
**SURE A
IN
CHM 101**

...Past questions with answers...

*WITH HARDWORK AND FOCUS,
SUCCESS IS GUARANTEED....*



PERIODIC TABLE AND PERIODICITY

1) Electronegativity is described as

- (a) The energy required to remove an electron completely from an atom of an element.
- (b) The energy involved in adding an electron to an atom of an element. (c) The quantization of atomic energy. (d) The measure of the power of an atom to attract electron to itself.

2) Ionization energy is defined as....

- (a) The energy required to remove an electron completely from an atom of an element.
- (b) The energy of an atom (c) A measure of the power of an atom to attract electrons to itself. (d) The energy involved in adding an electron to an atom of an element.

3) Elements in the S and P blocks of the periodic table are called

- (a) Inert transition elements. (b) Transition elements.(c) Rare Elements (d) Main group elements

4) The element HYDROGEN belongs to.....

- (a) group 1 (b) The Halogens (c) group O (d) Doesn't belong to any group.

5) The following periodic properties of elements increase across the period except

- (a) Atomic radius (b) Ionization energy (c) Electronegativity (d) Effective nuclear charge

6) As we move up and to the right on the periodic table....

- (a) Atomic radius increases and electronegativity increases (b) Atomic radius decreases and electronegativity decreases (c) Atomic radius decreases and electronegativity increases (d) Atomic radius increases and electronegativity decreases

7) The periodic law of elements was postulated by

- (a) Neil Bohr (b) Lothar Moyer (c) Dmitri Mendeleev (d) Arthur Mendeleev

8) The following periodic properties of elements increase across the period except

- (a) Atomic radius (b) Ionization Energy (c) Electronegativity (d) Effective nuclear charge

9) Arrange the following atoms in order of increasing first ionization energy: P, Na, Ne, Ar, K ..

IF PEOPLE ARE DOUBTING HOW FAR YOU CAN GO, GO
FAR THAT YOU CAN'T HEAR THEM ANYMORE

(a) K > Na > P > Ar > Ne (b) Ne > Ar > Na > P > K (c) K > P > Na > Ar > Ne (d) Ne > Ar > P > Na > K

10) Arrange the following atoms/ions in order of increasing size: O^{2-} , F^- , Na^+ , Mg^{2+} , Al^{3+}

- (a) $O^{2-} > F^- > Na^+ > Mg^{2+} > Al^{3+}$ (b) $Al^{3+} > Mg^{2+} > Na^+ > O^{2-} > F^-$ (c) $Al^{3+} < Mg^{2+} < Na^+ < O^{2-} < F^-$
(d) $O^{2-} < F^- < Mg^{2+} < Na^+ < Al^{3+}$

11) Electron Affinity of an atom is defined as.....

- (a) The ability of an atom to attract electron to itself in a molecule (b) The energy required to remove an electron from one mole of a gaseous atom (c) The energy released when an electron is added to one mole of a gaseous atom (d) None Of the above

12) Which of the following is not correct

- (a) The halogens have higher electron affinity than the alkali metals (b) The noble gases have the highest electron affinity in the periodic table (c) The group IIA elements have filled S sub shells (d) The alkali earth metals have low electron affinity

13) Beryllium atom has 4 protons, 5 neutrons and 4 electrons, What is the mass number of this atom?..

- (a) 4 (b) 5 (c) 8 (d) 9

14) Which of these are the symbols of Lawrencium and Nobelium?

- (a) Lw and Nb (b) Lr and No (c) La and Nm (d) None of the above

15) Which of the following is not a Main group element?

- (a) Sodium (b) Beryllium (c) Iodine (d) Cadmium

16) The size of atoms decrease from left to right across a period. This statement is

- (a) True (b) False (c) Not always (d) None of the above

17) Exhibition of variable valencies is common among

- (a) A period (b) Main group elements (c) d-block elements (d) Halogens

18) How many groups are in the periodic table?

- (a) 18 (b) 7 (c) 8 (d) None of the above

8) In Oxidation -Reduction reactions, the following statements are true except

- (a) Oxidation and reduction always occur simultaneously
- (b) Oxidation is characterized by the loss of electrons
- (c) Reduction is characterized by the loss of electrons
- (d) Oxidation can be defined as an increase in oxidation number

9) Which one of these is slightly soluble

- (a) AgSO_4
- (b) CaCO_3
- (c) CuSO_4
- (d) Na_3PO_4

10) Chemical equations must be balanced in accordance with

- (a) Law of Multiple proportion
- (b) Law of Conservation of Mass
- (c) Law of constant proportion
- (d) Le Chatelier principle

11) Which of the following statements is false?

- (a) All alkali metal compounds are soluble
- (b) All ammonium compounds are soluble
- (c) All carbonate are soluble
- (d) All compounds containing chlorate are soluble

12) Autoionization and amphiprotic substances can be defined as

- (a) is a substance that undergo protonation and is a substance that accept proton
- (b) is a substance that undergo self ionization and amphiprotic is a substance that can donate and accept a proton
- (c) is a substance that undergo self autoionization and amohiprotic is a subsatnce that can accept and donate electron
- (d) None of the above

13) Identify each of the following substances as a strong electrolyte, a weak electrolyte and non electrolyte. i. $(\text{NH}_2)_2\text{CO}$ ii. HNO_3 iii. HNO_2

- (a) i and iii are non electrolyte, ii is a strong electrolyte
- (b) i is a non electrolyte, ii and iii are strong electrolyte
- (c) i and iii are weak electrolyte, ii is a strong electrolyte
- (d) i is a non electrolyte , ii is a strong electrolyte and iii is a weak electrolyte

14) Give the formular of two soluble metal hydroxides and two insoluble metal hydroxides

- (a) KOH , $\text{Ba}(\text{OH})_2$, NaOH , $\text{Al}(\text{OH})_3$
- (b) $\text{Ba}(\text{OH})_2$, NaOH , AgOH , $\text{Al}(\text{OH})_3$
- (c) $\text{Al}(\text{OH})_3$, $\text{Sr}(\text{OH})_2$, AgOH , KOH
- (d) NaOH , KOH , $\text{Ba}(\text{OH})_2$, CSOH

15) Precipitation reaction:

- (a) Mixing a BaCl_2 solution with CaK_2SO_4
- (b) Mixing an aqueous solution $\text{YPb}(\text{NO}_3)_2$ with NaI
- (c) Mixing aqueous K_3PO_4 with aqueous $\text{Ca}(\text{NO}_3)_2$
- (d) All of the above

16) Give the oxidation numbers for the underlined atoms in the following molecules and ions. i) $\underline{H}_3\text{ASO}_3$ ii) $\underline{\text{Sb}}\text{F}_6$ iii) $\underline{\text{Pt}}\text{Cl}_4^{2-}$ iv) $\underline{\text{Mo}}\text{O}_4^{2-}$

- (a) +3, +5, +2, +6 (b) +2, +3, +5, +6 (c) +5, +3, +2, +6 (d) +6, +5, +3, +2

17) Which of the following reactions is a displacement redox reaction . i) $2\text{Al} + 3\text{H}_2\text{O} \rightarrow \text{Al}_2\text{O}_3 + 3\text{H}_2$ ii) $2\text{NaH}_{(s)} \rightarrow 2\text{Na}_{(s)} + \text{H}_{2(g)}$ iii) $2\text{KClO}_{3(s)} \rightarrow 2\text{KCl} + 3\text{O}_2$

- (a) i, ii and iii (b) i and ii only (c) ii and iii only (d) i and iii only

18) Which of the following reactions is an example of hydrogen displacement redox reaction . i) $\text{Ca}_{(s)} + 2\text{H}_2\text{O}_{(g)} \rightarrow \text{Ca}(\text{OH})_2 + \text{H}_2$ ii) $2\text{Al} + 3\text{H}_2\text{O} \rightarrow \text{Al}_2\text{O}_{3(s)} + 3\text{H}_{2(g)}$ iii) $\text{Sn} + 2\text{HCl} \rightarrow \text{SnCl}_2 + \text{H}_2$

- (a) i, ii and iii (b) i and ii only (c) i only (d) i and iii only#

19) Classify the reaction below as precipitation, acid-base or redox reaction; $\text{P}_4\text{O}_{10(s)} + 6\text{H}_2\text{O}_{(l)} \rightarrow 4\text{H}_3\text{PO}_{4(aq)}$

- (a) Precipitation reaction (b) Acid-base reaction (c) Redox reaction (d) All of the above

20) Which of the following processes will result in a precipitation reaction?

- (a) Mixing a NaNO_3 solution with a CuSO_4 solution (b) Mixing a NH_4NO_3 Solution with a NaOH solution (c) Mixing a Na_2S solution with a ZnCl_2 solution (d) Mixing a $(\text{NH}_4)_2\text{CO}_3$ solution with a NaCl

21) Choose the correct balanced equation

- (a) $2\text{C}_2\text{H}_5\text{OH} + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 3\text{H}_2\text{O}$ (b) $\text{C}_2\text{H}_5\text{OH} + 3\text{O}_2 \rightarrow \text{CO}_2 + 3\text{H}_2\text{O}$ (c) $\text{C}_2\text{H}_5\text{OH} + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 3\text{H}_2\text{O}$ ((d) $\text{C}_2\text{H}_5\text{OH} + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 3\text{H}_2\text{O}$

22) Which of the following statements is false?

- (a) All sulphides are insoluble (b) All phosphates are insoluble (c) All carbonates are insoluble (d) All compounds containing chlorate are insoluble

23) Which of the following metals cannot react with water?

- (a) Fe (b) Zn (c) Cu (d) Ba

24) Give the oxidation numbers for the underlined atoms in the following molecules and ions. i) $\underline{H}_3\text{ASO}_3$ ii) $\underline{\text{Sb}}\text{F}_6$ iii) $\underline{\text{Pt}}\text{Cl}_4^{2-}$ iv) $\underline{\text{Mo}}\text{O}_4^{2-}$

- (a) +3, +5, +2, +6 (b) +2, +3, +5, +6 (c) +5, +3, +2, +6 (d) +6, +5, +3, +2

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"DON'T LIMIT YOURSELF. YOU CAN DO GREAT THINGS IF YOU PUT YOUR MIND TO IT."

25) Which of the following processes will likely not result in a precipitation reaction.

- (a) Mixing of BaCl_2 solution with a K_2SO_4 solution (b) Mixing of PbNO_3 solution with NaI solution (c) Mixing of NaNO_3 solution with CuSO_4 solution (d) Mixing of $(\text{NH}_4)_2\text{CO}_3$ solution with CaCl_2 solution

26) Arrange the following species in order of increasing oxidation number of the sulphur atom. i) H_2S ii) SO_2 iii) H_2SO_4 iv) S_8

- (a) $\text{S}_8 \quad \text{H}_2\text{S} \quad \text{SO}_2 \quad \text{H}_2\text{SO}_4$ (b) $\text{SO}_2 \quad \text{H}_2\text{SO}_4 \quad \text{H}_2\text{S} \quad \text{S}_8$ (c) $\text{S}_8 \quad \text{H}_2\text{S} \quad \text{H}_2\text{SO}_4 \quad \text{SO}_2$ (d) $\text{H}_2\text{S} \quad \text{S}_8 \quad \text{SO}_2 \quad \text{H}_2\text{SO}_4$

27) Give the name of an insoluble metal iodide (a) NaI (b) AgI (c) MgI_2 (d) BaI_2

28) Identify from the following the substance that is not a strong electrolyte.

- (a) HF (b) HNO_3 (c) KCl (d) Ba(OH)_2

29) Characterize the following compounds as insoluble in water

- (a) $\text{Ca}_3(\text{PO}_4)_2$ (b) $\text{Mn}(\text{OH})_2$ (c) ZnSO_4 (d) HgSO_4

30) Magnesium ribbon is rubbed before burning because it has a coating of

- (a) Basic magnesium carbonate (b) Basic magnesium oxide (c) Basic magnesium sulphide (d) Basic magnesium chloride

31. Oxidation is a process which involves

- (a) addition of oxygen (b) addition of hydrogen (c) removal of oxygen (d) removal of hydrogen

32. Give the ratio in which hydrogen and oxygen are present in water by volume.

- (a) 1:1 (b) 1 : 2 (c) 2:1 (d) 1:8

33) $\text{MnO}_2 + 4\text{HCl} \rightarrow \text{MnCl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2$, identify the substance oxidized in the equation..

- (a) MnCl_2 (b) HCl (c) H_2O (d) MnO_2

34) What type of chemical reactions takes place when electricity is passed through water?

- (a) Displacement (b) Combination (c) Decomposition (d) Double Decomposition

(a) $9.580 \times 10^{11} \text{ CKg}^{-1}$ (b) $1.758 \times 10^{11} \text{ CKg}^{-1}$ (c) $1.758 \times 10^5 \text{ CKg}^{-1}$ (d) $9.580 \times 10^5 \text{ CKg}^{-1}$

6) The maximum number of electrons possible for an orbital with a value of $L = 3$ is

- (a) 14 (b) 10 (c) 6 (d) 2

7) Which of the following elements is expected to be diamagnetic?

- (a) Si (b) O (c) Mg (d) N

8) Magnetic orbital quantum number refers to.....

- (a) Orbital orientation in a magnetic field (b) energy level electrons occupy in an atom
(c) The orientation of electron spin in the orbital of an atom (d) Orbital electron(s) orientation of electrons in a magnetic field

9) What is degenerate orbital?

- (a) It is an orbital with unequal energy in an atom (b) IT is an orbital with equal energy in an atom (c) it is an orbital with energy in an atom (d) It is an orbital with equal electrons in an atom

10) Principal Energy Level is

- (a) n (b) Ms (c) l (d) $n-1$

11) The planetary model of the atom was proposed by -----

- (a) J.J Thompson (b) Neils Bohr (c) Ernest Rutherford (d) John Dalton

12) The discharge tube experiments led to the discovery of -----

- (a) Electrons and Protons (b) Protons and Neutrons (c) Electrons and Neutrons (d) Electrons

13) The maximum number of electrons possible for an orbital with value $n=4$, $l=2$ is -----

- (a) 14 (b) 10 (c) 6 (d) 2

14) The wave mechanical model of atom is a modification of the ----- atomic model

- (a) Bohr's (b) Dalton's (c) Rutherford's (d) Thompson's

15) The mass of an electron is $1/1836$ that of the hydrogen, what is the actual mass of a proton if an electron has a mass of $9.11 \times 10^{-31} \text{ Kg}$

COLLIGATIVE PROPERTIES, ACID AND BASE

- 1) The process in which an ion is surrounded by water molecules arranged in a specific manner is -----
(a) Hydrolysis (b) Ionization (c) Hydration (d) Solvation
- 2) Identify from the following, the specie that is not a strong acid
(a) HClO_4 (b) H_3PO_4 (c) HBr (d) HNO_3
- 3) When an acid loses a proton, it leaves a base called -----
(a) Arrhenius base (b) Lewis base (c) Conjugate base (d) Bronsted- Lowry Base
- 4) The vapour pressure of pure acetone (CH_3COCH_3) at 30°C is 0.327atm, suppose 15.0g of benzophenone $\text{C}_{13}\text{H}_{10}\text{O}$ is dissolved in 50.0g of acetone. Calculate the vapour pressure of acetone.
(a) 0.2985atm (b) 0.2895atm (c) 0.2598atm (d) 0.2589atm
- 5) The following are the properties of solution except
(a) Osmotic pressure (b) boiling point elevation (c) Freezing point elevation (d) vapour pressure lowering
- 6) The vapour pressure lowering caused is -----
(a) 4.28 (b) 4.82 (c) 8.42 (d) 2.48
- 7) The following are colligative properties of solution except
(a) Osmotic pressure (b) Boiling point elevation (c) Freezing point depression (d) none
- 8) $n = n_B / V \cdot RT$ in colligative properties represent.....
(a) Vant Hoff equation (b) Hoff vant equation (c) Ebullioscopy equation (d) Cryoscopy equation

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"IMPOSSIBLE IS JUST AN OPTION"

9) Find the pH of a solution containing 80cm^3 of 0.2mol dm^{-3} HCl mixed with 20cm^3 of 0.2M NaOH. The resulting solution contains the equivalent of 60cm^3 of 0.2mol dm^{-3} of HCl in 100cm^3 of solution

- (a) 0.92 (b) 1.92 (c) 2.92 (d) 0.29

10) Calculate the pH of a 0.25mol dm^{-3} solution of phenylamine if K_b for phenylamine is $4.8 \times 10^{-4}\text{mol dm}^{-3}$

- (a) 11.5 (b) 10.5 (c) 9.5 (d) 8.5

11) What is the degree of dissociation of a $0.2\text{mol}/\text{dm}^3$ solution of ethanoic acid if the pH is 5

- (a) 0.005% (b) 0.05% (c) 0.5% (d) 5.0%

12) The pH of 0.05mol dm^{-3} phosphoric acid is -----

- (a) 0.82 (b) 0.92 (c) 0.72 (d) 0.62

13) Ethanoic acid is strong acid in liquid ammonia and ----- in water.

- (a) Weak acid (b) weak base (c) strong base (d) neutral

14) Which of the following acid has the highest acidic properties in glacial acetic acid

- (a) HClO_4 (b) H_2SO_4 (c) HCl (d) HNO_3

15) An acid is defined as a substance that accepts a lone pair of electrons in forming a coordinate is defined by -----

- (a) Lewi (b) Bronsted - Lowry (c) Arrhenius (d) Henderson- Hasselbaek

16) The K_a for methanoic acid at 25°C is $2 \times 10^{-4}\text{mol dm}^{-3}$. Calculate the pH of 0.55 mol dm^{-3} methanoic acid.

- (a) 1.98 (b) 2.98 (c) 3.98 (d) 0.98

17) Which of the following dissociates completely when added to water?

- (a) weak acid (b) strong acid (c) strong base (d) b and c

18) ----- is the reactant that is completely consumed

- (a) Catalyst (b) Ions (c) Limiting reactant (d) radical

19) What is a net ionic equation?

(a) An equation written so that all ions are shown (b) An equation that includes only ions
(c) An equation that includes all the substances in the reaction (d) An equation that includes only that substance that takes part in the reaction

20) Classify each of the following species as a Bronsted acid or base; i) HBr ii) NO_2
iii) HCO_3^-

(a) Bronsted acid bronsted base bronsted base (b) bronsted base
bronsted acid bronsted acid (c) Bronsted base bronsted base bronsted
acid (d) Bronsted acid bronsted acid bronsted base

21) Sodium oxide and magnesium oxide are

(a) amphoteric (b) acidic (c) basic (d) none of the above

22) When an acid loses a proton it leaves a base called -----

(a) Arrhenius base (b) Lewis base (c) Conjugate base (d) Bronsted-Lowry base

23) The following are types of solvent except -----

(a) Protophilic (b) Protogenic (c) Aprotic (d) Prototic

24) What is the pH of 0.05M phosphoric acid solution

(a) 0.80 (b) 0.90 (c) 1.00 (d) 1.10

25) Find the pH of a solution containing 40cm^3 of 0.25mol dm^{-3} HCl mixed with 160cm^3 of 0.25mol dm^{-3} NaOH. The resulting solution contains at equivalent of 120cm^3 of 0.25mol dm^{-3} of NaOH in 200cm^3 of solution

(a) 13.2 (b) 13.3 (c) 12.3 (d) 13.5

26) When 2.62g of the non-volatile solid anthracene $\text{C}_{14}\text{H}_{10}$ is dissolved in 100 g of cyclohexane, C_6H_{12} , the boiling point of the cyclohexane is raised by 0.41°C . Calculate K_b for cyclohexane.

(a) $2.79^\circ\text{C}/\text{m}$ (b) $2.78^\circ\text{C}/\text{m}$ (c) $2.87^\circ\text{C}/\text{m}$ (d) $2.97^\circ\text{C}/\text{m}$

27) Calculate the freezing point of a solution having 257 g of napthalene C_{10}H_8 dissolved into 500.0g of chloroform CHCl_3 . Taken $k_b = 4.70^\circ\text{C}/\text{m}$.

(a) 18.85°C (b) 18.58°C (c) 18.80°C (d) 18.84°C

28) Indicate the nature of following solutions $[\text{H}^+] = 9.5 \times 10^{-11}\text{M}$, $[\text{H}^+] = 6.2 \times 10^{-6}\text{M}$, and $[\text{H}^+] = 0.0000001\text{M}$ respectively

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MAGIC IS BELIEVING IN YOURSELF.
IF YOU CAN MAKE THAT HAPPEN,
YOU CAN MAKE ANYTHING HAPPEN!)

(a) acidic, neutral and basic (b) neutral, basic and acidic (c) neutral, neutral and basic (d) basic, acidic and neutral

29) Which of these are Lewis acid and bases -----

- (a) BF_3 and NH_3 (b) HCN and OH^- (c) HClO and H_2O (d) OH^- and HI

30) Brønsted-Lowry defined an acid and base as-----

- (a) A proton acceptor and a proton donor (b) An electron and electron acceptor (c) A nucleon removal and a proton acceptor (d) A proton donor and a proton acceptor

31) Solution in which activities of each constituent is equal to its mole fraction can be defined as -----

- (a) Gibbs (b) Ideal (c) Non-ideal (d) Diluted

32) Properties of solution which depend only on the number of particles and not on the nature of the particles is called

- (a) Ebullioscopy (b) Ideal (c) Colligative (d) All of the above

33) The Raoult Law can be mathematically represented as-----

- (a) $p^* = p \cdot X_i$ (b) $P^* = p \cdot X_i$ (c) $p = p \cdot X_i$ (d) $X_i = p/p^*$

34) The sum of mole fraction of a system containing three different species; 6.0 mole of A, 4.0 mole of B, and 8.0 mole of C is

- (a) 18 (b) 180 (c) 1.8 (d) 1.0

35) Identify from the following the species that is not a strong acid

- (a) HClO_4 (b) H_3PO_4 (c) HBr (d) HNO_3

ANSWERS

1. D 2. B 3. C 4. B 5. C 6. 7. D 8. A 9. 10. 11. B 12. 13. A 14. B 15. A 16. 17. D
18. B 19. D 20. A 21. C 22. C 23. D 24. A 25. A 26. B 27. A 28. D 29. A 30. D 31. B
32. C 33. D 34. A 35. B

valence electron in an atom of the element (d) This consists of the identity of a compound and dotd for the valence electron in a molecule of the compound

9) ----- state that an atom other than hydrogen tends to form bonds until it is surrounded by eight valence electrons

(a) Lewis rule (b) Duplet rule (c) Formal charge (d) Octet rule

10) How many electrons will be required to write a Lewis structur for SO_4^{2-}

(a) 32 (b) 45 (c) 30 (d) 24

11) What is formal charge?

(a) This is the hypothetical charge on a molecule in a compound (b)This is the electrical charge difference betwen the valence electrons in an isolated atom and the number of electrons assigned to that atom in a Lewis structure (c) This is a representative of covalent bonding in which shared electron pairs are shown either as lines or as parts of dots between two atoms (d) None of the above #

12) One of these is not an exception for the Octet rule

(a) Atoms that contain more than eight valence around its central atom (b) Elements that has an incomplete octet (c) Elements with odd number of electrons (d) Elements with even number of electrons

13) ----- is one of two or more Lewis structures for a single molecules that cannot be represented accurately by only one Lewis structure.

(a) Expanded Octet (b) Geometry (c) Resonance (d) VSEPR model

14) In neutral(uncharged) species ----- forms three bonds and ----- form two bonds

(a) Oxygen and Nitrogen (b) Oxygen and Carbon (c) Nitrogen and Carbon (d) Nitrogen and Oxygen

15) What type of bonding is present in the following compounds; Water, Hydrogen molecule and Carbon monoxide .

(a) Covalent, covalent and coordinate bond (b) Coodinate , ionic and dative bond (c) Ionic, coordinate and covalent bond (d) Covalent, ionic and covalent bond

16) What type of bonding is achieved when hydrogen is dissolved in water to make hydrogen chloride acid?

(a) Dative covalent bonding (b) Ionic bond (c) Covalent bond (d) Ionic and Covalent bond

17) Which type of bond will form between two non-metals that differ slightly in electronegativity?

(a) Polar covalent (b) non-polar covalent (c) ionic (d) metallic

18) Ionic bonding occurs

(a) with only one type of anion (b) in the presence of high temperature (c) when electrons are transferred (d) in the presence of uranium

19) The shared electron pair in a molecule is called -----

(a) Ionic bonding (b) Covalent bonding (c) Non-polar ionic bonding (d) isomer transfer

20) Metals are made up of positive ions packed together in all of the following except

(a) Cubic closed pack (b) Hexagonal (c) Body-centred cubic (d) Dodecagonal cubic

21) Given that for $H_{2(g)}$ is 218 kJ/mol, determine the H-H bond energy.

(a) 436 kJ/mol (b) 249 kJ/mol (c) 129 kJ/mol (d) 428 kJ/mol

22) When electrons are shared unequally

(a) no reaction occurs (b) it is called polar covalent bonding (c) the electrical charge is always positive (d) only group IIA elements of the periodic table will react

23) Which type of bond will form between two non-metals that differ slightly in electronegativity?

(a) Polar covalent (b) non-polar covalent (c) ionic (d) metallic

24) The F-S-F bond angles in SF_6 are

(a) 109.28° (b) 45° and 90° (c) 90° and 120° (d) 30° and 120°

25) In the use of the octet rule, each negative charge on an ion corresponds -----

(a) to one electron less (b) to an additional electron (c) to a change of valence electron
(d) none of the above

NO ONE IS TO BLAME FOR YOUR FUTURE SITUATION

ANSWERS

1. B 2. C 3. B 4. A 5. D 6. 7. A 8. C 9. D 10. A 11. B 12. B 13. C 14. D 15. A 16. C
17. C 18. C 19. B 20. D 21. A 22. B 23. A 24. 25.

FORMATION OF BONDS(SIGMA & PI),HYBRIDIZATION

1) How many sigma electrons are there in a triple bond?

(a)2 (b) 3 (c) 6 (d) 4

2) Hybridization involves ----- and -----

(a) Excitation and distribution of electrons (b) excitatin and promotion of electrons (c)
promotion of electrons and mixing of orbitals (d) mixing of orbitals and promotion of
electrons

3) Hybridisation normally takes place at -----

(a) Ground state (b) Transition state (c) $Sp^2 - Sp^2$ state (d) Complex state

4) The following are types of hybridsation

(a) Sp^3 , Sp^4 , Sp (b) Sp^1 , Sp^2 , Sp^3 (c) Sp^2 , Sp^1 , Sp^4 (d) Sp^2 , Sp^1 , Sp^5

5) Overlap of Sp^2 - Sp^2 hybridized orbital will lead to the formation of -----

(a) Pi bond (b) Covalent bond (c) Sigma bond (d) Electrovalent bond

6) Arrange the following orbitals with respect to their overlapping power staarting with
the most powerful

(a) $Sp^3 > Sp^2 > Sp > P > S$ (b) $Sp^2 > Sp^3 > Sp > P > S$ (c) $Sp > Sp^3 > Sp^2 > P > S$ (d) $Sp^3 > Sp > Sp^2 > P > S$

7) Arrange the following orbitals with respect to their distance from the nucleus starting
with the closest. Sp , Sp^2 , Sp^3

(a) $Sp^3 > Sp^2 > Sp$ (b) $Sp^2 > Sp > Sp^3$ (c) $Sp > Sp^3 > Sp^2$ (d) $Sp^3 > Sp > Sp^2$

IUPAC NOMENCLATURE, EMPRICAL, MOLECULAR AND STRUCTURAL FORMULA OF ORGANIC COMPOUNDS

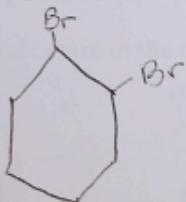
1) Homologous series include the following except;

- (a) They have the same general molecular formula (b) They have the same number of carbon structure (c) They have the same method of laboratory preparation (d) They have the same atom or group of atoms that directs the chemistry of the group

2) The IUPAC name of the compound $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}(\text{CH}_3)\text{CH}(\text{Br})(\text{OH})$

- (a) 6-bromo-5-methylhex-3-en-1-ol (b) 6-bromo-2-methylhex-3-en-1-ol (c) 1-bromo-2-methylhex-3-en-1-ol (d) 1-bromo-4-methylhex-3-en-1-ol

3) How many isomers has the compound

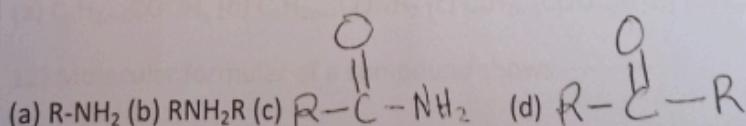


- (a) 1 (b) 2 (c) 3 (d) none of the above

4) An organic compound with molecular mass of 113 has the following percentage composition; C=53.12% N=12.4% O= 28.32% and H= 6.2%. The molecular formula of the compound is

- (a) $\text{C}_3\text{H}_6\text{NO}_2$ (b) $\text{C}_2\text{H}_6\text{NO}_2$ (c) $(\text{C}_3\text{H}_3\text{NO}_3)_2$ (d) $\text{C}_5\text{H}_7\text{NO}_2$

5) The functional group present in amide is -----



compound (c) the actual number of each kind of atom in a molecule (d) the ratio of the number of each kind of atom in a molecule

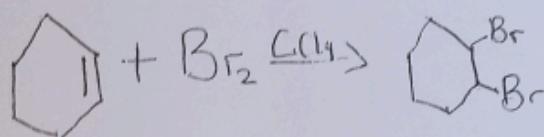
13) Which of the following can be used to determine whether a compound is saturated, unsaturated, how many bonds present or is the compound cyclic or acyclic?

- (a) Empirical formulae (b) Molecular formulae (c) Index of hydrogen deficiency (d) Homologous series

14) A series of organic compound that follows a regular structural pattern in which each successive member differ in composition by CH_2 or molecular mass 14 is -----

- (a) hydrocarbon (b) isomerism (c) saturated open chain (d) homologous series

15) The reaction below is an example of -----



- (a) addition reaction (b) substitution reaction (c) displacement reaction (d) elimination reaction

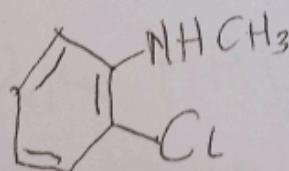
16) Arrange the following carbon cation in order of their stability: (i) CH_3^+ (ii) $\text{CH}_3\text{CH}^+\text{CH}_3$ (iii) $\text{CH}_3\text{C}^+\text{CH}_3$ (iv) CH_3CH_2^+

- (a) (i) > (ii) > (iii) > (iv) (b) (iii) > (ii) > (iv) > (i) (c) (iii) > (ii) > (i) > (iv) (d) (i) > (iii) > (iv) > (ii)

17) Arrange the following in order of increasing bond energy C-O, C=O, C=O

- (a) C-O < C=O < C=O (b) C=O < C-O < C=O (c) C-O < C=O < C=O (d) nil

18) The structure below is an example of



- (a) Primary Amine (b) Secondary Amine (c) Tertiary Amine

19) Compounds that contain same atomic sequence only in the spatial relationship of their parts are ----- 26

THE ONLY DIFFERENCE BETWEEN
ORDINARY AND EXTRAORDINARY
IS THAT LITTLE "EXTRA".

- 19) The elements titanium, zirconium, hafnium are in block?
- (a) s (b) p (c) d (d) f
- 20) Which of the following elements are diagonally related?
- (a) Beryllium and Aluminium (b) Potassium and Rubidium (c) Vanadium and Chromium
- 21) The ionization energy of boron is lower than that of beryllium in the same Period, because
- (a) the addition of one electron leaves a half filled p orbital (b) the removal of one electron leaves a half filled p orbital (c) the removal of one electron leaves a filled s orbital (d) the addition of one electron leaves a filled s orbital
- 22) Metallic properties increases
- (a) across the period (b) down the group (c) within the period (d) none of the above
- 23) The Lanthinide contraction is responsible for the similarity in the sizes of
- (a) lithium and sodium (b) niobium and tantalum (c) nickel and palladium (d) titanium and zirconium
- 24) The energy released when an extraelectron is added to a neutral gaseous atom is
- (a) electronegativity (b) electrophile (c) ionization energy (d) electron affinity
- 25) Which of the following is not a Periodic relationship?
- (a) Diagonal (b) Horizontal (c) Vertical (d) Octagonal
- 26) How many blocks are there in the Periodic Table?
- (a) 4 (b) 5 (c) 7 (d) 6
- 27) Across the priod, the atomic size decreases due to:
- a) shielding effect (b) photoelectric effect (c) increase in nuclear force of attraction (d) decrease in nuclear force of attraction
- 28) The average distance between the nucleus and outer shell is called
- (a) atomic size (b) nuclear size (c) shielding effect (d) atomic number
29. The Horizontal rows of the periodic table are called.....

3

NEVER COMPARE YOURSELF TO OTHERS, BECAUSE YOU ARE DIFFERENT!"

(a) rows (b) periods (c) columns (d) groups

30. In periodic table elements with similar valence shell configuration are placed in

(a) different groups (b) same group (c) different periods (d) same period

ANSWERS

1. d 2. a 3. d 4. d 5. a 6. c 7. c 8. a 9. a 10. a 11. c 12. d 13. d 14. b 15. d 16. a
17. c 18. b 19. d 20. a 21. b 22. b 23. b 24. d 25. d 26. a 27. c 28. a 29. b 30. b

CHEMICAL REACTION AND CHEMICAL EQUATION

1) Which of the following statement is false?

- (a) All alkali metal compounds are soluble (b) All ammonium compounds are soluble (c) All compounds containing perchlorate(ClO_4^-) are insoluble (d) All compounds containing chlorate are soluble.

2) Which of the following metals cannot react with water?

- (a) Fe (b) Zn (c) Cu (d) Ba

3) Which of the following processes will likely not result in a precipitation reaction

- (a) Mixing of BaCl_2 solution with a K_2SO_4 Solution (b) Mixing of PbNO_3 solution with a NaI solution (c) Mixing of NaNO_3 solution with CuSO_4 solution (d) Mixing of $(\text{NH}_3)_2\text{CO}_3$ solution with CaCl_2 solution

4) Classify the following ionic compounds as soluble, slightly soluble or insoluble

- (a) Silver sulphate (AgSO_4), calcium carbonate (CaCO_3), sodium phosphate (Na_3PO_4)
(b) sodium phosphate (Na_3PO_4), calcium carbonate (CaCO_3), Silver sulphate (AgSO_4)
(c) calcium carbonate (CaCO_3), Silver sulphate (AgSO_4), sodium phosphate (Na_3PO_4) (d) calcium carbonate (CaCO_3), sodium phosphate (Na_3PO_4), Silver sulphate (AgSO_4)

5) A redox reaction in which an ion (or atom) in a compound is replaced by another ion (or atom) of another element is called?

- (a) a combination redox reaction (b) a decomposition redox reaction (c) a displacement redox reaction (d) a metathesis redox reaction

6) The following are simple redox reaction

- (a) magnesium burning in air to form magnesium oxide and magnesium nitride (b) sodium burning in chlorine to form sodium chloride (c) aluminium reacting with bromine to form aluminium bromide (d) zinc reacting with hydrochloric acid to form zinc chloride with liberation of hydrogen gas

7) Which of the following metals can react with water? (i) Cu (ii) Li (iii) Hg (iv) Ca (v) Pt

- (a) i and v (b) ii and iv (c) i, iii and v (d) iii and

5

"ALL YOUR DREAMS CAN COME TRUE, IF YOU HAVE
THE COURAGE TO PURSUE THEM."

35) Select the oxidizing agent for the following reaction: $H_2S + I_2 \rightarrow 2HI + S$

- (a) I_2 (b) H_2S (c) HI (d) S

ANSWERS

1. A 2. B 3. B 4. B 5. C 6. B 7. B 8. C 9. A 10. C 11. C 12. B 13. D 14. D 15. A 16. A
17. B 18. A 19. A 20. - 21. C 23. C 24. A 25. C 26. A 27. B 28. A 29. A 30. A 31. A
32. B 33. D 34. C 35. A

ATOMIC AND MOLECULAR STRUCTURE OF MATTER

1) In the ground state, two electrons each occupying singly a pair of equivalent orbitals tend to have ----- spins

- (a) opposite (b) parallel (c) double (d) adjacent

2) The experiment of Bothe and Becker in which the Beryllium element was bombarded with alpha particles led to the discovery of -----

- (a) Neutron (b) Electron (c) Proton (d) Ions

3) Which of the following quantum numbers is not required for the description of atomic orbitals.....

- (a) Azimuthal quantum number (b) Spin quantum number (c) Principal quantum number
(d) Magnetic quantum number

4) The wave mechanical model of atom is a modification of the ----- atomic model

- (a) Thompson's (b) Dalton's (c) Rutherford's (d) Bohr's

5) What is the charge/mass ratio of electron?

(a) 1.6022×10^{-19} (b) 1.6726×10^{-27} Kg (c) 4.9621×10^{-27} Kg (d) 9.11×10^{-31} Kg

16) How many atoms would there be in 0.5 mole of sodium with atomic mass of 23, Avogadro's number is 6.022×10^{23}

(a) 4.003×10^{23} (b) 3.011×10^{23} (c) 12.045×10^{23} (d) 1.204×10^{23}

17) The cathode ray is

(a) Visible (b) invisible (c) Coloured (d) Colourless

18) The chemical properties of an element are determined by the number of -----

(a) protons or electrons (b) neutrons (c) the number of ions (d) the atomic size

19) Isotopes of an element have.....

(a) different chemical properties (b) same chemical properties (c) same physical properties (d) none of the above

20) According to atomic theory, electrons are usually found -----

(a) outside atomic nucleus (b) Outside the nucleus, yet very near it. They are attracted to the protons (c) Outside the nucleus, far from it - most of an atom's volume is its electron (d) outside the nucleus and often far from it - most of an atom is its electron cloud

21) The first part of an atom to be discovered was the -----

(a) Proton (b) neutron (c) electron (d) nucleus

22) Molecular formula of a compound shows-----

(a) the percentage composition of a compound (b) the molecular weight of the compound (c) the actual number of each kind of atom in a molecule (d) the proportion of the number of each kind of atom in a molecule

23) What is the designation for the orbital occupied by an electron described by quantum numbers $n=4, l=3$

(a) 4p (b) 4s (c) 4d (d) 4f

24) "No two electrons in an atom can have the same values for all the four quantum numbers". This is the statement of -----

a) Dalton's atomic theory (b) Heisenberg's principle (c) Pauli's exclusion principle (d) Wave mechanical model

11

HATEVER YOU ARE,

BE A GOOD ONE".

25) ----- was awarded Nobel Prize for His atomic model known as the planetary model of atom

- (a) Sir J.J Thompson (b) Sir John Dalton (c) Sir Ernest Rutherford (d) Sir James Chadwick

26) Write the quantum numbers for the electronic configuration, $4d1$

- (a) $n = 4, l = 2, Ms = +1/2 - 1/2$ (b) $n = 3, l = 3, Ms = +1/2$ (c) $n = 4, l = 2, Ms = -1/2$ (d) $n = 3, l = 3, Ms = +1/2$

27) Which of the following is called Azimuthal quantum number?

- (a) n (b) l (c) M_l (d) Ms

ANSWERS

1. A 2. A 3. B 4. D 5. B 6. A 7. C 8. A 9. D 10. A 11. C 12. A 13. B 14. A 15. A 16. B
17. A 18. A 19. B 20. B 21. C 22. C 23. D 24. C 25. A 26. - 27. B

CHEMICAL BONDING

- 1) The cleavage in organic reaction in which the two electrons that form the bond separate so that the two electrons become associated with one atom is called -----
(a) Heterolytic fission (b) Homolytic fission (c) A and B above (d) None of the above
- 2) Organic reaction in which the two electrons that form the bond separate so that one electron become associated with each of the atom is called -----
(a) Fragmentation reaction (b) Free radical reaction (c) Heterolytic cleavage reaction (d) Homolytic cleavage reaction
- 3) ----- are the two main types of bonds formed between atoms
(a) Hydrogen and coordinate (b) Ionic and covalent (c) Polar and non polar (d) Metallic and covalent
- 4) The bond formed between PCl_5 abd Cl^- is -----
(a) Covalent (b) Coordinate (c) Ionic (d) Hydrogen bond
- 5) The free electron model of bonding in a metal consideers the lattice as beign made up of -----
(a) Localized 'sea' of electrons (b)tetrahedral interstitial sites (c) Various band gaps (d) 'sea' of delocalised electrons
- 6) Which of the following molecules does not exhibit resonance structure?
(a) NO_3^- (b) SO_2 (c) O_3 (d) CO_2
- 7) The bond involved when a lattice made up of metal ion surrounded by a 'sea' of delocalized electrons is better described as-----
(a) Metallic (b) Covalent (c) Ionic (d) Coordinated
- 8) What is Lewis dot symbol?
(a) This is a symbol representing elements and its components in a molecular compound
(b) This is a symbol that shows which electrons are involve in formation of compound in chemical bonding (c) This consist of the symbol of an element and one dot for each

17

DON'T BE AFRAID TO GIVE UP THE GOOD
TO GO FOR THE GREAT."

8) Overlap of two $2P^y$ orbitals will lead to the formation of -----

- (a) Sigma Bond (b) Hydrogen Bond (c) Pi Bond (d) Gamma bond

9) Overlap of Sp^3 and S orbital will lead to the formation of -----

- (a) Gamma bond (b) Pi Bond (c) Sigma Bond (d) Van der waal bond

10) What is the percentage of s- orbital character between the orbitals having bond angle of 125° ?

- (a) 36.5% (b) 22.5% (c) 63.5% (d) 100%

11) An organic compound in which one of the carbon atoms has all its four attachments different is called ----- compound

- (a) β - carbon (b) Stereocentre (c) Chiral (d) Achiral

12) Any carbon that is bonded to four other atoms is said to be ;

- (a) Sp Hybridized (b) Sp^2 Hybridized (c) Sp^3 Hybridized (d) All Hybridized

13) Which of the following has the shortest bond length?

- (a) Sp Hybridized carbon (b) Sp^2 Hybridized carbon (c) Sp^3 Hybridized (d) None of the above

14) In organic chemistry, hybridization occurs:

- (a) In the ground state (b) in the excited state (c) at the molecular level (d) None of the above

15) In the formation of molecular orbitals:

- (a) the p orbitals overlap to form molecular orbitals is a weaker bond than when S orbitals overlap to form molecular orbitals (b) the s orbital overlap to form molecular orbitals is a weaker bond than when p orbitals overlap to form molecular orbitals (c) the $2p$ orbitals overlap to form molecular orbitals is a weaker bond than when $2s$ orbitals overlap to form molecular orbitals (d) the $2s$ orbitals overlap to form molecular orbitals is a weaker bond than when $2p$ orbitals overlap to form molecular orbitals.

16) Choose the correct statement

- (a) Actually, when two s orbitals or one s and one p orbitals overlap longitudinally then the bond between two atoms is known as a sigma bond (b) Actually, when two p

orbitals or one s and one p orbitals overlap longitudinally then the bond between the two atoms is known as a sigma bond (c) If two s orbitals laterally overlap, then a pi bond is said to be formed (d) If two p orbitals and two s orbitals laterally overlap, then a pi bond is said to be formed

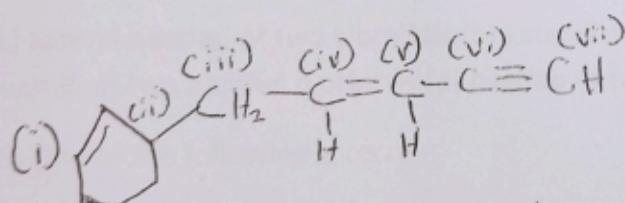
17) When two atoms combined to form a bond then:

- (a) Typically, a single bond is a sigma bond while a multiple bond is composed of one sigma bond together with pi or other bonds (b) Typically, a single bond is a pi bond while a multiple bond is composed of two sigma bond together or other bonds (c) Typically, a single bond is a pi bond while a multiple bond is composed of one sigma bond together with pi or other bonds (d) Typically, a single bond is a sigma bond while a multiple bond is composed of two sigma bond together with two pi or other bonds

18) Which of the following is best option for sigma bond

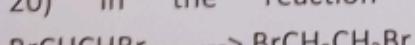
- (a) Sigma bond are cylindrically symmetrical and can rotate the bond any number of degrees (b) Sigma bonds are v-shaped and can rotate the bond any number of degrees (c) Sigma bonds have a nodal plane that is perpendicular to the lobes of the orbitals and can rotate the bond any number of degrees (d) Sigma bonds have a nodal plane that is perpendicular to the lobes of the orbitals and cannot rotate the bond any number of degrees

19) Indicate the hybridization of the carbon labelled (i) - (vii)



- (a) $Sp^2 Sp^3 Sp^3 Sp^2 Sp^2 SpSp$ (b) $Sp^2 SpSp Sp^2 Sp^3 Sp^3 Sp^2$ (c) $Sp^3 Sp^2 Sp^2 Sp^3 Sp^2 Sp^2$ (d) $Sp^3 Sp^3 Sp^2 Sp^2 Sp^2 SpSp$

20) In the reaction what is the hybridisation state of Carbon:



- (a) Sp^2-Sp^2/Sp^3-Sp^3 (b) $Sp-Sp/Sp^2-Sp^2$ (c) Sp^2-Sp/Sp^3-Sp^3 (d) Sp^2-Sp^2/Sp^3-Sp^3

21) What type of hybridization is observed in CH_3^+

- (a) Sp^3 (b) Sp^2 (c) Sp (d) Sp^4

22

22) An unsaturated bond is a mixture of;

- (a) Two σ bonds (b) σ and π bonds (c) Two π bonds (d) Two alternate bonds

23) The Phenomenon mixing of atomic orbitals of nearly equivalent energy involving redistribution of energy to form new hybrid orbitals of equal energy is called-----

- (a) Esterification (b) Hybridisation (c) Degeneration (d) Degradation

24) Which of the following property is uniform to Sp^3 , Sp^2 and Sp orbitals

- (a) S character (b) Bond angle (c) Shape (d) Sizes of the lobed orbitals

25) The overlapping power of the hybrid orbitals is described as follows -----

- (a) $Sp > Sp^2 > Sp^3$ (b) $Sp < Sp^2 < Sp^3$ (c) $Sp^2 > Sp > Sp^3$ (d) $Sp < Sp^2 < Sp^3$

26) Which of the following homonuclear diatomic molecules does not involve mixing of s and p orbital in the formation of its molecular orbital

- (a) B_2 (b) C_2 (c) (d) O_2

27) What Hybridisation change does the carbon atom undergo in the combustion of methane? $CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(g)}$

- (a) $sp \rightarrow sp^2$ (b) $sp^2 \rightarrow sp^3$ (c) $sp^3 \rightarrow sp$ (d) $sp^2 \rightarrow sp$

28) A pi bond is the result of the -----

- (a) Lateral overlap of two s orbitals (b) Lateral overlap of an s and p orbitals (c) Sidewise overlap of two parallel p orbitals (d) overlap of two p orbitals along their x-axes

29) One of the following is correct

- (a) Both pi and sigma bond has the same strength (b) Sigma bond is stronger than pi bond (c) Pi bonds are stronger than sigma bond (d) Both sigma and pi have the same strength only at the point of attachment.

30) What is the bond order of Nitrogen

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

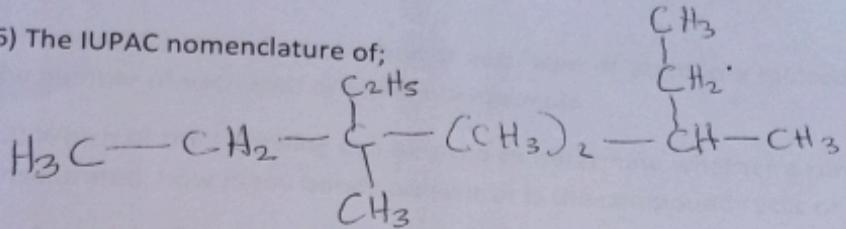
ANSWERS

1. A 2. B 3. C 4. B 5. C 6. C 7. A 8. C 9. C 10. A 11. C 12. C 13. A 14. B 15. A 16. C
17. A 18. A 19. A 20. D 21. B 22. B 23. B 24. A 25. C 26. A 27. C 28. B 29. B 30. C

WORK HARD IN SILENCE,

23

6) The IUPAC nomenclature of;

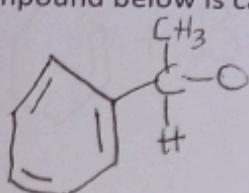


- (a) 3,6-dimethyl-3-methyloctane (b) 3,6-diethyl-3-methylheptane (c) 3,3-dimethyl-6-methyloctane (d) None of the above

7) Calculate the molecular formula of the organic compound whose empirical formula is C_3H_2O and has molecular weight of 118;

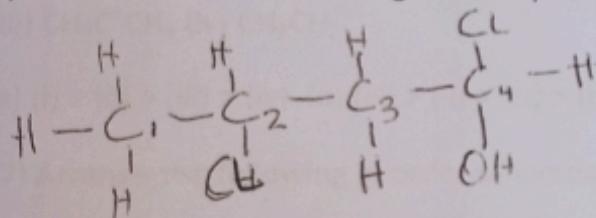
- (a) $C_6H_6O_2$ (b) $C_6H_{14}O$ (c) $C_5H_{14}O_2$ (d) None of the above

8) The compound below is called -----



- (a) 2-phenylethanol (b) 1-phenylpropanol (c) 2-phenylpropanol (d) 1-phenyl ethanol

9) The chiral centre in the organic compound below is;



- (a) C_1 (b) C_1 and C_2 (c) C_2 and C_4 (d) C_4

10) Organic compound in which one of the carbon atom has all its four attachment different, is called ----- compound

- (a) Beta carbon (b) Stereocarbon (c) Chiral (d) Achiral

11) The general formula of amide is

- (a) $C_nH_{2n-1}COOH_y$ (b) $C_nH_{2n+1}CONH_2$ (c) $C_nH_{2n-1}COOC_nH_{2n+1}$ (d) C_nH_{2n}

12) Molecular formula of a compound shows -----

- a) The percentage composition of a compound (b) the molecular weight of the

25

HARDWORK BEATS TALENT.
WHEN TALENT DOESN'T
... KNOWLEDGE"

a) Monomers (b) Polymers (c) Constitutional Isomerism (d) Stereoisomer

20) Classes of organic compounds include the following

(a) Alophatic and Alicyclic (b) Aromatic (c) Heterocyclic (d) All of the above

21) The term Enantiomer refer to -----

(a) two molecules of mirror images and non-super imposable (b) two molecules of mirror images and super imposable (c) two molecules of non-mirror images and non-super imposable (d) two molecules of non-mirror images and super imposable

22) Which of the following are example of reaction types in organic chemistry

(a) Addition (b) Elimination (c) Substitution (d) All of the above

ANSWERS

1. B 2. C 3. C 4. D 5. C 6. D 7. D 8. D 9. C 10. C 11. B 12. C 13. B 14. D 15. A 16. B
17. A 18. - 19. D 20. D 21. A 22. D

WORK HARD, BE KIND
AND AMAZING THINGS
WILL HAPPEN.