



1. What type of bonds can be used to describe the chemical bonds in BF_4^- ?
 (A) Ionic bond (B) Dative covalent bond (C) Covalent bond (D) Fluorine bond
2. Which bond is more polar, H-Cl or H-O. (Given: EN_H = 2.1; EN_{Cl} = 3.0; EN_O = 3.5)
 (A) H-Cl is more polar (B) H-O is more polar (C) Both have the same polarity (D) None of the above.
3. Which one is the correct order of repulsive power of pair of electrons?
 (A) Lone pair - lone pair > lone pair - bond pair > bond pair - bond pair
 (B) lone pair - bond pair > bond pair - bond pair > Lone pair - lone pair
 (C) bond pair - bond pair > lone pair - bond pair > Lone pair - lone pair
 (D) lone pair - bond pair > Lone pair - lone pair > bond pair - bond pair
4. The predicted shape of NH_3^- is
 (A) Pyramidal (B) Linear (C) Trigonal (D) Angular
5. One of the following is the shape of SO_3^{2-}
 (A) Linear (B) Tetrahedral (C) Angular (D) Pyramidal
6. One of the followings is not incorrect:
 (A) In the NH_3 molecule, only two of the electron groups are bond pairs, the third and fourth are lone pair
 (B) In the NH_3 molecule, all four electron groups are bond pairs.
 (C) In the NH_3 molecule, only three of the electron groups are bond pairs, the fourth is a lone pair
 (D) In the NH_3 molecule, only one of the electron groups is bond pair, the remaining are lone pairs
7. All the followings except one are the strategies used for predicting the shapes of the molecules:
 (A) Draw the plausible Lewis structure of the species
 (B) Determine the number of electron groups around the central atom, and identify them as being bond-pair electron groups lone-pairs of electrons.
 (C) Establish the electron-group geometry around the central atom
 (D) Determine the molecular geometry from the positions of surrounding atoms
8. The possible shape of H_2CO is
 (A) Trigonal planar (B) Trigonal pyramidal (C) Angular (D) Linear
9. Primary bonds, include the following except
 (A) ionic bond (B) covalent bond (C) polar covalent bond (D) Hydrogen bond.

10. A polar covalent bond is formed for two atoms with an electronegativity difference of between
(A) 0.4 and 1.0 (B) 0.4 and 2.0 (C) 0.4 and 3.0 (D) 0.4 and 4.0

11. Which of the following statements is correct:

- (A) The larger the electronegativity difference, the more ionic character the bond has.
(B) The larger the electropositivity difference, the more ionic character the bond has.
(C) The larger the electronegativity difference, the more covalent character the bond has.
(D) The larger the electropositivity difference, the more covalent character the bond has.

12. An example of a dipole-dipole interaction can be seen in

- (A) HCl (B) H₂S (C) H₂SO₄ (D) NH₃

13. The strongest of the intermolecular forces is called

- (A) hydrogen bonding (B) Metallic bonding (C) Electrovalent bonding (D) Covalent bonding

14. Hydrogen bonds can occur within

- (B) one single molecule (B) between two like molecules (C) between two unlike molecules (D)
All of the above

15. What makes carbon such a unique element?

(a) Elemental carbon comes in two forms; diamond and graphite.

(b) Carbon forms four bonds, although the ground state configuration would predict the formation of fewer bonds.

(c) Carbon forms covalent bonds rather than ionic bonds.

(d) To a greater extent than any other element, carbon can bond to itself to form straight chains, branched chains and rings.

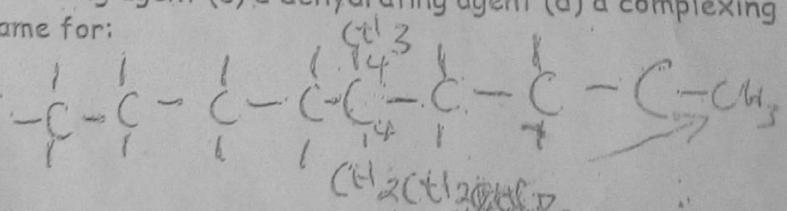
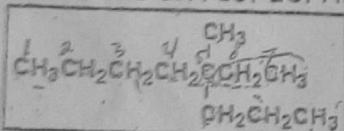
16. An ester will not be formed when an alcohol is reacted with:

- (a) a carboxylic acid (B) an aldehyde (c) an acid anhydride (d) an acid chloride

17. Lithium-aluminium hydrogen tri-tertiary butoxide is:

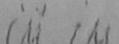
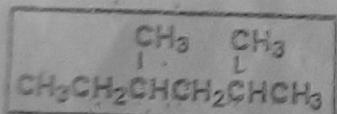
- (A) a reducing agent (b) an oxidizing agent (c) a dehydrating agent (d) a complexing agent

18. Select the correct IUPAC name for:



- (a) 5-methyl-5-ethyloctane (b) 5-methyl-5-propylheptane (c) 4-ethyl-4-methyloctane
(d) 3-methyl-3-propyloctane

19. Select the correct IUPAC name for:



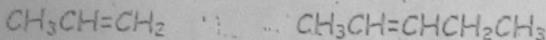
- (a) 1,1,3-trimethylpentane (b) 1-ethyl-1,3-dimethylbutane (C) 2,4-dimethylhexane (d) 3,5-dimethylhexane

20. Select the correct IUPAC name for:



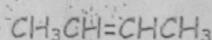
- (A) 1,4-dimethylcyclopentane (B) 1,3-dimethylcyclopentane (C) 2,5-dimethylcyclopentane

35. Dehydration of an alcohol leads to the formation of an _____.
 (a) alkene (b) alkane (c) alkyne (d) alkyl halide
36. Dehydration of an alcohol leads to the formation of an _____.
 (a) alkene (b) alkane (c) alkyne (d) alkyl halide
37. Ethanol can be oxidized stepwise. What is the first stable intermediate product when ethanol is oxidized with a mild oxidation agent?
 (a) CH_3COOH (b) CO_2 (c) CH_3CHO (d) $\text{CH}_3\text{CH}_2\text{OH}$
38. Which of the following alcohols forms a ketone when oxidized?
 (a) 1-propanol (b) methanol (c) 2-methyl-2-propanol (d) 2-propanol
39. What is the sum of the coefficients in the balanced equation for the complete combustion of 2-methylbutane? Use smallest whole number coefficients. Do not forget coefficients of 1.
 (a) 10 (b) 13 (c) 17 (d) 20
40. The organic starting materials for the preparation of an ester could be _____.
 (a) an acid and an alcohol (b) a ketone and an alcohol (c) an alkane and a ketone (d) only an acid
41. Hydrolysis (saponification) of a fat would yield _____.
 (a) water and an alkene (b) ethanol and propanoic acid (c) glycerol and soap (d) ethanol and a soap
42. The segment $-\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2-$ represents the polymer named _____.
 (a) polyethylene (b) polyhexene (c) polypropylene (d) polystyrene
43. For which of the compounds below are cis-trans isomers possible?



(1)

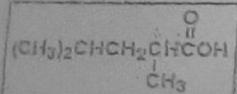
(2)



(3)

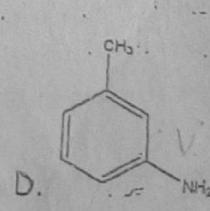
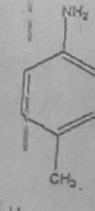
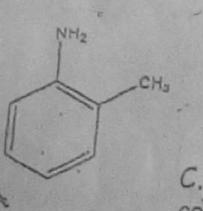
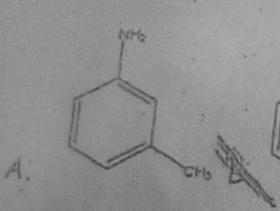
- (a) only 2 (b) both 1 and 2 (c) both 2 and 3 (d) all three

44. Select the IUPAC name for the compound below.



- (a) 2,4-dimethylpentanoic acid (b) 1,1,3-trimethylbutanoic acid (c) 1-hydroxy-2,4-dimethylpentanone
 (d) 2-carboxyisohexane

45. The structure of o-methylaniline is



46. The name of this structure

m-hydroxylbenzoic acid
 carboxylphenol

B. o-hydroxylbenzoic acid

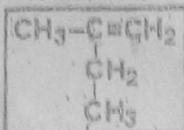
C. m-carboxylphenol

D. o-

(d) 2,3-dimethylcyclopentene

21. The general formula for monocyclic alkenes is
(a) C_nH_{2n+2} (b) C_nH_{2n} (c) C_nH_{2n-2} (d) C_nH_{n+2}

22. The correct name for the compound given below is



- (a) 2-methyl-1-butene (b) 2-ethyl-1-propene (c) 2-ethyl-1-pentene (d) 3-methyl-2-butene

23. Which one of the following is a secondary alcohol?

- (a) CH_3CH_2OH (b) CH_3OH (c) $CH_3CH(OH)CH_3$ (d) $(CH_3)_2COH$

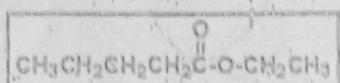
24. Schiff's reagent can be used to:

- (a) identify an aldehyde (b) oxidized aldehyde (c) reduce a ketone (d) all of the above

25. Which of the following formulas represents an alkene?

- (a) $CH_3CH_2CH_3$ (b) CH_3CH_3 (c) $CH_3CH_2CHCH_2$ (d) CH_3CH_2Cl

26. The compound given below is called _____.

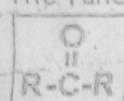


- (a) butyl acetate (b) ethyl pentanoate (c) propyl pentanoate (d) ethyl butanoate

27. The chemistry of aldehydes and ketones is largely determined by the

- (a) carbonyl group (b) alkoxy group (c) alkoxide group (d) carboxyl group

28. The functional group given below is characteristic of organic _____.



- (a) ketones (b) acids (c) aldehydes (d) esters

29. Two isomeric forms of a saturated hydrocarbon

- (a) have the same structure. (b) have different compositions of elements.

- (c) have the same molecular formula. (d) have a different content of the isotopes of hydrogen.

30. The name of the alkane isomer of cis-3-hexene is:

- (a) 2-methylpentane (b) 3-methylpentane (c) cyclohexane (d) 2,3-dimethylbutane

31. How many isomeric alkanes of the molecular formula C_5H_{12} are there?

- (a) 1 (b) 2 (c) 3 (d) 4

32. Which of the following statements is FALSE regarding the reaction between Cl_2 and C_2H_6 ?

- (a) It is a substitution reaction.

- (b) The reaction will give a single product of C_2H_5Cl .

- (c) The reaction mechanism involves free radicals.

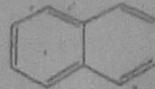
- (d) The reaction can be initiated with either sunlight or heat.

33. Which of the following will undergo an addition reaction with chlorine?

- (a) $CH_3CH_2CH_2CH_3$ (b) $CH_3CH_2CH=CHCH_3$ (c) C_6H_6 (d) CH_3CH_2COOH

34. The reaction of ethyne with which of the following gives $CH_2Br-CHBrCl$?

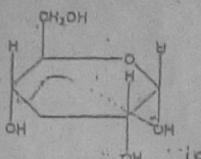
- (a) HCl, then HBr (b) HCl, then Br₂ (c) Cl₂, then HBr (d) Cl₂, then Br₂



naphthalene
5 double bonds

47. Using Huckel's rule, what is the value of aromaticity of
 A. 2 B. 1.5 C. 3 D. 5

(Correct)



$$\begin{array}{l} \text{H}_2\text{O} \\ | \\ \text{C}_6\text{H}_5-\text{C}_6\text{H}_4-\text{C}_6\text{H}_5 \\ | \\ \text{H}_2\text{O} \end{array}$$

48. The name of this structure is

- A. α -glucose B. β -glucose C. α -fructose D. β -fructose

49. According to the number of carbon atoms and functional group present, fructose is called

- A. aldohexose B. aldopentose C. ketohexose D. ketopentose

50. All these are reducing sugars except

- A. Glucose B. fructose C. galactose D. sucrose

51. Hydrolysis products of lactose are

- A. Glucose + fructose B. glycose + glucose C. glucose + galactose D. fructose + galactose

52. All these are examples of simple proteins except

- A. globulin B. prolamine C. albumin D. nucleoprotein

53. A mixture of N_2 , O_2 , He and H_2 constitutes how many phases

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

54. How many components are there in sugar - water system

- A. 1 B. 2 C. 3 D. 0

55. The degree of freedom of $\text{CaCO}_3 \rightleftharpoons \text{CaO} + \text{CO}_2$ is

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

56. Triple point of water is a —— system

- A. Non-variant B. univariant C. bivariant D. trivariant

Use the information below to answer questions 57, 58, 59 and 60

f.c.c.
 f.c.c.
 f.c.c.

f.c.c.
 f.c.c.

f.c.c.
 f.c.c.

Methanol

64

Ethanol

46

46

45

57. Mole fractions of methanol and ethanol are

- A. 0.5 & 0.5 B. 0.67 & 0.33 C. 0.33 & 0.67 D. 0.3 & 0.7

58. Partial pressure of methanol is

- A. 60.3 mmHg B. 29.7 mmHg C. 45 mmHg D. 22.5 mmHg

59. Partial pressure of ethanol is

- A. 60.3 mmHg B. 29.7 mmHg C. 45 mmHg D. 22.5 mmHg

60. Total pressure of the mixture is

- A. 90 mmHg B. 120.6 mmHg C. 67.5 mmHg D. 52.2 mmHg

61. All these are examples of f.c.c structures except

- A. Pb B. Al C. Ni D. W

62. All these are examples of b.c.c structures except

- A. Na
- B. Fe
- C. Mn
- D. Co

63. The mathematical relationship between the pressure of a gas and the average kinetic Energy of its molecule is a product of

- a. Charles's Law
- b. Kinetic theory
- c. Boyle's Law
- d. none of the above

64. What type of proportionality exists between the absolute temperature of a gas and it's Kinetic Energy?

- a. Inverse
- b. Direct
- c. Multiple
- d. none of the above

65. Continuous bombardment of the gas molecules on the walls of a cubical vessel will give rise to

- a. Gas
- b. Volume
- c. Pressure
- d. Movement

66. The change in momentum per molecule per single collision in the x - axis direction is

- a. $2mU_x$
- b. $2m_x$
- c. $4mU_x$
- d. mU_x

67. In solids, the intermolecular attractions are than the Kinetic Energy.

- a. The same
- b. weaker
- c. stronger
- d. none of the above

68. The key factor that determines the physical state of a substance is

- a. Average kinetic energy
- b. Phase change
- c. Equilibrium
- d. motion

69. Solids are rigid because they can't undergo

- a. Translational motion
- b. Vibrational motion
- c. Circular motion
- d. phase change

70. The change of matter from one state to another is called

- a. Kinetic theory
- b. Atomic theory
- c. Spectroscopy
- d. Phase change

P \nmid k.e

22. The phase rule is applicable to

- (a) homogenous systems (b) reversible systems (c) irreversible systems (d) heterogeneous system whether physical or chemical

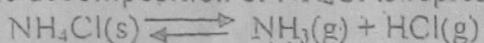
23. The reduced phase rule for a condensed system is

- (a) $F = C - P + 2$ (b) $F' = C - P + 1$ (c) $F^1 = C - P$ (d) $F = C - P + 3$

24. For a three phase system with one component, the degree of freedom according to phase rule is

- (a) 0 (b) 1 (c) 2 (d) 3

25. The decomposition of NH_4Cl is represented by the equation



The number of components present in the system is

- (a) 0 (b) 1 (c) 2 (d) 3

26. The vapour pressure of the metastable phase is always _____ than that of the stable phase at the same temperature

- (a) lower (b) higher (c) constant (d) none of these

27. The total number of variable factors which must be specified so that the remaining variables are fixed automatically and the system is completely defined. It is known as

- (a) a phase (b) a component (c) degrees of freedom (d) none of these.

28. A saturated solution of sodium chloride is a

- (a) one phase system (b) two phase system (c) three phase system (d) none of these

29. A mixture of two immiscible liquids (chloroform and water) constitutes a system having the number of phases equal to

- (a) zero (b) one (c) two (d) three

30. Which of the following is not a good conductor of electricity?

- (a) molten NaCl (b) aqueous NaCl (c) solid NaCl (d) none of the above

31. Diamond does not conduct electricity because

- (a) it does not have valence electron (b) it is a non metal (c) it does not have mobile valence electron (d) very hard.

32. The layers of graphite can easily slide over each other, and graphite therefore has a lubricating action.

This is because

- (a) The layers have weak intermolecular forces between them.
(b) The layers have strong intermolecular forces between them.
(c) The layers have weak intramolecular forces between them.
(d) The layers have strong intramolecular forces between them.

33. In NaCl crystal

- (a) The chloride ions are larger than the sodium ions
(b) The chloride ions are smaller than the sodium ions
(c) The chloride ions are equal in size to the sodium ions
(d) none of the above.

34. All the following include the types of crystals except
(a) metallic (b) covalent (c) ionic (d) aqueous

35. Metallic crystal can be defined as a lattice of cations held together by a
(a) sea of free electrons (b) fixed electrons (c) single electron (d) bonding electron

36. The bonding strength in metals varies with the number of electrons available as well as with the size of the atoms.
(a) no (b) yes (c) sometimes (d) none of these.

37. The attractive forces in molecular crystal are mainly
(a) van der Waals interactions (b) electrovalent interactions (c) covalent interactions (d) none of the above

38. The electrostatic forces in ionic crystals is
(a) directional (b) fixed (c) non-directional (d) none of the above

39. Salt will be insoluble if -
(a) lattice energy is lower than hydration energy (b) lattice energy and hydration energy are equal (c) lattice energy is higher than hydration energy (d) all of the above

40. The number of closest neighbors to which an atom is bonded is called
(a) number of atoms per unit cell (b) number of atoms per unit crystal (c) organization number (d) the coordination number

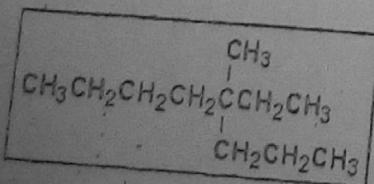
41. The energy change that accompanies the process in which the isolated gaseous ions of a compound come together to form 1 mol of the ionic solid is known as
(a) ionization energy (b) atomization energy (c) potential energy (d) lattice energy

42. A reaction is an exothermic reaction
(a) if the energy of the products is lower than the energy of the reactants.
(b) if the energy of the products is greater than the energy of the reactants.
(c) if the energy of the products is equal to the energy of the reactants.
(d) if no energy is involved.

43. Which one is correct order of the bonding strength in the following metals
(a) Al < Mg < Na (b) Al > Mg < Na (c) Al > Mg > Na (d) none of the above

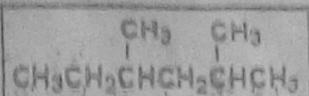
44. The ions NaCl are discrete or separate, because
(a) the electron density falls to zero between the ions (b) the electron volume falls to zero between the ions (c) the electron temperature falls to zero between the ions
(d) the electron energy falls to zero between the ions.

45. Select the correct IUPAC name for:



- (a) 3-methyl-5-ethyloctane (b) 5-methyl-5-propylheptane (c) 4-ethyl-4-methyloctane
(d) 3-methyl-3-propyloctane

46. Select the correct IUPAC name for:



- (a) 1,1,3-trimethylpentane (b) 1-ethyl-1,3-dimethylbutane (c) 2,4-dimethylhexane (d) 3,5-dimethylhexane

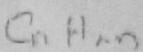
47. Select the correct IUPAC name for:



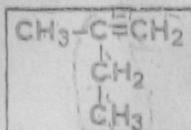
- (a) 1,4-dimethylcyclopentane (b) 1,3-dimethylcyclopentane (c) 2,5-dimethylcyclopentane
(d) 2,3-dimethylcyclopentane

48. The general formula for noncyclic alkenes is:

- (a) $\text{C}_n\text{H}_{2n+2}$ (b) C_nH_{2n} (c) $\text{C}_n\text{H}_{2n-2}$ (d) C_nH_{n+2}



49. The correct name for the compound given below is:



- (a) 2-methyl-1-butene (b) 2-ethyl-1-propene (c) 2-ethyl-1-pentane (d) 3-methyl-2-butene

50. Which one of the following is a secondary alcohol?

- (a) $\text{CH}_3\text{CH}_2\text{OH}$ (b) CH_3OH (c) $\text{CH}_3\text{CH}(\text{OH})\text{CH}_3$ (d) $(\text{CH}_3)_2\text{C}_2\text{OH}$

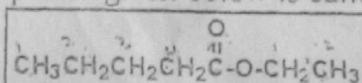
51. Schiff's reagent can be used to:

- (a) identify an aldehyde (b) oxidized aldehyde (c) reduce a ketone (d) all of the above

52. Which of the following formulas represents an alkene?

- (a) $\text{CH}_3\text{CH}_2\text{CH}_3$ (b) CH_3CH_3 (c) $\text{CH}_3\text{CH}_2\text{CHCH}_2$ (d) $\text{CH}_3\text{CH}_2\text{Cl}$

53. The compound given below is called?

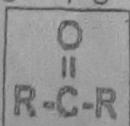


- (a) butyl acetate (b) ethyl pentanoate (c) propyl pentanoate (d) ethyl butanoate

54. The chemistry of aldehydes and ketones is largely determined by the.

- (a) carbonyl group (b) alkoxy group (c) alkoxide group (d) carboxyl group

55. The functional group given below is characteristic of organic



- (a) ketones (b) acids (c) aldehydes (d) esters

56. Select the compound that would have the highest boiling point
(a) CH_3COOH (b) CH_3OCH_3 (c) CH_3CH_3 (d) $\text{CH}_3\text{CH}_2\text{Cl}$
57. The name of the alkane isomer of cis-3-hexene is:
(a) 2-methylpentane (b) 3-methylpentane (c) cyclohexane (d) 2,3-dimethylbutane
58. Lithium aluminium hydrogen tri-tertiary butoxide is:
(a) reducing reagent (b) oxidizing agent (c) dehydrating reagent (d) complexing agent
59. Which of the following statements is FALSE regarding the reaction between Cl_2 and C_2H_6 ?
(a) It is a substitution reaction.
(b) The reaction will give a single product of $\text{C}_2\text{H}_5\text{Cl}$.
(c) The reaction mechanism involves free radicals.
(d) The reaction can be initiated with either sunlight or heat.
60. Which of the following will undergo an addition reaction with chlorine?
(a) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$ (b) $\text{CH}_3\text{CH}_2\text{CH}=\text{CHCH}_3$ (c) C_6H_6 (d) $\text{CH}_3\text{CH}_2\text{COOH}$
61. The reaction of ethyne with which of the following gives $\text{CH}_2\text{Br}-\text{CHBrCl}$?
(a) HCl, then HBr (b) HCl, then Br_2 (c) Cl_2 , then HBr (d) Cl_2 , then Br_2
62. Dehydration of an alcohol leads to the formation of an
(a) alkene (b) alkane (c) alkyne (d) alkyl halide
63. Aldehydes can be distinguished from ketones by means of:
(a) brady's reagent test (b) Lucas reagent test (c) Tollen's reagent test (d) Iodoform test
64. Which of the following alcohols forms a ketone when oxidized?
(a) 1-propanol (b) methanol (c) 2-methyl-2-propanol (d) 2-propanol
65. What is the sum of the coefficients in the balanced equation for the complete combustion of 2-methylbutane? Use smallest whole number coefficients. Do not forget coefficients of 1.
(a) 10 (b) 13 (c) 17 (d) 20
66. The organic starting materials for the preparation of an ester could be
(a) an acid and an alcohol (b) a ketone and an alcohol (c) an alkane and a ketone (d) only an acid
67. The reverse process of esterification is known as?
(a) Hydrolysis (b) Saponification (c) Polymerization (d) hydration
68. The segment $-\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2-$ represents the polymer named
(a) polyethylene (b) polyhexene (c) polypropylene (d) polystyrene
69. For which of the compounds below are cis-trans isomers possible?
 $\text{CH}_3\text{CH}=\text{CH}_2$ $\text{CH}_3\text{CH}=\text{CHCH}_2\text{CH}_3$ $\text{CH}_3\text{CH}=\text{CHCH}_3$
(1) (2) (3)
(a) only 2 (b) both 1 and 2 (c) both 2 and 3 (d) all three
70. Select the IUPAC name for the compound below.
(CH3)2CHCH2CH(C(=O)O)CH3
(a) 2,4-dimethylpentanoic acid (b) 1,1,3-trimethylbutanoic acid
(c) 1-hydroxy-2,4-dimethylpentanone (d) 2-carboxyisohexane

22. $\text{C}_2\text{H}_5\text{O}_2 \xrightarrow{\text{zymase}} 2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$ + energy. The reaction represented by the equation is useful in production of (a) propanoic acid (b) butanol (c) methanol (d) ethanol
23. The saponification of an alkanoate to produce soap and alkanol involves (a) dehydration (b) esterification (c) hydrolysis (d) hydration
24. The final oxidation product of propanol is (a) propanoic acid (b) propanoyl chloride (c) propylethanoate (d) propanamide
25. The de-carboxylation of ethanoic acid will produce carbon (iv) oxide and (a) methane (b) ethane (c) propane (d) butane
26. An organic compound with a pleasant smell is likely to have the general molecular formula (a) RCHO (b) RCOOH (c) RCOOR' (d) RCOR'
- $\text{H}-\text{C}=\text{C}-\text{H}$
27. The name of $\text{Cl}-\text{CH}=\text{CH}-\text{Cl}$ is (a) trans-1,2-dichloroethene (b) cis-1,2-dichloroethene (c) trans-1,1-dichloroethene (d) cis-1,1-dichloroethene
28. The empirical formula of a hydrocarbon ($\text{C}=12, \text{H}=1$) that contains 80.0% carbon is (a) CH_3 (b) CH_2 (c) C_2H (d) C_2H_2
29. Complete hydrogenation of ethyne yields (a) benzene (b) methane (c) ethane (d) ether
30. If the silver mirror test is positive, it indicates the presence of an (a) alkyne (b) alkanol (c) alkanone (d) alkanal
- $\begin{array}{c} \text{CH}_3 & \text{CH}_3 \\ | & | \\ \text{CH}_3\text{CH}_2\text{CH}-\text{CH}_2\text{CH}-\text{CH}_3 \end{array}$
31. Select the correct IUPAC name for: (a) 1,1,3-trimethylpentane (b) 1-ethyl-1,3-dimethylbutane (c) 2,4-dimethylhexane (d) 3,5-dimethylhexane
32. The correct name for the compound given below is:
- $\begin{array}{c} \text{CH}_3-\text{C}=\text{CH}_2 \\ | \\ \text{CH}_2 \\ | \\ \text{CH}_3 \end{array}$
- (a) 2-methyl-1-butene (b) 2-ethyl-1-propene (c) 2-ethyl-1-pentane (d) 3-methyl-2-butene
33. Select the correct IUPAC name for:
- $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{C}(\text{CH}_3)\text{CH}_2\text{CH}_3 \\ | \\ \text{CH}_2\text{CH}_2\text{CH}_3 \end{array}$
- (a) 5-methyl-5-ethyloctane (b) 5-methyl-5-propylheptane (c) 4-ethyl-4-methyloctane (d) 3-methyl-3-propyloctane
- An organic compound, on analysis, contain 40% carbon, 6.7% hydrogen. If the molar mass is 60, use the information to answer questions 34 and 35:
34. What is the empirical formula? (a) CH_2 (b) CH_2Cl (c) CH_2O (d) CHO
35. What is the molecular formula? (a) $\text{C}_2\text{H}_4\text{O}_2$ (b) C_2H_2 (c) $\text{C}_3\text{H}_6\text{O}_3$ (d) $\text{C}_2\text{H}_2\text{O}_2$
36. The formula which shows the mode of linkage of the various atoms in a molecule is called (a) molecular formula (b) structural formula (c) empirical formula (d) bonding formula
- of these is not a chromatography technique? (a) Gas-Solid chromatography (b) Thin layer chromatography (c) Column chromatography (d) partition chromatography
- formula which expresses the simplest ratio of number of atom of the constituent element present (a) molecular formula (b) structural formula (c) empirical formula (d) rational formula
- these factors should be considered when selecting method of purification except (a) solubility (b) boiling point (c) crystallization (d) melting point
- Which of these methods of purification depends on the differences in solubility (a) distillation (b) sublimation (c) crystallization (d) differential extraction
- Which method can be used to separate sugar and sodium chloride in hot ethanol (a) distillation (b) sublimation (c) crystallization (d) differential extraction
42. A device for the extraction of organic components from an insoluble matrix is (a) distillation apparatus (b) separating funnel (c) soxhlet extractor (d) differential extractor

- Which technique is used to separate constituent particle of a mixture
 (a) Thin-layer chromatography (b) sublimation (c) crystallization (d) distillation
15. The liquid chromatography uses what type of phases? (a) Gas-Liquid (b) Liquid-Liquid (c) Liquid (d) Solid
16. For a pure rule was first discovered by (a) Nernst (b) Gibbs (c) Arrhenius (d) Le Chatelier
17. The shape gas and mixture of gases, the degrees of freedom are (a) 2 & 2 (b) 2 & 3 (c) 3 & 2 (d) 3 & 3
18. The shape of BO_3^{3-} ion is (a) Trigonal Bipyramidal (b) equilateral (c) Trigonal planar (d) octahedral
19. For one component of components in a solution of common salt is (a) 0 (b) 1 (c) 2 (d) 3
20. For one component system, at triple point the number of degrees of freedom is (a) 0 (b) 1 (c) 2 (d) 3
21. In ionic Crystals (a) Ionic Crystals (b) Metallic Crystals (c) Molecular Crystals (d) Macromolecular crystals
22. (a) The sodium of NaCl (b) Metallic Crystals (c) Molecular Crystals (d) Macromolecular crystals
23. All the none of the above (a) The chloride ions are larger than the sodium ions (b) The chloride and sodium ions are equal in size between the following (c) The chloride and sodium ions are equal in size (d) In the ions
24. Metals (a) Structure of ionic crystal except (a) High melting points because of strong forces (b) none or aqueous solution, they are good conductors of electricity (c) lattice will be soluble in aqueous solvents.
25. Salt (a) primary bonds (b) secondary bonds (c) tertiary bonds (d) lattice energy is higher than hydration energy
26. A mixture of two miscible liquids (ethanol and water) has the number of phases equal to (a) zero (b) one (c) two (d) three
27. What is the shape of sodium chloride is a (a) one phase system (b) two phase system (c) three phase system (d) none of these
28. The continuous bombardment of molecules of a gas on the wall of a vessel gives rise to (a) absolute temperature (b) kinetic theory (c) pressure (d) gas
29. The total rate of change of momentum per molecule per second for all the three components is (a) mU_x (b) mU_y (c) $2mU_z$ (d) $3V$
30. The key factor that determines the physical state of a substance is the average kinetic energy of the molecules relative to (a) heat (b) pressure (c) average energy of the attractive forces between them (d) condensation
31. Conversions from one state to another occurs via heating or cooling which changes the (a) temperature (b) average kinetic energy of matter (c) translational motion (d) freezing
32. The change of matter from one state to another is called a (a) vapourization (b) sublimation (c) phase change (d) freezing
33. NaCl boils at (a) $804^\circ C$ (b) room temperature (c) $1456^\circ C$ (d) $1465^\circ C$
34. What is the distance covered by a molecule of a gas moving from one wall of a container to another (a) $4L$ (b) L (c) $2L$ (d) $6L$
35. What does this mathematical expression represents $2mnU^2/L$ (a) Ideal gas equation (b) Volum (c) total rate of change of momentum for n particles (d) Rate of change of momentum relative to the y - axis
36. The molecule of a gas within a container will be in a state of motion unless they (a) React with (b) become inert (c) collide with the wall (d) none of the above
37. Collisions of gas against one another and the wall are said to be (a) Brittle (b) Inelastic (c) none (d) above
38. In solids, the intermolecular attractions are than the Kinetic Energy (a) the same (b) weaker (c) stronger (d) none of the above

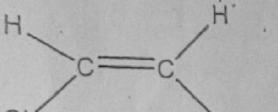
3. Which technique is used to separate constituent particle of a mixture
(a) chromatography (b) sublimation (c) crystallization (d) distillation
4. Thin-layer chromatography uses what type of phases? (a) Gas-Liquid (b) Liquid-Liquid (c) Liquid-Gas
5. Liquid-Solid
15. The phase rule was first discovered by (a) Nernst (b) Gibbs (c) Arrhenius (d) Le Chatelier
16. For a pure gas and mixture of gases, the degrees of freedom are (a) 2 & 2 (b) 2 & 3 (c) 3 & 2 (d) 3 & 3
17. The shape of BO_3^{3-} ion is (a) Trigonal Bipyramidal (b) equilateral (c) Trigonal planar (c) octahedral
18. The number of components in a solution of common salt is (a) 0 (b) 1 (c) 2 (d) 3
49. For one component system, at triple point the number of degrees of freedom is (a) 0 (b) 1 (c) 2 (d) 3
50. For a two component system, at triple point the number of degrees of freedom is (a) 0 (b) 1 (c) 2 (d) 3
51. Which of the following solid crystals is formed by transfer and acceptance of electron
(a) Ionic Crystals (b) Metallic Crystals (c) Molecular Crystals (d) Macromolecular crystals
52. In ionic crystal of NaCl (a) The chloride ions are larger than the sodium ions
(b) The sodium ions are larger than the chloride ions (c) The chloride and sodium ions are equal in size
(d) none of the above
53. All the following are properties of ionic crystal except (a) High melting points because of strong forces between ions (b) Structure is rigid and brittle (c) They are usually soluble in aqueous solvents.
(d) In the solid state or aqueous solution, they are good conductors of electricity
54. Metals and ceramics are held together by (a) primary bonds (b) secondary bonds (c) tertiary bonds
(d) none of the above
55. Salt will be soluble in water if
(a) lattice energy is higher than hydration energy (b) lattice energy is lower than hydration energy
(c) lattice energy is equal to hydration energy (d) lattice energy is lower than ionisation energy
56. A mixture of two miscible liquids (ethanol and water) has the number of phases equal to
(a) zero (b) one (c) two (d) three
57. A saturated solution of sodium chloride is a (a) one phase system (b) two phase system
(c) three phase system (d) none of these
58. What is the shape of SO_4^{2-} ? (a) T-shape (b) linear shape (c) quadrilateral shape (d) tetrahedral shape
59. The continuous bombardment of molecules of a gas on the wall of a vessel gives rise to (a) absolute temperature (b) kinetic theory (c) pressure (d) gas
60. The change in momentum per molecule per single collision in the x-direction at face A wall of a cubic vessel is (a) mU_x (b) mU_x (c) $2mU_x$ (d) $2L$
61. The total rate of change of momentum per molecule per second for all the three components is (a) mU
(b) $2mU^2$ (c) $2mU_1^2/L$ (d) $3V$
62. The key factor that determines the physical state of a substance is the average kinetic energy of the molecules relative to (a) heat (b) pressure (c) average energy of the attractive forces between them (d) condensation
63. Conversions from one state to another occurs via heating or cooling which changes the (a) temperature
(b) average kinetic energy of matter (d) translational motion
64. The change of matter from one state to another is called a (a) vapourization (b) sublimation (c) pha

48. The shape of BO_3^{3-} ion is (a) Trigonal Bipyramidal (b) Tetrahedral
 49. The number of components in a solution of common salt is (a) 0 (b) 1
 50. For one component system, at triple point the number of degrees of freedom is (a) 0 (b) 1
 51. For a two component system in a single phase, the degree of freedom is (a) 0 (b) 1
 52. Which of the following solid crystals is formed by transfer and acceptance of electron (c) Molecular Crystals (d) Macromolecular crystals
 53. In ionic crystal of NaCl (a) The chloride ions are larger than the sodium ions (b) The sodium ions are larger than the chloride ions (c) The chloride and sodium ions are equal in size (d) none of the above
 54. All the following are properties of ionic crystal except (a) High melting points because of strong forces between ions (b) Structure is rigid and brittle (c) They are usually soluble in aqueous solvents.
 55. Metals and ceramics are held together by (a) primary bonds (b) secondary bonds (c) tertiary bonds (d) none of the above
 56. Salt will be soluble in water if (a) lattice energy is higher than hydration energy (b) lattice energy is lower than hydration energy
 (c) lattice energy is equal to hydration energy (d) lattice energy is lower than ionization energy
 57. A mixture of two miscible liquids (ethanol and water) has the number of phases equal to (a) zero (b) one (c) two (d) three
 58. A saturated solution of sodium chloride is a (a) one phase system (b) two phase system
 (c) three phase system (d) none of these
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 61. The change in momentum per molecule per single collision in the x-direction at face A wall of a cubic vessel is (a) mU_x (b) mU_x (c) $2mU_x$ (d) $2L$
 62. The total rate of change of momentum per molecule per second for all the three components is (a) mU_x (b) $2mU_x^2$ (c) $2mU_x^2/L$ (d) $3V$
 63. The key factor that determines the physical state of a substance is the average kinetic energy of the molecules relative to (a) heat (b) pressure (c) average energy of the attractive forces between them (d) condensation
 64. Conversions from one state to another occurs via heating or cooling which changes the (a) temperature (b) average kinetic energy (c) matter (d) translational motion
 65. The change of matter from one state to another is called a (a) vapourization (b) sublimation (c) phase change (d) freezing
 66. NaCl boils at (a) $804^\circ C$ (b) room temperature (c) $1456^\circ C$ (d) $1465^\circ C$
 67. What is the distance covered by a molecule of a gas moving from one wall of a container to another (a) $4L$ (b) L (c) $2L$ (d) $6L$
 68. The molecule of a gas within a container will be in a state of motion unless they (a) React with (b) become inert (c) collide with the wall (d) none of the above
 69. Collisions of gas against one another and the wall are said to be (a) Brittle (b) Inelastic (c) none of the above (d) Elastic
 70. In solids, the intermolecular attractions are than the Kinetic Energy (a) the same (b) weaker (c) stronger (d) none of the above

2016/007

1. You can expect that carbon in CH_3Cl will be (a) unhybridized (b) sp^2 -hybridized (c) sp^3 -hybridized
..... is the equilibrium distance between the nuclei of the bonded atoms in a molecule (a) atom distance (b) ionic strength (c) lattice energy (d) Bond length
19. The $\text{C}\equiv\text{C}$ bond in ethyne is viewed as a multiple bond of the (a) $\sigma + \pi + \pi$ (b) $\sigma + \text{sp} + \pi$ (c) $\sigma + \text{sp} +$ (d) $\pi\pi: \sigma + \sigma$
20. In a molecule of ethene, an unhybridized half-filled 2p orbital in a carbon atom overlaps side-by-side with the unhybridized, half-filled 2p orbital of other carbon atom to give bond (a) sigma (b) pi (c) s (d) none of options (a) to (c)
21. The σ bond in the C-H bond of methane results from the bonding of and orbitals (a) 2s and 1s (b) 2sp^3 and sp (c) 2sp^3 and 1s (d) 2p and 1s
22. The sigma bond connecting the two carbons of ethyne are formed by orbitals of (a) $2\text{sp}-2\text{sp}$ (b) $2\text{p}-2\text{p}$ (c) s-sp (d) $2\text{sp}^2-2\text{sp}^2$
23. In the reversible reaction: $\text{H}-\text{C}\equiv\text{C}-\text{H} + \text{-NH}_2$ to produce $\text{H}-\text{C}\equiv\text{C}^- + \text{NH}_3$, the stronger acid is (a) $\text{H}-\text{C}\equiv\text{C}^-$ (b) $\text{H}-\text{C}\equiv\text{C}-\text{H}$ (c) NH_3 (d) -NH_2
24. A covalent bond formed due to head-to-head overlap of orbitals of two atoms along the line joining the two nuclei is called (a) pi bond (b) hydrogen bond (c) sigma bond (d) ionic bond
25. Consider CHCl_2COOH , CCl_3COOH , CH_2ClCOOH , and CH_3COOH . The most acidic of the four is (a) CCl_3COOH (b) CH_3COOH (c) CH_2ClCOOH (d) CHCl_2COOH
26. The main ways in which structure affects the acidity of organic compounds in solutions depend on the following except (a) The electronegativity of the atom from which the proton is lost (b) electron delocalization in the conjugate base (c) size of the central atom in the organic compound (d) the strength of the bond to the atom from which the proton is lost
27. You can expect that carbon in the functional group of $\text{C}_2\text{H}_5\text{CHO}$ will be (a) sp^3 -hybridized (b) sp^2 -hybridized (c) sp-hybridized (d) unhybridized
28. The process of mixing of the atomic orbitals together to form new hybrid orbitals, having equal energy, identical shape and symmetrical orientation is (a) catenation (b) polarization (c) hybridization (d) electronic excitation
9. The order of increasing acidity of $\text{HC}\equiv\text{CH}$, $\text{H}_3\text{C}-\text{CH}_2$, $\text{H}_2\text{C}=\text{CH}_2$ is arranged as (a) $\text{HC}\equiv\text{CH} > \text{H}_2\text{C}=\text{CH}_2 > \text{H}_3\text{C}-\text{CH}_2$ (b) $\text{H}_3\text{C}-\text{CH}_2 > \text{H}_2\text{C}=\text{CH}_2 > \text{HC}\equiv\text{CH}$ (c) $\text{H}_2\text{C}=\text{CH}_2 > \text{H}_3\text{C}-\text{CH}_2 > \text{HC}\equiv\text{CH}$ (d) $\text{HC}\equiv\text{CH}$, $\text{H}_2\text{C}=\text{CH}_2$ and $\text{H}_3\text{C}-\text{CH}_2$ have equal acid strength
- Consider CH_4 , HF, H_2O and NH_3 , CH_4 is considered the weakest acid due to (a) bigger size its volatility (b) the more electropositive of carbon (c) the presence of four hydrogen atoms continuous bombardment of molecules of a gas on the wall of a vessel gives rise to (a) absolute temperature (b) kinetic theory (c) pressure (d) gas
3. The total rate of change of momentum per molecule per second for all the three components is (a) mU_x (b) mU_x (c) $2mU_x$ (d) $2L$
- sizey factor that determines the physical state of a substance is the average kinetic energy of the molecule due to (a) heat (b) pressure (c) average energy of the attractive forces between them (d) condensation forces from one state to another occurs via heating or cooling which changes the (a) temperature (b) average kinetic energy (c) matter (d) translational motion
- Change of matter from one state to another is called a (a) vapourization (b) sublimation (c) phase change (d) freezing
- NaCl boils at (a) 804°C (b) room temperature (c) 1456°C (d) 1465°C
- What is the distance covered by a molecule of a gas moving from one wall of a container to another (a) $4L$ (b) L (c) $2L$ (d) $6L$
- What does this mathematical expression represents $2mn/L^2$ (a) total rate of change of (b) density (c) total rate of change of

- The σ bond in the C-H bond of methane results from the bonding of and orbitals (a) 2s and 1s (b) $2sp^3$ and sp (c) $2sp^3$ and 1s (d) $2p$ and 1s
- In the reversible reaction: $H-C\equiv C-H + -NH_2 \rightarrow H-C\equiv C^- + NH_3$, the stronger acid is (a) $H-C\equiv C-$ (b) $H-C\equiv C-H$ (c) NH_3 (d) $-NH_2$
- A covalent bond formed due to head-to-head overlap of orbitals of two atoms along the line joining the two nuclei is called (a) pi bond (b) hydrogen bond (c) sigma bond (d) ionic bond
- Consider $CHCl_2COOH$, CCl_3COOH , $CH_2ClCOOH$, and CH_3COOH . The most acidic of the four is (a) CCl_3COOH (b) CH_3COOH (c) $CH_2ClCOOH$ (d) $CHCl_2COOH$
- The main ways in which structure affects the acidity of organic compounds in solutions depend on the delocalization in the conjugate base (a) size of the central atom in the organic compound (b) the strength of the bond to the atom from which the proton is lost (c) the strength of the bond to the atom from which the proton is lost (d) the strength of the bond to the atom from which the proton is lost
- You can expect that carbon in the functional group of C_2H_5CHO will be (a) sp^3 -hybridized (b) sp^2 -hybridized (c) sp -hybridized (d) unhybridized
- The process of mixing of the atomic orbitals together to form new hybrid orbitals, having equal energy, identical shape and symmetrical orientation is (a) catenation (b) polarization (c) hybridization (d) electronic excitation
- The order of increasing acidity of $HC\equiv CH$, H_3C-CH_2 , $H_2C=CH_2$ is arranged as (a) $HC\equiv CH > H_2C=CH_2 > H_3C-CH_2$ (b) $H_3C-CH_2 > H_2C=CH_2 > HC\equiv CH$
- Consider CH_4 , HF, H_2O and NH_3 . CH_4 is considered the weakest acid due to (a) bigger size of its volatility (b) more electropositive of carbon (c) the more electropositive of carbon (d) the presence of four hydrogen atoms
- Continuous bombardment of molecules of a gas on the wall of a vessel gives rise to (a) absolute temperature (b) kinetic theory (c) pressure (d) gas
- Total rate of change of momentum per molecule per second for all the three components is (a) mU_x^2 (b) mU_x (c) $2mU_x$ (d) $2L$
- sizey factor that determines the physical state of a substance is the average kinetic energy of the molecules (a) heat (b) pressure (c) average energy of the attractive forces between them (d) condensation
- forions from one state to another occurs via heating or cooling which changes the (a) temperature (b) average kinetic energy (c) matter (d) translational motion
- Change of matter from one state to another is called a (a) vapourization (b) sublimation (c) phase change (d) freezing
- $NaCl$ boils at (a) $804^\circ C$ (b) room temperature (c) $1456^\circ C$ (d) $1465^\circ C$
- What is the distance covered by a molecule of a gas moving from one wall of a container to another? (a) $4L$ (b) L (c) $2L$ (d) $6L$
- What does this mathematical expression represents $2mnU^2/L$ (a) Ideal gas equation (b) Volume of the cube (c) total rate of change of momentum for n particles (d) Rate of change of momentum relative to y-axis
- The molecule of a gas within a container will be in a state of motion unless they (a) React with gases (b) become inert (c) collide with the wall (d) none of the above
- Collisions of gas against one another and the wall are said to be (a) Brittle (b) Inelastic (c) none of the above (d) Elastic
- In solids, the intermolecular attractions are than the Kinetic Energy (a) the same (b) weaker (c) stronger (d) none of the above

1. The conversion of open chain alkanes into cycloalkanes and aromatics compounds is called
 (a) cracking (b) isomerization (c) reforming (d) polymerization
2. The simplest branched chain hydrocarbon (a) ethane (b) ethene (c) propane (d) butane
3. The final product of the reaction between methane and chlorine in the presence of ultraviolet light are hydrogen chloride and (a) trichloromethane (b) dichloromethane (c) tetrachloromethane (d) monochloromethane
4. The ability of carbon to form long chains is (a) alkylation (b) acylation (c) catenation (d) carbonation
5. Which of the following compounds will undergo polymerization reaction? (a) C_2H_2 (b) C_2H_5COOH
 (c) C_2H_6 (d) C_2H_5OH
6. $C_6H_{12}O_6 \xrightarrow{\text{zymase}} 2C_2H_5OH + 2CO_2 + \text{energy}$. The reaction represented by the equation is useful in the production of (a) propanol (b) butanol (c) methanol (d) ethanol
7. The saponification of an alkanoate to produce soap and alkanol involves (a) dehydration (b) esterification (c) hydrolysis (d) hydration
8. The final oxidation product of propanol is (a) propanoic acid (b) propanoyl chloride (c) propylethanoate (d) propanamide
9. The de-carboxylation of ethanoic acid will produce carbon (iv) oxide and (a) methane (b) ethane (c) propane (d) butane
10. An organic compound with a pleasant smell is likely to have the general molecular formula (a) $RCHO$ (b) $RCOOH$ (c) $RCOOR'$ (d) $RCOR'$
11. 
12. The name of $Cl-C=C-Cl$ is (a) trans-1,2-dichloroethene (b) cis-1,2-dichloroethene
 (c) trans-1,1-dichloroethene (d) cis-1,1-dichloroethene
13. The empirical formula of a hydrocarbon ($C=12, H=1$) that contains 80.0% carbon is (a) CH_3 (b) CH_2 (c) C_2H (d) C_2H_2
14. Complete hydrogenation of ethyne yields (a) benzene (b) methane (c) ethane (d) ethane
15. If the silver mirror test is positive, it indicates the presence of an (a) alkyne (b) alkanol (c) alkanone (d) alkanal
16. The phase rule was first discovered by (a) Nernst (b) Gibbs (c) Arrhenius (d) Le Chatelier
17. For a pure gas and mixture of gases, the degrees of freedom are (a) 2 & 2 (b) 2 & 3 (c) 3 & 2 (d) 3 & 3
18. The shape of BO_3^{3-} ion is (a) Trigonal Bipyramidal (b) equilateral (c) Trigonal planar (d) octahedral
19. The number of components in a solution of common salt is (a) 0 (b) 1 (c) 2 (d) 3
20. For one component system, at triple point the number of degrees of freedom is (a) 0 (b) 1 (c) 2 (d) 3
21. For a two component system in a single phase, the degree of freedom is (a) 0 (b) 1 (c) 2 (d) 3
22. Which of the following solid crystals is formed by transfer and acceptance of electron (a) Ionic Crystals (b) Metallic Crystals (c) Molecular Crystals (d) Macromolecular crystal
23. In ionic crystal of $NaCl$ (a) The chloride ions are larger than the sodium ions
 (b) The sodium ions are larger than the chloride ions (c) The chloride and sodium ions are equal in size (d) none of the above
24. All the following are properties of ionic crystal except (a) High melting points because of strong attraction between ions (b) Structure is rigid and brittle (c) They are usually soluble in aqueous solvents.
 (d) In the solid state or aqueous solution, they are good conductors of electricity
25. Metals and ceramics are held together by (a) primary bonds (b) secondary bonds (c) tertiary bonds (d) none of the above
26. Salt will be soluble in water if (a) lattice energy is higher than hydration energy (b) lattice energy is lower than hydration energy
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27. A mixture of two miscible liquids (ethanol and water) has the number of phases equal to (a) zero (b) one (c) two (d) three
28. A saturated solution of sodium chloride is a (a) one phase system (b) two phase system
 (c) three phase system (d) none of these
29. What is the shape of SO_4^{2-} ? (a) T-shape (b) linear shape (c) quadrilateral shape (d) tetrahedral shape

- (a) 5-methyl-5-ethyloctane (b) 5-methyl-5-propylheptane (c) 4-ethyl-4-methyloctane
 (d) 3-methyl-3-propyloctane
- An organic compound, on analysis, contain 40% carbon, 6.7% hydrogen. If the molar mass is 60, use the information to answer questions 34 and 35:
18. What is the empirical formula? (a) CH_2 (b) CH_2Cl (c) CH_2O (d) CHO
 19. What is the molecular formula? (a) $\text{C}_2\text{H}_4\text{O}_2$ (b) C_2H_2 (c) $\text{C}_3\text{H}_6\text{O}_3$ (d) $\text{C}_2\text{H}_2\text{O}_2$
20. The formular which shows the mode of linkage of the various atoms in a molecule is called (a) molecular formular (b) structural formular (c) empirical formular (d) bonding formular
21. One of these is not a chromatography technique? (a) Gas-Solid chromatography (b) Thin layer chromatography (c) Column chromatography (d) partition chromatography
22. The formular which expresses the simplest ratio of number of atom of the constituent element present is (a) molecular formula (b) structural formular (c) empirical formular (d) rational formular
23. These factors should be considered when selecting method of purification except (a) solubility (b) boiling point (c) crystallization (d) melting point
24. Which of these methods of purification depends on the differences in solubility (a) distillation (b) sublimation (c) crystallization (d) differential extraction
25. Which method can be used to separate sugar and sodium chloride in hot ethanol (a) distillation (b) sublimation (c) crystallization (d) differential extraction
26. A device for the extraction of organic components from an insoluble matrix is (a) distillation apparatus (b) separating funnel (c) soxhlet extractor (d) differential extractor
27. Which technique is used to separate constituent particle of a mixture (a) chromatography (b) sublimation (c) crystallization (d) distillation
28. Thin-layer chromatography uses what type of phases? (a) Gas-Liquid (b) Liquid-Liquid (c) Liquid-Gas (d) Liquid-Solid
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30. For a pure gas and mixture of gases, the degrees of freedom are (a) 2 & 2 (b) 2 & 3 (c) 3 & 2 (d) 3 & 3
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35. Which of the following solid crystals is formed by transfer and acceptance of electron (a) Ionic Crystals (b) Metallic Crystals (c) Molecular Crystals (d) Macromolecular crystals
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- A saturated solution of sodium chloride is a (a) one phase system (b) two phase system (c) three phase system (d) none of these
- What is the shape of SO_4^{2-} (a) T-shape (b) linear shape (c) quadrilateral shape (d) tetrahedral shape
- Continuous bombardment of molecules of a gas on the wall of a vessel gives rise to (a) absolute temperature (b) kinetic theory (c) pressure (d) gas
- Change in momentum per molecule per single collision in the x-direction at face A wall of a cubical vessel (a) mU_{x0} (b) mU_x (c) $2mU_x$ (d) $2L$

- (a) 5-methyl-5-ethyloctane (b) 5-methyl-5-propylheptane (c) 4-ethyl-4-methyloctane
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- Change in momentum per molecule per single collision in the x-direction at face A wall of a cubical vessel
 (a) mU_x (b) $-mU_x$ (c) $2mU_x$ (d) $2L$

2/3

6+3

2

The total rate of change of momentum per molecule per second for all the three components is (a) mU^2 (b) $2mU^2$ (c) $2mU_1^2/L$ (d) $3V$

The key factor that determines the physical state of a substance is the average kinetic energy of the molecules relative to (a) heat (b) pressure (c) average energy of the attractive forces between them (d) condensation. Conversions from one state to another occurs via heating or cooling which changes the (a) temperature (b) average kinetic energy (c) matter (d) translational motion.

Change of matter from one state to another is (a) vapourization (b) sublimation (c) phase change (d) freezing. NaCl boils at (a) 804°C (b) room temperature (c) 1456°C (d) 1465°C

What is the distance covered by a molecule of a gas moving from one wall of a container to another? (a) $4L$ (b) L (c) $2L$ (d) $6L$

What does this mathematical expression represents $2mnU^2/L$ (a) Ideal gas equation (b) Volume of the cube (c) total rate of change of momentum for n particles (d) Rate of change of momentum relative to y -axis

The molecule of a gas within a container will be in a state of motion unless they (a) React with gases (b) become inert (c) collide with the wall (d) none of the above

Collisions of gas against one another and the wall are said to be (a) Brittle (b) Inelastic (c) none of the above (d) Elastic

In solids, the intermolecular attractions are than the Kinetic Energy (a) the same (b) weaker (c) stronger (d) none of the above

The product of the magnitude of the charge and distance between the centres of positive and negative charge is called (a) lattice energy (b) bond strength (c) dipole moment (d) electronegativity

In order to act as an acid in solution, an organic compound transfers to water (a) electron (b) proton (c) hydroxyl ion (d) radical

You can expect that carbon in CH_3Cl will be (a) unhybridized (b) sp-hybridized (c) sp^2 -hybridized (d) sp^3 -hybridized

..... is the equilibrium distance between the nuclei of the bonded atoms in a molecule (a) atomic distance (b) ionic strength (c) lattice energy (d) Bond length

The $\text{C}\equiv\text{C}$ bond in ethyne is viewed as a multiple bond of the (a) $\sigma + \pi + \pi$ (b) $\sigma + \text{sp} + \pi$ (c) $\sigma + \text{sp} + \text{sp}$ (d) $\pi + \sigma + \sigma$

In a molecule of ethene, an unhybridized half-filled 2p orbital in a carbon atom overlaps side-by-side with the unhybridized, half-filled 2p orbital of other carbon atom to give bond (a) sigma (b) pi (c) sp (d) none of options (a) to (c)

The σ bond in the C-H bond of methane results from the bonding of and orbitals (a) 2s and 1s (b) 2sp^3 and sp (c) 2sp^3 and 1s (d) 2p and 1s

The sigma bond connecting the two carbons of ethyne are formed by orbitals of (a) $2\text{sp}-2\text{sp}$ (b) $2\text{p}-2\text{p}$ (c) s-sp (d) $2\text{sp}^2-2\text{sp}^2$

In the reversible reaction: $\text{H}-\text{C}\equiv\text{C}-\text{H} + \text{-NH}_2$ to produce $\text{H}-\text{C}\equiv\text{C}^- + \text{NH}_3$, the stronger acid is (a) $\text{H}-\text{C}\equiv\text{C}^-$ (b) $\text{H}-\text{C}\equiv\text{C}-\text{H}$ (c) NH_3 (d) -NH_2

A covalent bond formed due to head-to-head overlap of orbitals of two atoms along the line joining the two nuclei is called (a) pi bond (b) hydrogen bond (c) sigma bond (d) ionic bond

Consider CHCl_2COOH , CCl_3COOH , CH_2ClCOOH , and CH_3COOH . The most acidic of the four is (a) CCl_3COOH (b) CH_3COOH (c) CH_2ClCOOH (d) CHCl_2COOH

6. The main ways in which structure affects the acidity of organic compounds in solutions depend on the following except (a) The electronegativity of the atom from which the proton is lost (b) electron delocalization in the conjugate base (c) size of the central atom in the organic compound (d) the strength of the bond to the atom from which the proton is lost

7. You can expect that carbon in the functional group of $\text{C}_2\text{H}_5\text{CHO}$ will be (a) sp^3 -hybridized (b) sp^2 -hybridized (c) sp-hybridized (d) unhybridized

8. The process of mixing of the atomic orbitals together to form new hybrid orbitals, having equal energy, identical shape and symmetrical orientation is (a) catenation (b) polarization (c) hybridization (d) electronic excitation

9. The order of increasing acidity of $\text{HC}\equiv\text{CH}$, $\text{H}_3\text{C}-\text{CH}_3$, $\text{H}_2\text{C}=\text{CH}_2$ is arranged as (a) $\text{HC}\equiv\text{CH} > \text{H}_2\text{C}=\text{CH}_2 > \text{H}_3\text{C}-\text{CH}_3$ (b) $\text{H}_3\text{C}-\text{CH}_3 > \text{H}_2\text{C}=\text{CH}_2 > \text{HC}\equiv\text{CH}$ (c) $\text{H}_2\text{C}=\text{CH}_2 > \text{H}_3\text{C}-\text{CH}_3 > \text{HC}\equiv\text{CH}$ (d) $\text{HC}\equiv\text{CH}, \text{H}_2\text{C}=\text{CH}_2$ and $\text{H}_3\text{C}-\text{CH}_3$ have equal acid strength

Consider CH_4 , HF, H_2O and NH_3 , CH_4 is considered the weakest acid due to (a) bigger size atoms (b) its volatility (c) the more electronegative atoms

- NaCl boils at (a) 804°C (b) room temperature
 What is the distance covered by a molecule of a gas moving from (a) $4L$ (b) L (c) $2L$ (d) $6L$
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 (c) $\text{H}_2\text{C}=\text{CH}_2 > \text{H}_3\text{C}-\text{CH}_3 > \text{HC}\equiv\text{CH}$ (d) $\text{HC}\equiv\text{CH}$, $\text{H}_2\text{C}=\text{CH}_2$ and $\text{H}_3\text{C}-\text{CH}_3$ have equal acid strength
8. Consider CH_4 , HF , H_2O and NH_3 , CH_4 is considered the weakest acid due to (a) bigger size
 (b) its volatility (c) the more electropositive of carbon (d) the presence of four hydrogen atoms

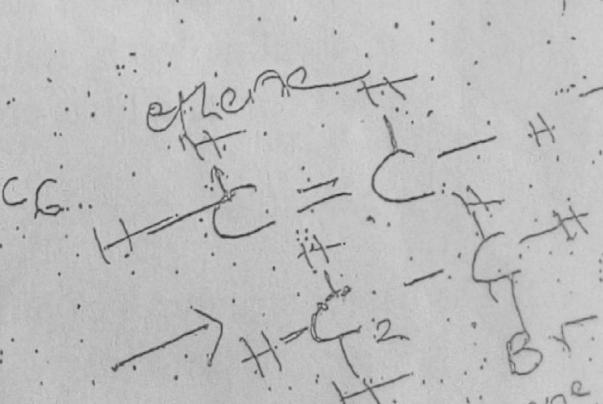
CHEMISTRY

- (1) In the preparation of alkanes from alkene what is the name of the catalyst used (a) ni. (b) nle (c) Zn
 ✓ (2) From the preparation of alkanes from halogenoalkanes _____ is used as catalyst (a) Zn/CH₃COOH (b) HgI₂/Zn (c) Cu-Zn (d) Ethoxyethane (e) pd
 ✓ (3) CH₃CH₂CH₂CH₂CH₃ is _____ (a) hexane (b) pentane (c) pentene (d) pentyne (e) Pentano.
 ✓ (4) In chlorination CH₄ _____ ls. are needed. (a) Cl₂ (b) Cl₂ ultra violet light (c) Cl₂ and nickel (d) nickel (e) pd and CH₃COOH
 ✓ (5) The general molecular formula for alkyl group is (a) C_nH_{2n+2} (b) C_nH_n (c) C_nH_{2n+1} (d) C_nH_{2n}
 ✓ (e) C_nH_{n+1}
 ✓ (6) Cracking of petroleum gives (a) ethene (b) ethano (c) propane (d) alkene (e) alkane
 ✓ (7) CH₂=CHCH₂CH₂C≡CH is (a) pentyne (b) hexyne (c) hex-5-yne (d) hex-5-ene-1-yne (e) hex-5-yne-2-one.
 ✓ (8) CH₂=C(CH₃)CH₂CH₃ is (a) 2-methylbut-1-ene (b) but-1-1-ene (c) 2-methylpropane (d) butane (e) but-4-ene.
 ✓ (9) Carbon 1 to 4 are (a) liquid (b) gases (c) waxy base (d) gasoline (e) solid dense
 ✓ (10) The functional group of aldehyde is (a) CHO (b) C=O (c) COOH (d) CH₃CH₂CH₂ (e) NH₂
 ✓ (11) The functional group of ketone is (a) R-OH (b) CO₂H (c) = (d) CH₃ (e) -OR
 ✓ (12) The functional group of alkanol is (a) R-OH (b) -H (c) -OR (d) COOH (e) =
 ✓ (13) Reaction between alkanol and carboxylic acid gives (a) alkyl alkanoate and water (b)
 alkanoate alkyl (d) propylethanoate (e) soap
 ✓ (14) The process of the above is called (a) Esterification (b) saponification (c) hydrolyses (d)
 Esterification
 ✓ (15) The reverse of the above equation is called (a) hydrolyses (b) hydroxyses
 (c) hydrolyses (d) saponins (e) alkanoyses.
 ✓ (16) Carbon 5 to carbon 7 are referred to as _____. In alkene (a) waxy liquid (b) liquid
 (c) liquid solid (d) liquidified gas (e) gases
 ✓ (17) Addition of HBr to ethene gives (a) ethane bromine (b) ethane bromane (c)
 bromoethane (d) bromoethyne
 ✓ (18) Number 12 family of Alkane member is _____.
 ✓ (19) The same molecular formula with different molecular structural formula is (a) Isotopes
 (b) Enantiomers (c) Isomers (d) mesomerism (e) Merism
 ✓ (20) _____ is the reversible interconversion of structural isomers of organic compounds (a)
 Isomers (b) Tautomerism (c) Metamerism (d) Isomorphism (e) nuclear isomerism.

SECTION B

1. Write the equation reaction of the following compounds, propanol and propanoic acid,
2. Name the following compounds. CH₃CH₂-CHBr₂-CH₂-CH₂CHCl-CH₃
3. 2 conditions are to be met during preparation of alkane from alkene. Name them
4. Write down the equations of chlorination of methane
5. Draw all the isomer of octane.

Cr H₂O



7. a. Amylase; b. cellulose; c. glycogen; d. sucrose
8. β -1,4-glycosidic bonds can be found in a polymer of
a. β -lactose; b. cellulose; c. amylopectin; d. starch
9. Which of the following polymer is more abundant in starch?
a. Furanose; b. amylase; c. glyceraldehydes; d. amylopectin
10. The oligosaccharide formed on acidic hydrolysis of either amylase or amylopectin is
a. Maltose; b. dextrin; c. glucose; d. starch
11. Which of the following is a saturated fatty acid?
a. Palmitoleic; b. lauric; c. Trans-oleic acid; d. linolenic acid
12. Which of the following is an unsaturated fatty acid?
a. Oleic; b. myristic; c. stearic; d. palmitic
13. Glyceryl tristearate can be produced from --- an --- molecules of stearic acid and glycerol respectively:
a. 1 & 2 b. 1 & 3 c. 1 & 1 d. 1 & 4
14. Which of the following reactions can encourage fat and oil manufacturers as well as agro based industries?
i. Saponification ii. Rancidity iii. Hydrogenation
a. i only b. i. & ii c. i, ii & iii d. i. & ii
15. Which of the following can be produced by condensation
i. Carbohydrate ii. protein iii. soap iv. margarine
a. i. & iv b. ii & iii c. i, ii & iii d. i & ii
16. An amino acid in ionic form is referred to as
a. Peptide ion b. zwitter ion c. amino ion d. zwitter ion
17. The bond that links constituent monomer in protein molecule is called
a. pie bond b. glycosidic bond c. hydrogen bond d. peptide bond
18. The basic structures of proteins are:
i. primary, ii. Secondary, iii. tertiary, iv. Quaternary
a. i. only b. i. & ii c. i, ii & iii d. i, ii, iii & iv

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19. Which of the following have Lewis structure that does not obey the octet rule?

- A. NH_3 B. BF_3 C. NF_3 D. CO_2

20. Which of the following molecules would you expect to have a resultant dipole moment?

- A. NO_2 B. CO C. HBr D. F_2

21. One of the following ions has a trigonal planar shape.

- A. NO_3^- B. ClO_3^- C. ICl_4^- D. SO_4^{2-}

22. The shape of molecules is determined by

- A. Lone pair of electrons and types of hybridization
- B. Lone pair of electrons and electron affinity
- C. Electronegativity and electropositivity
- D. Bond energy and lattice energy.

23. Which of the following order of repulsion between electrons is correct?

- A. shared pair, shared pair > lone pair, shared pair > lone pair, lone pair
- B. lone pair, shared pair > lone pair, lone pair > shared pair, shared pair
- C. lone pair, lone pair > shared pair, shared pair > lone pair, lone pair
- D. lone pair, lone pair > lone pair, shared pair > shared pair, shared pair

24. At the critical point C in a phase diagram, the liquid and gaseous state become

- A. Identical and distinguishable
- B. Non identical indistinguishable
- C. Identical and indistinguishable
- D. Non identical and distinguishable.

25. In what respect is the phase diagram of CO_2 different from that of water?

- A. In CO_2 , the pressure at the triple point O is greater than 1 atm.
- B. In CO_2 , the pressure at the triple point O is lower than 1 atm.
- C. In CO_2 , the pressure at the triple point O is equal to 1 atm.
- D. In CO_2 , the pressure at the triple point O is not known.

26. The coordination number in hexagonal close-packed crystal shape is

- A. 12 B. 10 C. 8 D. 6

27. The entropy in the three phases of matter follows the order

C_S

A. $S_m^{\text{gas}} > S_m^{\text{liquid}} > S_m^{\text{solid}}$ B. $S_m^{\text{gas}} > S_m^{\text{solid}} > S_m^{\text{liquid}}$

C. $S_m^{\text{gas}} > S_m^{\text{liquid}} > S_m^{\text{solid}}$ D. $S_m^{\text{solid}} > S_m^{\text{gas}} > S_m^{\text{liquid}}$

The ease with which metals conduct electricity indicates that the electrons are loosely held together. B. not mobile C. localized D. well held together

All the following are three types of holes in closest packed structures except trigonal holes A. tetrahedral holes B. octahedral holes C. hexahedral holes

The packing in the ionic crystals seeks to achieve two main things

- A. neutrality among the ions and their stability B. conduction of heat and electricity
C. given shape of different sizes D. determination of strength of crystal

At room temperature, HF is a gas while H_2O is a liquid because

- A. H_2O has a strong electrostatic force of attraction B. H_2O has double hydrogen bond
C. HF has no hydrogen bond D. H_2O and HF has equal hydrogen bond

The strength of metallic bond depends on the following except

- A. the number of electrons that become delocalized from the metal
B. the charge of the cation C. the size of the cation
D. the number of electrons that metal has.

3. The attraction between the positive end of a molecule and the negative end of another molecule is called

- A. van der Waal's attraction B. hydrogen forces of attraction C. dipole-dipole attraction
D. nuclear attraction

34. Melting of ice to become liquid is

- A. exothermic process B. endothermic process C. nuclear process
D. dispersion process

35. In phase equilibrium diagram, supercritical fluid means

- A. high density of a liquid and the low viscosity of a gas
B. high density of a gas and the low viscosity of a liquid
C. low density of a liquid and the high viscosity of a gas
D. high density of a liquid and gas

36. The mathematical relationship between the pressure of a gas and the average kinetic Energy of its molecule is a product of

- a. Charles's Law b. Kinetic theory c. Boyle's Law d. none of the above

37. What type of proportionality exists between the absolute temperature of a gas and it's Kinetic Energy?

- a. Inverse b. Direct c. Multiple d. none of the above

38. Continuous bombardment of the gas molecules on the walls of a cubical vessel will give rise to

- a. Gas b. Volume c. Pressure d. Movement