

الورقة الاولى
(٢-١)



Zagazig University
Faculty of Science
Dept. of Chemistry

General Chemistry
CHEM 101
Final Exam
Fall semester
2024-2025



Time allowed: 50min.
Date: Jan. 13, 2025
Points: 60

Chose the correct answer

1st part: Physical Chemistry:

(20)

1. The mole volume of any gas at standard conditions (STP) is equal to

- (a) 11.2 liter. (b) 12.2 liter.
(c) 22.4 liter. (d) 20.2 liter.

2. At constant temperature, the pressure of the gas is reduced to one third, the volume

- (a) reduces to one third. (b) increases by three times.
(c) remains the same. (d) cannot be predicted

3. At constant pressure, the volume of a fixed mass of a gas is.

- (a) directly proportional to its temperature.
(b) Directly proportional to its absolute temperature.
(c) inversely proportional to its temperature
(d) inversely. proportional to its absolute temperature.

4. A certain quantity of gas is put in constant container vessel, at temperature 30°C under pressure 3.0 atm. How much will be the gas pressure at temperate 0.0°C?

- (a) 2.6 atm. (b) 2.7 atm.
(c) 2.8 atm. (d) 1.8 atm.

5. "Equal volume of all gases at the same temperature and pressure contain equal number of molecules" is the statement of

- (a) Combined gas law. (b) Charle's law.
(c) Avogadro's law. (d) Boyle's law.

6. According to van der-Waals , the ideal gas equation at slightly higher pressure is replaced by,

- (a) $\left(P + \frac{a}{V^2}\right) V = RT$, (b) $PV + \frac{a}{V} = RT$,
(c) $PV = RT - \frac{a}{V}$, (d) all of these.

7. The volume of one mole of gas, 1.0 mol, at definite pressure and temperature is =7.0 liter. What is the volume of gas (V_2), if the number of mole of the gas increases to 5 moles ,at the same conditions .

- (a) 35 mol. (b) 35 liter.
(c) 35 liter mol⁻¹. (d) 50 liter.

8. The velocity of gases diffusion are equal.....

- (a) $\sqrt{\frac{d_2}{d_1}}$ (b) $\sqrt{\frac{M_2}{M_1}}$
(c) $\sqrt{\frac{T_2}{T_1}}$ (d) all of these.

9. The suitable method for liquids of very low vapour pressure is the.....

- (a) Dynamic method. (b) direct method .
(c) Static method. (d) Barometric method.

10. With rise in temperature, the surface tension of a liquid.....

- (a) increases. (b) decreases.
(c) remains the same. (d) none of the above.

11. Surface tension is caused by the forces of liquid molecules at the surface.

- (a) positive . (b) negative . (c) unbalanced. (d) None of these.

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12. Which of the following statements is incorrect?
 (a) The pressure exerted by the vapour in equilibrium with the liquid at a fixed temperature is called vapour pressure.
 (b) The vapour pressure increases with rise in temperature.
 (c) At equilibrium, liquid = vapour.
 (d) At equilibrium, the rate of evaporation is not equal to the rate of condensation.
13. The point of the liquid may be defined as the temperature at which the vapour pressure of the liquid is equal to the atmospheric pressure.
 (a) freezing. (b) boiling. (c) depression. (d) all of these.
14. The boiling point of a liquid with external pressure.
 (a) Always increases. (b) Changes.
 (c) Always decreases. (d) Remains the same.
15. Under constant pressure, if the products and reactants have the same volume,
 (a) $\Delta H < \Delta E$. (b) $\Delta H = \Delta E$. (c) $\Delta H > \Delta E$. (d) $\Delta H \geq \Delta E$.
16. The heat or enthalpy changes accompanying chemical reactions are expressed in different ways, depending on the nature of the.....
 (a) reaction. (b) results. (c) reactor. (d) product.
17. The amount of heat evolved or absorbed when one gram mole of substance is dissolved in a quantity of sufficient solvent, to form a saturated solution only is defined as heat of...
 (a) Formation. (b) Combustion.
 (c) Neutralization. (d) Solution.
18. According to Kinetic Molecular Theory of Gases, all collisions of the gases are Hence, there is no loss of the kinetic energy of a molecule during a collision.
 (a) semi elastic. (b) non elastic.
 (c) perfectly elastic. (d) all of these.
19. Calculate the saturated vapour pressure of water if you know that when 100 liter of dry helium gas is passed through 56.00 g water and left behind of it 63.00 g of water, where M.W of H and oxygen are 1 and 16, respectively.
 (a) 0.038 atm. (b) 0.036 atm. (c) 0.034 atm. (d) 0.041 atm.
20. The liquids with high intermolecular attractive forces have viscosity.
 (a) Low. (b) Intermediate. (c) high. (d) None of these.

2nd part: Inorganic Chemistry:

(20)

21. What is the wave number of the falling electron from the 3rd excited energy level to the 1st excited energy level
 a- $2.0875 \times 10^9 \text{ cm}^{-1}$ b- $4.8601 \times 10^7 \text{ cm}^{-1}$
 c- 20584.6 cm^{-1} d- $6.0875 \times 10^6 \text{ cm}^{-1}$
22. The quantum numbers of the electron number ten in Al13 are
 a- $n=2, l=1, m=+1, s=-1/2$ b- $n=2, l=1, m=-1, s=+1/2$
 c- $n=2, l=1, m=0, s=-1/2$ d- $n=2, l=1, m=0, s=+1/2$
23. The Ag47 is a transition element, lying in periodic table as
 a- 4th period and 9th group b- 5th period and 11th group
 c- 6th period and 10th group d- 3rd period and 8th group
24. How many electrons have the following q.nos $[n=4, l=3]$
 a- 2 electron b- 4 electrons
 c- 10 electrons d- 14 electrons
25. What is the amount of absorbed energy required to transfer of electron to the 5th energy level in paschen series
 a- $+1.55 \times 10^{-19} \text{ J.s}$ b- $-2.3396 \times 10^{14} \text{ Hz}$
 c- $2.3396 \times 10^{14} \text{ Hz}$ d- $-1.55 \times 10^{19} \text{ J.s}$

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26. What is the de Broglie wave length for the 1.9×10^{-24} Kg ball moving with velocity 5.9×10^8 cm/sec, $h = 6.62 \times 10^{-27}$ erg.sec
- a- 5.905×10^{-8} cm b- 1.2×10^{-8} cm
c- 3.803×10^{-8} cm d- 2.452×10^{-8} cm
27. According to Heisenberg Uncertainty principle if the change in the momentum of an electron $\Delta p = 13.2 \times 10^{-21}$ Kg m S⁻¹, the change in position ΔX will be -----
- a) 17.8×10^{-21} m b- 6.62×10^{-13} m
c- 13.2×10^{-21} m d- 10^{-13} m
28. In case of $3p^2$
- a- The two electrons have different spin q.n
b- The two electrons have different principle q.n
c- The two electrons have the same magnetic q.n
d- The two electrons have the same sublevel q.n
29. The element X has atomic number 16 is lying in
- a- 4th period and 5th group
b- 4th period and 9th group
c- 3rd period and 16th group
d- 3rd period and 6th group
30. Sigma bond (σ) is formed from the
- a- Side to side overlapping
b- Lateral overlapping
c- Overlapping between s-orbital and P_y or P_z orbital
d- Overlapping between P_y and P_y orbitals or P_z and P_z orbitals
31. What is the electron number, which having these quantum numbers in S16 [$n=3, l=1, m=1, s=-1/2$]
- a- 1 b- 16 c- 2 d- 14
32. What is the released energy from the adding of an electron to the Na11 atom to form Na⁺ ion
- a- 4.0875×10^{-19} J b- 2.422×10^{-19} J
c- 5.9018×10^{-19} J d- 3.0118×10^{-19} J
33. in case of studying the 1st ionization energy for the elements, we found that
- a- Be (4) is less than Ne (10) b- N (7) is less than Li (3)
c- He (2e) is less than Na(11) d- F (9) is less than Al (13)
34. All these compounds are ionic compounds except
- a- LiBr and CaO b- Mg_3N_2 and CaO
c- O₂ and HBr d- Al_2O_3 and CaO
35. "Electrons must occupy all the orbitals of a given sublevel energetically equivalent or degenerate orbitals) singly before pairing begins and these unpaired electrons have parallel spins", this is
- a- Aufbau principle b- Uncertainty principle
c- Hund's rule d- Dual nature
36. The order of these compounds according to rising of degree of polarity is
- a- $HF < HCl < HBr < HI$ b- $HF > HBr > HI > HCl$
c- $HI < HCl < HBr < HF$ d- $HI > HBr > HCl > HF$
37. If ΔE_n of $H_2=0.0$, ΔE_n of $HBr=0.7$, ΔE_n of $HCl=0.9$ and ΔE_n of $HF=1.9$, the order of these compounds according to increasing of covalent characters, is
- a- $HF < HBr < H_2$ b- $HBr > HCl > HF$
c- $H_2 > HCl > HF$ d- All of above

38. in the polar covalent bond is characterized by

- a- The electron density localized at the center between atoms
- b- The electron density shifted toward the more electronegative atom
- c- It formed between two similar atoms
- d- All of above

39. The energy released when an extra electron is added to a neutral gaseous atom is

- a- Electronegativity
- b- Electron affinity
- c- Ionization energy
- d- No answer

40. "no two electrons in the same atom can have the same set of four quantum numbers", this is known as

- a- Aufbau principle
- b- Uncertainty principle
- c- Hund's rule
- d- Pauli Exclusion Principle

*The atomic numbers of the elements, H(1e), Li(3e), N(7e), O(8e), F(9e), Cl(17e), Br(35e), I(53e), Na(11e), Mg(12e),

Answer the following questions

1- Draw the structure of the following compounds:

- a) 2,3,4-Trimethylpentane
- b) 2-Bromo-4-methylhexane
- c) 1-Ethyl-3-methyl-cyclohexane
- d) 4,4-Dimethyl-1-pentyne
- e) 2-Methoxy-2-methylpropane
- f) Trans-2-pentene
- g) 3-Hydroxy-2-methylhexanal
- h) 3-methyl-2-chlorobutanoic acid
- i) Succinic anhydride
- j) Acetophenone

2- Write short notes on the following

- a) Functional Isomerism
- b) Geometrical Isomerism
- c) Hybridization of Ethylene

With our best wishes

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