.4°C

D. 240°C

Answer: D



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11. A five litre flask contains 3.5gm of N_2 and 8g of O_2 at 27°C . The total pressure exerted by the mixture of these gases is

A. 92 atm

B. 0.92 atm

C. 9.2 atm

D. 92 atm

Answer: C



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12. 0.3 g of a gas has a volume of 112 ml at $0^{\circ}C$ and 2atm pressure. Its Molecular weight is

A. 60

B. 30

C. 44

D. 28

Answer: C



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13. At 273°C and 380 torr pressure, the density of a gas is $1.25\text{ kg}/\text{m}^3$. So its density at STP in g/l is

- A. $5\text{ g}/\text{l}$
- B. $2.5\text{ g}/\text{l}$
- C. $10\text{ g}/\text{l}$
- D. $0.5\text{ g}/\text{l}$

Answer: B



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14. If 10 gm of a gas at atmospheric pressure is cooled from 273°C to 0°C keeping the volume constant, its pressure would become

- A. 2 atm
- B. 273 atm

C. $1/273$ atm

D. $1/2$ atm

Answer: B



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15. The molecular weights of two ideal gases A and B are respectively 100 and 200. One gram of A occupies V litres of volume at STP. What is the volume (in litres) occupied by one gram of B at STP ?

A. $V/2$

B. V

C. V^2

D. $2V$

Answer: C



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16. A gas occupies a volume of 300 cc at $27^{\circ}C$ and 620 mm pressure. The volume of the gas at $47^{\circ}C$ and 640 mm pressure is

A. 260 cc

B. 310 cc

C. 390 cc

D. 450 cc

Answer: C



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17. Two samples of gases 'a' and 'b' are at the same temperature. The molecules of 'a' are travelling 4 times faster than molecules of 'b'. The ratio of M_a/M_b will be

A. $1/4$

B. $16/1$

C. $4/1$

D. $1/16$

Answer: C



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18. A gaseous mixture of three gases A, B and C has a pressure of 10atm. The total number of moles of all the gases is 10. The partial pressure of A and B are 3 and 1 atm respectively. If C has a molecular weight of 2, what is the weight of C in grams present in the mixture?

A. 6

B. 3

C. 12

D. 8

Answer: A



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19. The total pressure of a mixture of 6.4 grams of oxygen and 5.6 grams of nitrogen present in a 2 lit vessel is 1200mm. What is the partial pressure of nitrogen in mm?

A. 1200

B. 600

C. 900

D. 200

Answer: B



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20. At 27°C , a closed vessel contains a mixture of equal weights of helium (mol. wt. = 4), methane (mol. wt. = 16) and sulphur dioxide (mol. wt. = 64). The pressure exerted by the mixture is 210 mm. If the partial pressures of helium, methane and sulphur dioxide are P_1 , P_2 and P_3 respectively, which one of the following is correct?

A. $P_3 > P_2 > P_1$

B. $P_1 > P_2 > P_3$

C. $P_1 > P_3 > P_2$

D. $P_2 > P_3 > P_1$

Answer: A



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21. x gm of water is mixed with 69 gm of ethanol. The mole fraction of ethanol in the resulting solution is 0.6. What is the value of x in gm

A. 54

B. 36

C. 180

D. 18

Answer: B



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22. A and B are ideal gases. The molecular weights of A and B are in the ratio of 1 : 4. The pressure of a gas mixture containing equal weights of A and B is P atm. What is the partial pressure (in atm) of B in the mixture?

A. $P/5$

B. $P/2$

C. $P/2.5$

D. $3P/4$

Answer: D



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23. If the molecules of SO_2 effuse a distance of 150cm in a certain period of time, the distance travelled by the molecules of CH_4 effusing in the same time is

A. 300 cm

B. 600 cm

C. 37.5 cm

D. 75 cm

Answer: A



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24. A cubical vessel has a side with 'l' cm length contained a gas at a pressure of 'P'. When the side of the vessel is made $l/2$ cm, the pressure of the gas becomes

- A. P
- B. $P/8$
- C. $2P$
- D. $8P$

Answer: A



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25. In a mixture of N_2 and CO_2 gases, the partial pressure of CO_2 is 1.25 atm. The total pressure of the mixture is 5 atm. The mole fraction of N_2 in the mixture is

- A. 0.82

B. 0.75

C. 0.8

D. 0.65

Answer: A



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26. In a gaseous mixture at 4 atm pressure, 25% of molecules are Nitrogen, 40% of molecules are carbon dioxide and the rest are oxygen. The partial pressure of oxygen in the mixture is

A. 1.40 atm

B. 1.6 atm

C. 1 atm

D. 0.9 atm

Answer: D

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27. The entropy value at temperature T is

A. $S = \int_0^T C_p \cdot dT$

B. $S = \int_0^T C_p \cdot T dT$

C. $S = \int_0^T \frac{C_p}{T} \cdot dT$

D. $S = \int_0^T C_p \cdot T^3 dT$

Answer: C

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28. In the vicinity of absolute zero , the value of $C_p - C_v$ is

A. R

B. zero

C. aT^3

D. $3/2RT$

Answer: B



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29. In a reversible reaction at equilibrium the net heat change of the reaction is :

A. Positive

B. Negative

C. Zero

D. Cannot be predicted

Answer: C



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30. ΔG_{sys} is equal to

A. $T\Delta S_{sys}$

B. $T\Delta S_{total}$

C. $-T\Delta S_{total}$

D. $\Delta S_{sys} + \Delta S_{surrounding}$

Answer: C



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31. For a reaction the ΔS value is $-20Jmol^{-1}K^{-1}$. If the temperature is increased from $0^{\circ}C$ at $25^{\circ}C$, the increases in the value of ΔG is (in $Jmol^{-1}$)

A. 500

B. -500

C. 0

D. 14900

Answer: A



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32. For the reaction $A \rightarrow B$, $\Delta E = 85 \text{ kJ mol}^{-1}$, if the system proceeds from A to B by a reversible path and returns to A by an irreversible path, the net change in internal energy (in KJ) is

A. 170

B. zero

C. 42.5

D. 85

Answer: B



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33. For an isothermal reversible phase transition process , ΔS is

A. $T / \Delta H$

B. $T \cdot \Delta H$

C. $H\Delta / T$

D. $\int_0^T \frac{C_p}{T} dT$

Answer: C



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34. The energy associated with a system by virtue of its position is

A. Gibbs energy

B. Internal energy

C. Kinetic energy

D. Potential energy

Answer: D



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35. Among : I. 18 g water at 298 K

II . 18 g ice at 263 K III . 18 g steam at 373 K

IV. 9 g ice at 263 K , correct order of "U"

A. $IV > II > I > III$

B. $IV < II < I < III$

C. $II < IV < I < III$

D. $III > I > IV > II$

Answer: B



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36. A gas absorbs 250 J of heat and expands from 1 litre to 10 litre at constant temperature against external pressure of 0.5 atm . The values of q , w and ΔE will be respectively.

A. 250 J , 455 J , 710 J

B. 250J, $-455J$, $-205J$

C. $-250J$, $-455J$, $-205J$

D. $-250J$, 455J, 205J

Answer: B



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37. The heat of combustion of solid benzoic acid at constant volume is $-321.30KJ$ at $27^{\circ}C$. The heat of combustion at constant pressure is

A. $-321.30 - 300R$

B. $-321.30 + 300R$

C. $-321.30 - 150 \text{ R}$

D. $-321.30 + 900 \text{ R}$

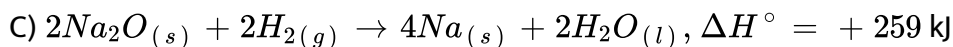
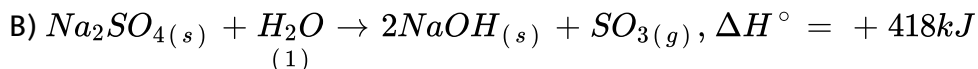
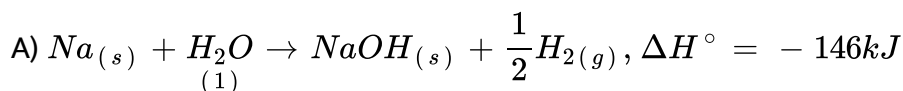
Answer: C



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38. Calculate ΔH° for the reaction :

$\text{Na}_2\text{O} + \text{SO}_3 \rightarrow \text{Na}_2\text{SO}_4$ given the following :



A. $+823 \text{ KJ}$

B. -580.5 KJ

C. -435 KJ

D. $+531 \text{ KJ}$

Answer: B



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39. For a reaction , $A(g) \rightarrow A(l)$, $\Delta H = -3RT$. The correct statement for the reaction is

A. $\Delta H = \Delta U \neq 0$

B. $|\Delta H| > |\Delta U|$

C. $|\Delta H| < |\Delta U|$

D. $\Delta H = \Delta U = 0$

Answer: B



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40. The enthalpy change on freezing of 1 mol of water at $5^{\circ}C$ to ice at $-5^{\circ}C$ is

(Given

$$\Delta_{\text{fus}}H = 6 \text{ kJ mol}^{-1}$$

at

$$0^\circ \text{C}, C_p(\text{H}_2\text{O}, l) = 75.3 \text{ J mol}^{-1} \text{K}^{-1}, C_p(\text{H}_2\text{O}, s) = 36.8 \text{ J mol}^{-1} \text{K}^{-1})$$

A. 5.81 kJ mol^{-1}

B. 5.44 kJ mol^{-1}

C. 6.00 kJ mol^{-1}

D. 6.56 kJ mol^{-1}

Answer: D



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41. A gas undergoes change from state A to state B . In this process , the heat absorbed and work done by the gas is 5 J and 8J respectively . Now gas is brought back to A by another process during which 3 J of heat is evolved . In this reverse process of B to A

A. 10 J of the work will be done by the surrounding on gas .

B. 10 J of the work will be done by the gas .

C. 6 J of the work will be done by the surrounding on gas .

D. 6 J of the work will be done by the gas .

Answer: C



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42. An ideal gas undergoes isothermal expansion at constant pressure .

During the process

A. enthalpy increases but entropy decreases .

B. enthalpy remains constant but entropy increases.

C. enthalpy decreases but entropy increases .

D. Both enthalpy and entropy remain constant .

Answer: B



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1. 50 g $CaCO_3$ is allowed to dissociated in 22.4 lit vessel at $819^\circ C$. If 50% of $CaCO_3$ is left at equilibrium , active masses of $CaCO_3$, CaO and CO_2 respectively are

A. 25 g , 14 g , $1/22.4$ mol/lit

B. 1, 1, $1/89.6$ mol/lit

C. 25, 14 , $1/89.6$ mol/lit

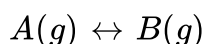
D. 1 , 1, 1

Answer: B



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2. One mole of A (g) is heated to $200^\circ C$ in a one litre closed flask, till the following equilibrium is reached.



The rate of forward reaction, at equilibrium, is $0.02 \text{ mol L}^{-1} \text{ min}^{-1}$. What is the rate (in $\text{mol L}^{-1} \text{ min}^{-1}$) of the backward reaction at equilibrium?

A. 0.04

B. 0.01

C. 0.02

D. 1

Answer: C



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3. An equilibrium mixture for the reaction, $2H_2S(g) \rightleftharpoons 2H_2(g) + S_2(g)$ has 1 mole of H_2S , 0.2 mole of H_2 and 0.8 mole of S_2 in 2 L flask . The value of K_C in mol L^{-1} is

A. 0.004

B. 0.016

C. 0.080

D. 0.160

Answer: B



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4. For the reversible reaction

$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ at $500^\circ C$. The value of K_p is 1.44×10^{-5}

, when partial pressure is measured in atmospheres. The corresponding

value of K_c with concentration in $\text{mol } L^{-1}$ is

A. $1.44 \times 10^{-5} l(0.082 \times 500)^{-2}$

B. $1.44 \times 10^{-5} (8.314 \times 773)^{-2}$

C. $1.44 \times 10^{-5} l(0.082 \times 500)^2$

D. $1.44 \times 10^{-5} l(0.082 \times 773)^{-2}$

Answer: D



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5. The K_c for the reaction $I_{2(g)} \rightleftharpoons 2I_{(g)}$ is 4×10^{-3} . If the equilibrium concentration of atomic iodine is $4 \times 10^{-2} \text{ M}$. What is the concentration of molecular iodine ?

A. 0.8 M

B. 0.3 M

C. 0.4 M

D. 0.2 M

Answer: C



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6. At 298 K, the molar equilibrium concentrations of Ag^+ , NH_3 and $[Ag(NH_3)_2]^+$ for the equilibrium $Ag^+_{(aq)} + 2NH_{3(aq)} \rightleftharpoons [Ag(NH_3)_3]^+_{aq}$ were found to be 10^{-1} , 10^{-3} , and 10^{-1} respectively.

The value of K_C is

A. 10^6

B. 10^{-6}

C. 5×10^4

D. 2×10^{-3}

Answer: A



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7. The value of K_p for the reaction $2H_2S(g) \rightleftharpoons 2H_2(g) + S_2(g)$ is 1.2×10^{-2} at $1065^\circ C$. The value of K, for this reaction is

A. 1.2×10^{-2}

B. $< 1.2 \times 10^{-2}$

C. 83

D. $> 1.2 \times 10^{-2}$

Answer: B



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8. In a closed container and at constant temperature 0.3 mole of SO_2 & 0.2 mole of O_2 gas at 750 torr are kept with a catalyst . If at equilibrium 0.2 mole of SO_3 is formed the partial pressure of SO_2 is ...torr

A. 375

B. 187

C. 360

D. 150

Answer: D



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9. For $A + B \rightleftharpoons C + D$, $\Delta H = -QKJ$, K_f & K_b respectively are 0.25 & 5000 at 400 K . Now , K_c for same process at 500 K may be

A. 4×10^{-5}

B. 4.5×10^{-4}

C. 5×10^{-5}

D. 5.2×10^{-5}

Answer: A



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10. At certain temperature 28 gm of N_2 and 6 gm of H_2 are taken in a 2 lit vessel in Haber's process if concentration of N_2 at equilibrium is

A. Greater than the concentration of H_2

B. Greater than the concentration of NH_3

C. Lower than the concentration of H_2

D. Equal to the concentration of H_2

Answer: C



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11. x mol N_2O_4 is taken at P_1 atm in a closed vessel & heated . When 75% N_2O_4 dissociated at equilibrium , total pressure is found to be P_2 atm .

The relation between P_1 and P_2 is

A. $P_1 : P_2 = 7 : 4$

B. $P_1 : P_2 = 7 : 2$

C. $P_1 : P_2 = 4 : 7$

D. $P_1 : P_2 = 3 : 4$

Answer: C



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12. 3 moles of NH_3 are allowed to dissociate in a 5 litre vessel and the equilibrium concentration of N_2 is 0.2 mole/lit . Then the total number of moles at equilibrium is

A. 2.5

B. 5

C. 1.5

D. 7.5

Answer: B



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13. When 1 mole of N_2 and 1 mole of H_2 is enclosed in a 5 L vessel and reaction is allowed to attain equilibrium . It is found that at equilibrium there is x mole of H_2 . The number of moles of NH_3 formed would be

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

B. $\frac{2(1+x)}{3}$

C. $\frac{2(1-x)}{3}$

D. $\frac{(1-x)}{2}$

Answer: C



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14. One mole of compound AB reacts with one mole of a compound CD according to the equation $AB_{(g)} + CD_{(g)} \rightleftharpoons AD_{(g)} + CB_{(g)}$. When equilibrium had been established it was found that $3/4$ mole of reactants AB and CD had been converted to AD and CB . There is no change in volume . The equilibrium constant for the reaction is

A. $9/16$

B. $1/9$

C. $16/9$

D. 9

Answer: D

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15. 56 gm of nitrogen and 4 gm of hydrogen are taken in a closed vessel

A. 0.4

B. 1

C. 1.3

D. 0.2

Answer: D

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16. AB_2 dissociates as : $AB_{2(g)} \rightleftharpoons AB_{(g)} + B_{(g)}$ When the initial pressure of AB_2 is 500 mm Hg , the total equilibrium pressure is 700 mm Hg . Calculate equilibrium constant for the reaction , assuming that the volume of the system remains unchanged .

- A. 100 mm Hg
- B. 133.3 mm Hg
- C. 200 mm Hg
- D. 214.6 mm Hg

Answer: B



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17. At a certain temperature and total pressure of 10^5 Pa , iodine vapour contains 40 % by volume of I atoms



Calculate K_p for the equilibrium

- A. 0.67
- B. 1.5
- C. 2.67×10^4
- D. 9.0×10^4

Answer: C



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18. For the reaction $\text{SnO}_{2(s)} + 2\text{H}_{2(g)} \rightleftharpoons 2\text{H}_2\text{O}_{(g)} + \text{Sn}_{(d)}$. Calculate K_p at 900K, where the equilibrium steam hydrogen mixture was 45% H_2 by volume.

A. 1.15

B. 2.25

C. 7.75

D. 10

Answer: B



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19. 3 mole of reactant A and one mole of reactant B are mixed in a vessel of volume 1 litre . The reaction taking place is $A + B \rightleftharpoons 2C$. If 1.5 mol of C is formed at equilibrium , the value of K_c is

A. 0.12

B. 0.50

C. 4.00

D. 0.25

Answer: C



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20. An amount of solid NH_4HS is placed in a flask already containing ammonia gas at a certain temperature and 0.50 atm, pressure . Ammonium hydrogen sulphide decomposes to yield NH_3 and H_2S gases in the flask . When the decomposition reaction reaches equilibrium the

total pressure in the flask rises to 0.84 atm . The equilibrium constant for NH_4HS decomposition at this temperature is

A. 0.30

B. 0.18

C. 0.17

D. 0.11

Answer: D



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21. The first and second dissociation constants of an acid H_2A are 10^{-5} and 5×10^{-10} respectively . Then overall dissociation constant of the acid is

A. 5×10^{15}

B. 5×10^{-15}

C. 2×10^5

D. 5×10^{-5}

Answer: B



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22. 2.2 moles of phosphorus penta chloride were taken in a closed vessel and dissociated into phosphorus trichloride and chlorine . At equilibrium , the total number of moles of the reactants and the products was 2.53 . The degree of dissociation is ,

A. 0.33

B. 0.165

C. 0.15

D. 0.3

Answer: C



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23. The equilibrium constant for the reaction ,

$H_2(g) + CO_2(g) \rightleftharpoons H_2O(g) + CO(g)$ is 16 at $1000^\circ C$. If 1.0 mole of H_2 and 1.0 mole of CO_2 are placed in one litre flask , the final equilibrium concentration of CO at $1000^\circ C$ is

A. 0.8 M

B. 0.87 M

C. 0.78 M

D. 0.68 M

Answer: A



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24. 9.2 g of $N_2O_{4(g)}$ is taken in 1 lit vessel and heated . At equilibrium , 50 % is dissociated . Equilibrium constant (mol/lit) [MW = 92]

A. 0.1

B. 0.2

C. 0.4

D. 2

Answer: B



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25. At constant temperature & volume, 50% of ozone is decomposed out of 2 atm of ozone taken initially and the equilibrium $2O_{3(g)} \rightleftharpoons 3O_{2(g)}$ is established, K_p for the decomposition of ozone is

A. $\left(\frac{3}{2}\right)^3$

B. $\left(\frac{3}{2}\right)^2$

C. $\left(\frac{2}{3}\right)^3$

D. $\left(\frac{2}{3}\right)^2$

Answer: A

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26. 120 mm of pressure is developed at equilibrium when PCl_5 at 100 mm is subjected to decomposition . Then the percentage of dissociation of PCl_5 is

- A. 0.1
- B. 0.2
- C. 0.4
- D. 0.5

Answer: B

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27. For the reaction $A + B \rightleftharpoons C + D$, the concentrations of A and B are equal . The equilibrium concentration of C is twice that of A . K_C of the reaction is

A. $1/4$

B. 4

C. $1/9$

D. 9

Answer: B



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28. In the reaction $2SO_{3(g)} \rightleftharpoons 2SO_{2(g)} + O_{2(g)}$, $SO_{3(g)}$ is 50 % dissociated at $27^\circ C$ when the equilibrium pressure is 0.5 atm . Partial pressure of $SO_{3(g)}$ at Equilibrium is

A. 0.5 atm

B. 0.3 atm

C. 0.2 atm

D. 0.1 atm

Answer: C



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29. A vessel contains N_2O_4 at certain temperature & 2 atm . If the degree of dissociation of N_2O_4 at equilibrium is 0.2 , final pressure of system (in atm) ?

A. 1.2

B. 2.4

C. 3.6

D. 0.8

Answer: B



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30. 1 mol PCl_3 and 1 mol Cl_2 are taken in a 10 lit vessel and heated . Now , if 0.8 mol PCl_5 is present at equilibrium , then

A. $[PCl_3] = 0.8 \text{ M}$

B. $[Cl_2] = 0.02 \text{ M}$

C. $[PCl_5] = 0.02 \text{ M}$

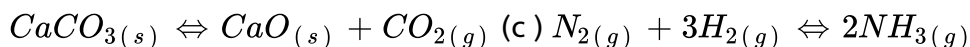
D. $[PCl_3] = [Cl_2] = 0.2 \text{ M}$

Answer: B



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31. Number of phases present in the following thermodynamic systems are:



A. $I > III > II$

B. $I = III < II$

C. $II > III > I$

D. $II > I > III$

Answer: C



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32. 4.5 mol each of H_2 and I_2 are present in a 10 lit vessel . At equilibrium the mixture contains 3 mole . HI , Kp for $H_2 + I_2 \rightleftharpoons 2HI$ and mass of I_2 at equilibrium (in g) respectively are

A. 1, 0.3

B. 1, 381

C. 1, 762

D. 4, 762

Answer: C

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33. For $MgO_{(g)} + C_{(g)} \rightleftharpoons Mg_{(g)} + CO_{(g)}$, equilibrium pressure at 2000 K is 100 atm . Now K_p for the process is (in atm^2)

A. 2500

B. 1250

C. 10^4

D. 10

Answer: A

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34. K_C for $2SO_2 + O_2 \rightleftharpoons 2SO_3$ in a 10 lit flask at certain T is $100 \text{ lit} \cdot \text{mol}^{-1}$. Now , if equilibrium pressures of SO_2 and SO_3 are equal , then mass of O_2 present at equilibrium is

A. 6.4 g

B. 12.8 g

C. 3.2 g

D. 16 g

Answer: C



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35. For a gaseous phase reaction $A_{(g)} + 3B_{(g)} \rightleftharpoons 2C_{(g)}$, initial pressure is 600 mm at 1:3 molar ratio of A and B . If the equilibrium pressure of A is 100 mm , that of B & C respectively are (in mm)

A. 300 , 100

B. 150 , 200

C. 150 , 300

D. 300 , 200

Answer: A



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36. A vessel at 1000 K contains CO_2 at 0.4 atm . If certain amount of CO_2 is converted into CO by the addition of graphite , the following equilibrium is established $CO_2 + C \rightleftharpoons 2CO$, at a pressure of 0.6 atm , then equilibrium constant is

A. 0.2 atm

B. 0.05 atm

C. 0.8 atm

D. 0.15 atm

Answer: C



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37. 1 mol $A_{(g)}$ is heated in 1 lit closed vessel and equilibrium is reached at $300^{\circ}C$ in $A_{(g)} \rightleftharpoons B_{(g)}$. If $K_C = 4$, concentration of $B_{(g)}$ at equilibrium is (in mol/lit)

A. 0.2

B. 0.6

C. 0.8

D. 0.1

Answer: C



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38. 140 mm pressure is developed at equilibrium when PCl_5 at 100 mm is subjected to dissociation . Then K_p for $PCl_3 + Cl_2 \rightleftharpoons PCl_5$ is (in atm^{-1}) nearly

A. 0.03

B. 0.01

C. 0.04

D. 0.02

Answer: C



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39. x mole HI is taken in 10 lit vessel and heated . If the equilibrium concentration of $H_{2(g)}$ is $0.1 \text{ mol} \cdot \text{lit}^{-1}$, value of x and mass of I_2 at equilibrium respectively are

A. 2, 254 g

B. 4 , 127 g

C. 4 , 254 g

D. 2 , 127 g

Answer: C

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40. In this process $I_2 + I^- \rightleftharpoons I_3^-$ (in aq medium) , initially there are 2 mole I_2 & 2 mole I^- . But at equilibrium due to addition of $AgNO_{3(aq)}$, 1.75 mole yellow ppt is obtained . K_C for the process is ($V_{\text{flask}} = 1dm^3$) nearly

A. 0.08

B. 0.02

C. 0.16

D. 0.12

Answer: A

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41. For $XY_{2(g)} \rightleftharpoons XY_{(g)} + Y_{(g)}$, initially 1 mole each of XY_2 & Y are present in 10 lit flask at 500 mm . If the equilibrium pressure of XY is 150

mm, K_p is (in mm)

A. 500

B. $\sqrt{500}$

C. 300

D. 600

Answer: D



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42. The value of K_c for the reaction $2A \rightleftharpoons B + C$ is 2×10^{-3} . At a given time, the composition of reaction mixture is $[A] = [B] = [C] = 3 \times 10^{-4} M$. In which direction the reaction will proceed ?

A. Forward direction

B. Reverse direction

C. Reaction is at equilibrium

D. Reaction is increased

Answer: B



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43. If the degree of dissociation of $PCl_5(g)$ at certain temperature and equilibrium is $3/4$, VD of PCl_5 at same temperature is nearly (M.W. of $PCl_5 = 208.5$)

A. 60

B. 70

C. 75

D. 50

Answer: A



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44. VDs of $N_2O_{4(g)}$ at equilibrium at temperatures T_1 & T_2 K respectively are 40 & 30 . Ratio of total number of moles of components at equilibrium at T_1K to T_2K shall be

A. 3:4

B. 1:2

C. 4:3

D. 3:7

Answer: A



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45. The reaction quotient (Q) for the reaction

$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$ is given by

$Q = \frac{[NH_3]^2}{[N_2][H_2]^3}$. The reaction will proceed from right to left if

A. $Q = 0$

B. $Q = K_c$

C. $Q < K_c$

D. $Q > K_c$

Answer: D



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46. For $N_2 + 3H_2 \rightleftharpoons 2NH_3$, continous removal of NH_3 maintains the following condition

A. $Q_C = K_C$

B. $Q_C > K_C$

C. $Q_C < K_C$

D. $Q_C = K_C = 1$

Answer: C



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47. The equilibrium constant s K_{p1} and K_{p2} for the reactions $X \rightleftharpoons 2Y$ and $Z \rightleftharpoons P + Q$ respectively are in the ratio of 1:9 . If the degree of dissociation of X and Z be equal then the ratio of total pressures at these equilibria is

- A. 1:1
- B. 1:3
- C. 1:9
- D. 1:36

Answer: D



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48. For $PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$ at equilibrium , $K_P = P/3$. Then degree of dissociation of PCl_5 at that temperature is

A. 0.75

B. 0.25

C. 0.9

D. 0.5

Answer: D



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49. Vapour density of PCl_5 is 104.16 but when heated at $230^\circ C$ its vapour density is reduced to 62 . The degree of dissociation of PCl_5 at this temperature will be

A. 6.8 %

B. 0.68

C. 0.46

D. 0.6

Answer: B



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50. The vapour density of N_2O_4 at certain temperature is 30 . What is the percentage dissociation of N_2O_4 at that temperature ?

[Hint : $\alpha = (D - d) / d(n - 1)$]

A. 53.3 %

B. 106.6 %

C. 26.7 %

D. 83.4 %

Answer: A



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51. For $\text{CaCO}_3 \rightleftharpoons \text{CaO} + \text{CO}_2$, at equilibrium $\log K_p = 8 - \frac{6400}{T(k)}$.

Then temperature at which $K_p = 1$?

A. 427°C

B. 527°C

C. 527K

D. 900K

Answer: B



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52. At 227°C & 4 atm, PCl_5 is dissociated to an extent 50%. At same temperature, extent of dissociation of PCl_5 is 0.75 at a pressure of [Hint

$$: \alpha \propto \frac{1}{\sqrt{P}}]$$

A. 1.77 atm

B. 2 atm

C. 4 atm

D. 8 atm

Answer: A



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53. If the % dissociation of N_2O_4 is 50 , the ratio of K_p and P_{eq} for $N_2O_4 \rightleftharpoons 2NO_2$ becomes equal to

A. $3/4$

B. $3/8$

C. $4/3$

D. $4/9$

Answer: C



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54. Cu^{2+} ions get precipitated with little H_2S . While Ni^{2+} ions get precipitated with more H_2S . This is because

- A. K_{sp} of Cu S is low
- B. K_{sp} of NiS is low
- C. K_{sp} of Cu S is high
- D. K_{sp} of NiS is high

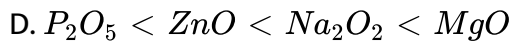
Answer: A



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55. The increasing order of acidic nature among ZnO , Na_2O_2 , P_2O_5 and MgO is

- A. $\text{ZnO} < \text{P}_2\text{O}_5 < \text{Na}_2\text{O}_2 < \text{MgO}$
- B. $\text{MgO} < \text{Na}_2\text{O}_2 < \text{ZnO} < \text{P}_2\text{O}_5$
- C. $\text{Na}_2\text{O}_2 < \text{MgO} < \text{ZnO} < \text{P}_2\text{O}_5$

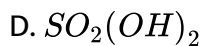
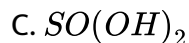
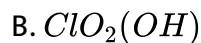
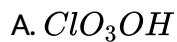


Answer: C



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56. Which of the following is the strongest acid ?



Answer: A



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57. If the solubility of $Ca(OH)_2$ is $\sqrt{3}$, What is its solubility product ?

A. 3

B. $3\sqrt{3}$

C. 27

D. $12\sqrt{3}$

Answer: D



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58. In a saturated aqueous solution of AgBr , conc, of Ag^+ ion is 10^{-6} mol/lit. if K_{sp} for Ag Br is 1×10^{-12} , then concentration of Br^- in the solution is

A. 1×10^{-6} mol/lit

B. 4×10^{-8} mol/lit

C. 4×10^{-7} mol/lit

D. 4×10^{-19} mol/lit

Answer: A



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59. The dissociation constant of water at $10^{\circ}C$ is 5.31×10^{-17} . The ionic product of water is

A. $0.295 \times 10^{-14} \text{mole}^2 \text{lit}^{-2}$

B. $0.6 \times 10^{-14} \text{mole}^2 \text{lit}^{-2}$

C. $0.54 \times 10^{-14} \text{mole}^2 \text{lit}^{-2}$

D. $0.82 \times 10^{-14} \text{mole}^2 \text{lit}^{-2}$

Answer: A



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60. The ionic product of water at $60^{\circ}C$ is $9.55 \times 10^{-14} \text{mole}^2 \text{lit}^{-2}$. The dissociation constant of water at the same temperature is

A. 1.09×10^{-15}

B. 5.2×10^{-16}

C. 1.8×10^{-16}

D. 1.72×10^{-15}

Answer: D



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61. The concentration of oxalic acid is 'X' mol lit^{-1} . 40 ml of this solution reacts with 16 ml of 0.05 M acidified $KMnO_4$. What is the pH of 'X' M oxalic acid solution ? (Assume that oxalic acid dissociates completely)

A. 1.3

B. 1.699

C. 1

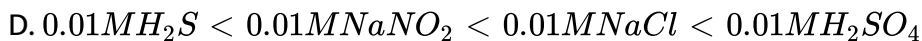
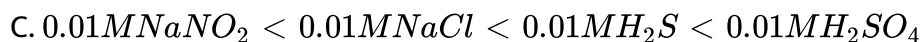
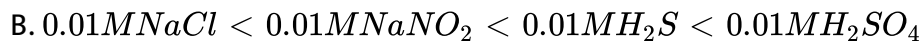
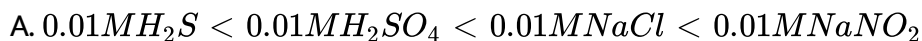
D. 2

Answer: C



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62. The correct order of increasing $[H_3O^+]$ in the aqueous solution is



Answer: C



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63. The pH of a base solution is 12.699 . The amount of crystalline oxalic acid required to react with 2 lit of this base solution is (assume oxalic acid dissociates completely)

A. 4.5 g

B. 6.3 g

C. 12.6 g

D. 9 g

Answer: B



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64. The pH of a sample of H_2SO_4 is 1.3979 . The percentage of the solution is 73.5 % (w/w) , the density of the solution is

A. $2.66 \times 10^{-3} g/$

B. $5.32 \times 10^{-3} g/$

C. $1.33 \times 10^{-3} g/$

D. $0.01 g/$

Answer: A

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65. The pH of a sample KOH solution is 12.3979 . The weight of solid KOH of 70% pure required to prepare 2.5 lit of this solution is

A. 3.5 g

B. 5 g

C. 8 g

D. 6 g

Answer: B

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66. The mass of acetic acid present in 500 ml solution in which it is 1% ionised (K_a of $CH_3COOH = 1.8 \times 10^{-5}$)

A. 10.8 g

B. 5.4 g

C. 12.0 g

D. 6.0 g

Answer: B



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67. The pH of 1.2 % (w/v) aqueous solution of CH_3COOH at $25^\circ C$ is
($pK_a = 4.7$)

A. 5.0

B. 9.26

C. 2.7

D. 2.9

Answer: C



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68. The concentration of acetic acid required to get 3.5×10^{-4} mole/lit of H^+ ion is $[K_a = 1.8 \times 10^{-5}]$

A. $6.8 \times 10^{-3} \text{mollit}^{-1}$

B. $6.8N$

C. $1.94N$

D. $1.94 \times 10^{-2}N$

Answer: A



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69. Equal volumes of M NaOH and 0.3 M KOH are mixed in an experiment.

Find the POH and pH of the resulting solution.

A. 13.6, 0.4

B. 0.4, 13.6

C. 0.7, 13.3

D. 13.3, 0.7

Answer: A



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70. At $100^{\circ}C$, ionic product of water is $51.3 \times 10^{-14} M^2$. Then dissociation constant of water at $100^{\circ}C$ is

A. 1.72×10^{-15}

B. 1.009×10^{-15}

C. 9.243×10^{-15}

D. 5.2×10^{-16}

Answer: C



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71. When 11.2 g of KOH is added to one litre of 'X' M H_2SO_4 solution , the pOH of the solution becomes 13.301 . Then the value of 'X' is (assume no change in the volume of solution by the addition of KOH)

A. 0.4

B. 0.6

C. 0.8

D. 0.2

Answer: D



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72. Urine normally has a pH of 6.0 . A patient eliminates 1.3 litres of uring per day . How many moles of H^+ ions does he eliminate in a day ?

A. 1.3×10^{-3}

B. 1.3×10^{-6}

C. $1.94N$

D. $1.94 \times 10^{-2}N$

Answer: B



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73. 50 ml of $0.2NH_2SO_4$ is mixed with 100 ml of 0.4 N KOH solution and 1.85 lit of distilled water is added . The pH of resulting solution is ($\log 1.5 = 0.176$)

A. 13.301

B. 0.699

C. 1.824

D. 12.176

Answer: D



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74. Which of the following solution will have pH closer to 1.0 ?

A. 100 ml of M/10 HCl + 45 ml of M/10 NaOH

B. 55 ml of M/10 HCl + 45 ml of M/10 NaOH

C. 10 ml of M/10 HCl + 90 ml of M/10 NaOH

D. 75 ml of M/5 HCl + 25 ml of M/5 NaOH

Answer: D



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75. 20 cc of 'x' M HCl is exactly neutralised by 40 cc of 0.05 M NaOH . The pH of HCl solution is

A. 1.0

B. 2.0

C. 1.5

D. 2.5

Answer: A



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76. One lit. of aqueous solution of H_2SO_4 contain 4.9 g of the acid . 100 ml of this solution is taken in a 1 lit. flask and diluted with water upto the mark . The pH of the dilute solution is

A. 2.0

B. 2.301

C. 1.699

D. 3.699

Answer: A



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77. The pH of a solution is 4.301 . To 50 ml of this solution 200 ml of water is added . Then the pH of resulting solution is

A. 4.9

B. 5.301

C. 5.7

D. 5.0

Answer: D



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78. The pH of a solution is 5.0 . To a 10 ml of this solution , 990 ml of water is added . Then the pH of the resulting solution is

A. 7

B. 8

C. 9

D. 6.96

Answer: D



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79. The pH of a solution is 12 . The no. of H^{+} ions present in 1 ml of this solution at 25°C is

A. 6.02×10^{20}

B. 6.02×10^8

C. 10^{-12}

D. 10^{-2}

Answer: B



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80. K_a for HCN is 5×10^{-10} at $25^\circ C$. For maintaining a constant pH of 9, the volume of 5M KCN solution required to be added to 10 ml of 2M HCN solution is

- A. 4 ml
- B. 7.95 ml
- C. 2 ml
- D. 9.3 ml

Answer: C



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81. Find the change in pH when 0.01 mole CH_3COONa is added to one litre 0.01M CH_3COOH solution ($pK_a = 4.74$)

- A. 3.27
- B. 4.74

C. 1.37

D. 2.74

Answer: C



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82. 2 g of NaOH per 250 ml of solution is added to a buffer solution of buffer capacity 0.2 . Then the change in pH is

A. 0.5

B. 1

C. 1.5

D. 2.0

Answer: B



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83. A solution is prepared by mixing 100 ml of 0.1 M NH_4OH and 200 ml of 0.2 M NH_4Cl . pK_b of NH_4OH is 4.8. Then the pH of the solution is

- A. 9.0
- B. 8.0
- C. 8.5979
- D. 5.4021

Answer: C



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84. A one litre solution contains 0.08 mole of acetic acid ($K_a = 1.75 \times 10^{-5}$). To this solution, 0.02 mole of NaOH is added. Then the pH of resulting solution is $[\log 1.75 = 0.243]$

- A. 5.234

B. 5.058

C. 4.28

D. 4.456

Answer: C



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85. The pH of a buffer solution is 4.745 . When 0.044 mole of $Ba(OH)_2$ is added to 1 lit. of the buffer , the pH changes to 4.756 . Then the buffer capacity is

A. 4

B. 0.25

C. 0.5

D. 8

Answer: D

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86. A buffer solution is prepared by mixing CH_3COONa and CH_3COOH . The pK_a of acetic acid is 4.74 . To maintain the pH of the buffer solution as 6.04 , the concentration ratio of CH_3COONa and CH_3COOH to be maintained is

A. 1 : 20

B. 1 : 10

C. 2 : 1

D. 20 : 1

Answer: D

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87. A solution contains equimolar concentration of a weak acid HA and its conjugate base A^- , pK_b of A^- is 9 . The pH of the solution is

A. 9

B. 5

C. 7

D. 5.301

Answer: B



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88. A buffer solution consists of 1 mole each of HA and its conjugate base A^- , Addition of which of the following decreases the pH of buffer ?

A. 0.1 mole of HA

B. 0.1 mole of A^-

C. 0.1 mole of $NaOH$

D. Water

Answer: A

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89. In an acidic buffer solution ($\text{pH} = 4.4$) , the concentration ratio of acid and salt is 2 : 1 . The value of dissociation constant of weak acid may be

A. 1.8×10^{-4}

B. 2×10^7

C. 4×10^{-5}

D. 2×10^{-5}

Answer: D

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90. 4 mole of NH_4OH and 1 mole of H_2SO_4 are mixed and dilute to 1 lit solution . The $\text{p}K_b$ of NH_4OH is 4.8 . The pH of solution is

A. 4.8

B. 9.2

C. 9.5

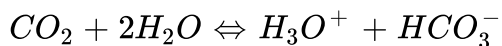
D. 8.9

Answer: B



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91. When CO_2 is bubbled in excess of water , the following equilibrium is established .



$$K_c = 3.8 \times 10^{-7}, pH = 6$$

What would be the $[HCO_3^-] / [CO_2]$?

A. 6

B. 0.0038

C. 0.038

D. 0.38

Answer: D



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92. pH of a buffer solution decreases by 0.02 units when 0.12 g of acetic acid is added to 250 mL of a buffer solution of acetic acid and potassium acetate at 27°C . The buffer capacity of the solution is

A. 0.1

B. 10

C. 1

D. 0.4

Answer: D



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93. 20 mL of 0.1 M acetic acid is mixed with 50 mL of potassium acetate. K_a of acetic acid = 1.8×10^{-5} at $27^\circ C$. Calculate concentration of potassium acetate if pH of the mixture is 4.8.

- A. 0.1 M
- B. 0.04 M
- C. 0.4 M
- D. 0.02 M

Answer: B



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94. Let the solubilities of AgCl in H_2O , 0.01 M $CaCl_2$, 0.01 M NaCl and 0.05 M $AgNO_3$ be S_1 , S_2 , S_3 and S_4 respectively. What is the correct relationship between these quantities?

- A. $S_1 > S_2 > S_3 > S_4$

B. $S_1 > S_2 = S_3 > S_4$

C. $S_1 > S_3 > S_2 > S_4$

D. $S_4 > S_2 > S_3 > S_1$

Answer: C



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95. At 298 K , the K_{sp} of M_2SO_4 is 3.2×10^{-5} . The maximum concentration of SO_4^{2-} ion that could be attained in a saturated solution of this solid at 298 K is

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

B. $7 \times 10^{-2} M$

C. $2.89 \times 10^{-9} M$

D. $2 \times 10^{-2} M$

Answer: D

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96. The pH of the neutralisation point of 0.1 N $NaOH$ with 0.1 N HCl is

A. 1

B. 6

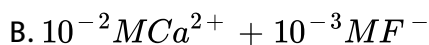
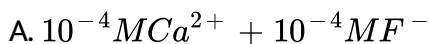
C. 7

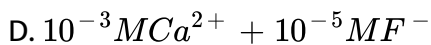
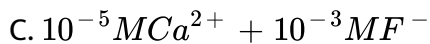
D. 9

Answer: C

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97. The precipitate of CaF_2 ($K_{sp} = 1.7 \times 10^{-10}$) is obtained when equal volumes of the following are mixed ?





Answer: B



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98. Which of the following is relatively weak acid ? (pK_a values are given in brackets)

A. HA (6,8)

B. HB (4,2)

C. HC (5,4)

D. HD (9,62)

Answer: D



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99. A basic buffer contains equal concentration of base and its salt . The dissociation of base is 10^{-6} . Then the pH of the buffer solution is

A. 6

B. 8

C. 5

D. 9

Answer: B



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100. The K_{sp} values of MA , MB , MC , MD are 1.8×10^{-10} , 4×10^{-3} , 4×10^{-8} & 6×10^{-5} respectively . If a 0.01 M solution of MX is added dropwise to a mixture containing A , B , C , D solution the one to be precipitated first will be :

A. MA

B. MB

C. MC

D. MD

Answer: A



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101. When inert gas is added to the given reversible process at constant pressure , then the equilibrium will

A. Be unaffected

B. Shift in backward direction

C. Shift in forward direction

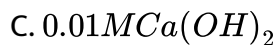
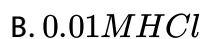
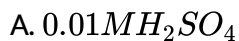
D. Cannot be predicted

Answer: C



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102. Which has maximum pH



Answer: C



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103. pK_b of aq. NH_3 is 4.74 hence pH of 0.01 M NH_3 solution is

A. 3.37

B. 10.63

C. 2.0

D. 12.00

Answer: B



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104. For the equilibrium $A_{(g)} + B_{(g)} + C_{(g)}$, $K_p = 0.82 \text{ atm}$ at 27°C .

At the same temperature its K_C in mol li^{-1} is ($R = 0.082 \text{ lit atm mol}^{-1} \text{K}^{-1}$)

A. 0.033

B. 3.3

C. 1.0

D. 0.33

Answer: B



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105. For the equilibrium $A_{(g)} + B_{(g)} + C_{(g)}$, $K_p = 0.82 \text{ atm}$ at 27°C . At the same temperature its K_C in mol li^{-1} is ($R = 0.082 \text{ lit atm mol}^{-1} \text{K}^{-1}$)

A. 0.033

B. 3.3

C. 1.0

D. 0.33

Answer: A



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106. Addition of sodium hydroxide solution to a weak acid (HA) results in a buffer of pH 6. If ionisation constant of HA is 10^{-5} , the ratio of salt to acid concentration in the buffer solution will be

A. 10:1

B. 4: 5

C. 1: 10

D. 5: 4

Answer: A



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107. 50 mL of 0.2 M ammonia solution is treated with 25mL of 0.2 M HCl . If pK_b of ammonia solution is 4.75 , the pH of the mixture will be

A. 4.75

B. 3.75

C. 9.25

D. 8.25

Answer: C



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