



Course Title
Course Code CH 101

Zagazig University
Faculty of Science
Chemistry Department
Final Exam of General Chemistry (I)
1st semester for Mathematical Students



3/01/2026
Time: 2 Hours
No. of points: 60

Q1: Select the Correct Answer

- If you have equal volumes of three gases (O_2 , CH_4 and CH_3 , its M. wt is 32, 71 and 16, respectively) at the same conditions of temperature and pressure. The ratio between these moles is.....
A) 2 : 4.4 : 1 B) 1 : 2.2 : 0.5 C) 1 : 1 : 1 D) 1 : 2.2 : 1
- If temperature of one mole of a gas at constant pressure is changed from $100^\circ C$ to 300 K, the final volume will be..... (The initial volume is V_0):
A) 1.24 V_0 B) 0.804 V_0 C) 3.0 V_0 D) 2.0 V_0
- The volume of 10 g of H_2 gas at $-25^\circ C$ and 1.0 atm is
A) 22.4 L B) 101.68 mL C) 22.4 mL D) 101.68 L
- The mathematic formula for root mean square (RMS) velocity is (are):
A) $\mu = \sqrt{(3PV/M)}$ B) $\mu = \sqrt{(3RT/M)}$ C) $\mu = \sqrt{(3P/D)}$ D) all of them
- The mathematic equation for van der waal's equation is
A) $[P + (an^2/V^2)(V + nb)] = nRT$ B) $[P - (an^2/V^2)(V - nb)] = nRT$
C) $[P + (an^2/V^2)(V - nb)] = nRT$ D) None of them
- The average velocity of a gas molecule is given by
A) $\bar{V} = \sqrt{(3RT/M)}$ B) $\bar{V} = \sqrt{(8RT/M)}$ C) $\bar{V} = \sqrt{(8RT/\pi M)}$ D) None of them
- A mixture of two gases consists of 14g N_2 and 11 g CO_2 at the same conditions of temperature and pressure. Their volume ratio (N_2/CO_2) is....
A) 1 : 2 B) 4 : 8 C) 2 : 1 D) None of them
- The heat of formation defined as....
A) It is the amount of heat evolved when one mole of compound is formed from its elements
B) The change in enthalpy that takes place when one mole of the compound is formed from its elements
C) It is the amount of heat absorbed when one mole of compound is formed from its elements
D) None of them
- The mathematic formula for root mean square (RMS) velocity is (are):
A) $\mu = \sqrt{(3PV/M)}$ B) $\mu = \sqrt{(3RT/M)}$ C) $\mu = \sqrt{(3P/D)}$ D) all of them
- The kinetic gas equation is given by the relation
A) $PV = nRT$ B) $PV = \frac{1}{2}mN\bar{u}^2$ C) $PV = \frac{1}{2}mN\bar{u}^2$ D) all of these
- If the pressure and absolute temperature of X liter of a gas increased twice (2 times), the volume would be.....
A) 2 X B) 4 X C) 0.5 X D) None of them

- the total pressure of a mixture of gases (non-reacting) is equal to the sum of the partial pressures of all gases present, is the statement of:
- A) Graham's law
B) Dalton's law
C) Avogadro's law
D) None of them
13. The real gases show nearly ideal behaviour at
- A) low pressure and low temperature
B) low pressure and high temperature
C) high pressure and low temperature
D) high pressure and high temperature
14. In a closed flask of one liter, 2.0 moles of hydrogen is heated from 25 to 100 °C. Which of the following is incorrect?
- A) The pressure of the gas increases
B) The kinetic energy of the gas increases
C) The number of moles of the gas increases
D) The rate of collision increases
15. the hybridization of C1, C2, C3 in (2-Bromo-2-butene) compound is,
- A) sp^3, sp^2, sp
B) sp^2, sp^2, sp^2
C) sp^2, sp^3, sp^3
D) None of them
16. The following compound $(C_6H_5)_2NCH_3$ is,
- A) Secondary amine
B) Tertiary amine
C) Primary amine
D) Acetamide
17. 2,3-Dimethyl pentane has:
- A) Optical isomers
B) Geometric isomers
C) All of them
D) None of these
18. Compounds with the -OH group attached to a Phenyl group are known as:
- A) Benzyl alcohol
B) Aromatic alcohol
C) None of them
D) All of them
19. Diethyl ether and butanol are:
- A) Geometrical isomerism
B) Functional isomerism
C) Metamerism
D) Position isomerism
20. A molecule named o-Chlorobenzyl alcohol consists of-----hydrogen bond
- A) Intramolecular
B) Intermolecular
C) None of them
D) All of them
21. Which of the following types of hydrocarbons is saturated?
- A) C_6H_{10}
B) C_6H_{14}
C) C_6H_{12}
D) None of them
22. The IUPAC name of the following compound is: $CH_3CH(Br)CH_2COOH$
- A) 2-bromopropanoic acid
B) 2-bromobutanoic acid
C) 2-bromo-3-carboxypropane
D) 3-bromobutanoic acid
23. The correct name of $(CH_3CH(Cl)C(CH_3)=CHCH_3)$ is:
- A) 2-Chloro-3-methyl pent-3-ene
B) 4-Chloro -3-methyl pent-2-ene
C) 3-methyl-4- Chloro hex-2-ene
D) 3-methyl-2-Chloro pent-3-ene
24. The structural formula of methyl iso propyl ketone is:
- A) $CH_3CH_2COCH_2CH_3$
B) $CH_3CH_2COCH_3$
C) $CH_3COCH(CH_3)_2$
D) $CH_3COC(CH_3)_2$
25. Acetylene is more acidic than Ethylene due to
- A) Decreasing of S-character
B) Increasing of S-character
C) None of them
D) All of them
26. In methane molecule the H-C-H Bond angle is:
- A) 120°
B) 104°
C) 107°
D) None of them

- Intramolecular hydrogen bond ----- Boiling point of the organic compounds,
 A) increase B) decrease C) Not effect D) None of them
28. The number of protons for N^{3-} is ($Z=7$ & $A=14$).
 A) 7 B) 14 C) 21 D) 30
29. Determine the number of protons, neutrons and electrons in the Sb ($Z=51$ & $A=121$)?
 A) $p^+ = 51, n^0 = 121, e^- = 51$ B) $p^+ = 51, n^0 = 70, e^- = 51$
 C) $p^+ = 51, n^0 = 121, e^- = 70$ D) $p^+ = 51, n^0 = 172, e^- = 511$
30. The complete electronic configuration for Ga ($Z=31$) is.....
 A) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2, 4d^{10}, 4p^1$ B) $1s^2, 2s^2, 2p^3, 3s^2, 3p^6, 4s^3, 3d^{10}, 4p^1$
 C) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2, 3d^{10}, 4p^1$ D) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2, 3d^5, 4p^3$
31. What is the mass number of an atom?
 A) Number of protons in the nucleus B) Number of neutrons in the nucleus
 C) Number of protons and neutrons in the nucleus D) Number of electrons in the atom
32. What is the maximum number of electrons that can occupy a d orbital?
 A) 1 B) 2 C) 3 D) 10
33. Which type of bond involves the transfer of electrons from one atom to another?
 A) Ionic bond B) Covalent bond C) Hydrogen bond D) Van der Waals bond
34. What is the spin quantum number (s) value for an electron?
 A) $+1/2$ or $-1/2$ B) $+1$ or -1 C) 0 or 1 D) $+2$ or -2
35. For $n = 3$, what are the possible values of l ?
 A) 0, 1 B) 0, 1, 2 C) 1, 2 D) 0, 2
36. Which orbital corresponds to $l = 1$?
 A) s B) p C) d D) f
37. Which is the quantum number that determines the shape of an orbital?
 A) n B) l C) m D) s
38. The magnetic quantum number (m) describes?
 A) Energy level B) Shape of orbital C) Orientation of an orbital D) Spin of electron
39. For $l = 2$, what are the possible values of m?
 A) -1, 0, +1 B) -2, -1, 0, +1, +2 C) 0 D) -2, +2
40. What model describes electrons in specific energy levels?
 A) Bohr model B) Rutherford model C) Thomson model D) Dalton model
41. Which principle along with Hund's rule helps explain electron configuration?
 A) Aufbau principle B) Pauli exclusion principle
 C) Both A and B D) Heisenberg principle

ASSAY QUESTIONS:

(19 Marks)

Write on:

- 1) The postulates of kinetic theory of gases?
- 2) The relation between the average velocity and the root mean square velocity?
- 3) Define wavelength and frequency, and then write the (equation) relationship between them?
- 4) Define the ionic and covalent bond; give an example for each one?
- 5) Define Node, and then draw p_x orbital.
- 6) Calculate the wavenumber for an electron falls from the fifth shell to the ground shell in UV region (R, Rydberg constant = 109678 cm^{-1})?
- 7) For energy level No. 3, the number of atomic orbitals = ... and the maximum number of electrons = ...
- 8) A) Write the structural formulae of the following
 - i) 3-Phenyl -2-methyl -1-Hexene
 - ii) 1,2,3-propanetriolB) Write down the correct IUPAC name of the following
 - i) 2-Chloro-1-Bromopentane
 - ii) 3-pentyneC) Arrange the following and explain
 - i) Alkane, alkyne, alkene (acidity)
 - ii) Diethyl ether, butanol (boiling point)
 - iii) Trichloromethane and Tetrachloromethane (Polarity)