Assiut University
Faculty of Science
Chemistry Department

19th June 2021
Time allowed: 2 h

Second Semester Examination
Subject: General Chemistry (C-105)
Students: First Level "Credit Hours System"

يتم طمس (تسويد) الإجابة المختارة من قبل الطالب باستخدام القلم الجاف فقط

Q1: Final Exam "50 Marks"
Shade the correct answer; A, B, C or D: (1 Mark each)
Section A: Organic Chemistry (25 Marks)

1) How many structural isomers are possible for a compound has the molecular formula C_5H_{10}?
A) 5 B) 8 C) 9 D) 10

2) Which carbon has the lowest % S- character?
A) CH_4 B) $H_2C{=}{=}CH_2$ C) $HC{\equiv}CH$ D) None of them

3) Which of the following alkanes would have the highest boiling point?
A) $CH_3\,(CH_2)_5\,CH_3$
B) $(CH_3)_2\,CH\,CH\,CH_2\,CH_3$ with CH_3 branch
C) $(CH_3)_2\,CH\,CH_2\,CH$ with CH_3 and CH_3 branches
D) $(CH_3)_3\,C\,CH\,(CH_3)_2$

4) The reaction mechanism of addition of HBr to alkene is:
A) Free radical B) Electrophilic C) Nucleophilic D) Concerted

5) Covalent bond may be formed by linear overlapping of two atomic orbital:
A) Each one is occupied by one electron
B) One of them is occupied by three electrons and the one is empty
C) One of them is empty and the other one is occupied by two electrons
D) A and C

6) The curved headed arrow is used to indicate:
A) Homolytic bond fission
B) Heterolytic bond fission
C) Movement of two electrons to electron rich center
D) B and C

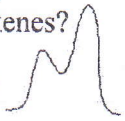
7) Which of the following is an acceptable Lewis structure for the diatomic nitrogen molecule?
A) $\ddot{N}{=}{=}\ddot{N}$ B) $\cdot N{\equiv}{\equiv}N\cdot$ C) $:N{\equiv}{\equiv}N:$ D) $\ddot{N}{\equiv}{\equiv}\ddot{N}$

8) On hybridization of one s and one p orbitals we get:
A) Two mutually perpendicular orbitals B) Two orbital at 180°
C) Four orbitals directed tetrahedrally D) Three orbital in a plane

9) The most favorable energetically conformation of cyclohexane is:
A) Boat B) Twist boat C) Half chair D) Chair

Please turn over for the rest of questions

10) Which energy diagram best describes the electrophilic addition of hydrogen halides to alkenes?

A)  B)  C)  D) 

11) Which one is the correct order of increasing stability?

A) $(CH_3)_3\ C^+$, $(CH_3)_2\ CH^+$, $CH_3\ CH_2^+$, CH_3^+

B) $(CH_3)_2\ CH^+$, $(CH_3)_3\ C^+$, CH_3^+, $CH_3\ CH_2^+$

C) CH_3^+, $CH_3\ CH_2^+$, $(CH_3)_2\ CH^+$, $(CH_3)_3\ C^+$

D) $CH_3\ CH_2^+$, CH_3^+, $(CH_3)_2\ CH^+$, $(CH_3)_3\ C^+$

12) Which is the correct order of increasing acidity?

A) $H_3C-\underset{H}{C}=CH_2$, $H_3C-C\equiv CH$, $HC\equiv CH$, $H_2C=CH_2$

B) $H_3C-\underset{H}{C}=CH_2$, $H_2C=CH_2$, $H_3C-C\equiv CH$, $HC\equiv CH$

C) $HC\equiv CH$, $H_3C-C\equiv CH$, $H_2C=CH_2$, $H_3C-\underset{H}{C}=CH_2$

D) $H_3C-C\equiv CH$, $HC\equiv CH$, $H_2C=CH_2$, $H_3C-\underset{H}{C}=CH_2$

13) Which one is the correct order of increasing angle between the hybrid orbitals

A) SP^3, SP, SP^2 B) SP, SP^2, SP^3

C) SP^2, SP^3,SP D) SP^3, SP^2, SP

14) Which one is correct order of increasing energy of the following orbitals?

A) S, P, SP^2, SP^3, SP B) S, SP^3, SP^2, SP, P

C) S, SP, SP^2, SP^3, P D) S, SP^3, SP, SP^2, P

15) What is the correct formal charge on the atoms of $CH_3\ NH_3$?

A) C= 0, N=-1, H=0 B) C=0, N=+1, H=0

C) C= +1, N=0, H=0 D) C=0, N=-1, H+1

16) Which of the following alkene exhibit Cis-Trans isomerism?

A) $(CH_3)_2\ C=CH-CH_3$

B) $CH_3-CH=CH-CH_3$

C) $CH_3-CH=C\ (CH_2Cl)_2$

D) $H_3C-CH_2-CH=CH_2$

17) Which atomic orbitals overlap to form the C— C σ bond and π bond of ethene?

A) σ: SP^3+SP^3 and π: SP^2+SP^2 B) σ: SP^2+SP^2 and π: P+P

C) σ: SP^2+SP^3 and π: P+P D) σ: SP^2+SP^2 and π: SP^2+SP^2

18) Which of the following compounds reacted with HBr according to Markovnikov's rule?

1) $CH_3-CH=CH-CH_3$ 2) $H_3C-CH_2-CH=CH_2$

3) $(CH_3)_2\ C=CH-CH_3$ 4) $(CH_3)_2\ C=C\ (CH_3)_2$

A) 1 and 2 B) 2 and 3 C) 3 and 4 D) 1 and 3

Please turn over for the rest of questions

19) How many products could be obtained from mono chlorination of 2-methylpropane?

A) 1 B) 2 C) 3 D) 4

❖ **Predict the product (P) of the following reactions:**

20) $H_3C-CH=CH_2 \xrightarrow[H_2O_2/\bar{O}H]{BH_3} P$

A) 1- Propanol B) 2-Propanol C) Propanal D) A and B

21) $H_3C-CH=CH_2 \xrightarrow{H_2O/H^+} P$

A) Propanal B) 1-Propanol C) 2-Propanol D) A and C

22) $H_3C-C\equiv CH \xrightarrow[Hg\ SO_4]{H_2O/H^+} P$

A) Propanal B) 1-Propanone C) Propanone D) A and C

23) $H_3C-C\equiv C-CH_3 + 2H_2 \xrightarrow[or\ Ni]{Pt,\ Pd} P$

A) Butane B) Cis-butene C) Trans-butene D) B and C

24) $H_3C-C\equiv CH + 2HBr \longrightarrow P$

A) 1,2- dibromopropane B) 1,1-dibromopropane C) 2,2-dibromopropane D) B and C

25) $H_3C-CH=CH-CH_3 \xrightarrow[Zn/H_2O]{O_3} P$

A) Ethanol B) Ethanal C) Ethene D) A and B

Section B: Analytical Chemistry (25 Marks)

26. For the reaction: $2\ SO_{2\,(g)} + O_{2\,(g)} \rightleftharpoons 2\ SO_{3\,(g)}$ K_c (i) is equal to 2.8×10^2 at 1000 K. Accordingly, for the reaction: $SO_{2\,(g)} + \frac{1}{2}\ O_{2\,(g)} \rightleftharpoons SO_{3\,(g)}$, K_c (ii) is given by:

A) $K_c\ (ii) = (K_c\ (i))^2$ B) $K_c\ (ii) = (K_c\ (i))^{1/2}$

C) $K_c\ (ii) = (K_c\ (i))^4$ D) $K_c\ (ii) = (K_c\ (i))^{2/5}$

27. When the system $A + B \rightleftharpoons C + D$ is at equilibrium,

A) The forward reaction has stopped.
B) Both the forward and the reverse reactions have stopped.
C) Neither the forward nor the reverse reaction has stopped.
D) The reverse reaction has stopped.

28. On increasing the concentration of reactants in a reversible reaction, then equilibrium constant will:

A) Maximized B) Increase C) Unchanged D) Decrease

Please turn over for the rest of questions

29. Consider the gas-phase equilibrium system: $2H_2O_{(g)} \rightleftharpoons 2H_{2(g)} + O_{2(g)}$. Given that the forward reaction is endothermic, which of the following changes will decrease the equilibrium amount of H_2O?
A) Adding more oxygen
B) Decreasing the volume of the container (the total pressure increases)
C) Increasing the temperature at constant pressure
D) None of these

30. In which of the following equilibria $K_p = K_c$?
A) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2\ HI_{(g)}$
B) $2\ SO_{2(g)} + O_{2(g)} \rightleftharpoons 2\ SO_{3(g)}$
C) $2NO_{(g)} + O_{2(g)} \rightleftharpoons 2NO_{2(g)}$
D) $CaCO_{3(s)} \rightleftharpoons CaO_{(s)} + CO_{2(g)}$

31. Consider the reversible reaction $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$. In a 3.00 liter container, the following amounts are found in equilibrium at 400 °C: 0.0420 mole N_2, 0.516 mole H_2 and 0.0357 mole NH_3. Evaluate K_c.
A) 0.202 B) 1.988 C) 0.503 D) 2.202

32. Find the conjugate acid of NH_2^-
A) NH_3 B) NH_4OH C) NH_4^+ D) $NH_3{\cdot}H_2O$

33. When NH_4Cl is added to NH_4OH solution, the dissociation of ammonium hydroxide is reduced due to:
A) Hydrolysis B) Oxidation C) Common ion effect D) Reduction

34. Which of the following is false for an alkaline aqueous solution?
A) $pH > pK_w/2$ B) $pH < pOH$ C) $pOH < pK_w/2$ D) $pH > pOH$

35. The pOH of a solution of NaOH is 11.30. What is the $[H^+]$ for this solution?
A) 1.995×10^{-3} B) 2.500×10^{-3} C) 5.000×10^{-12} D) 5.500×10^{-13}

36. The pOH value of CH_3COONa solution can be calculated from the equation:
A) $pOH = \frac{1}{2}\ pK_w + \frac{1}{2}\ pK_a - \frac{1}{2} \log C$
B) $pOH = \frac{1}{2}\ pK_w - \frac{1}{2}\ pK_a - \frac{1}{2} \log C$
C) $pOH = \frac{1}{2}\ pK_w + \frac{1}{2}\ pK_a + \frac{1}{2} \log C$
D) $pOH = \frac{1}{2}\ pK_w - \frac{1}{2}\ pK_b - \frac{1}{2} \log C$

37. Henderson-Hasselbalch equation for a buffer solution composed of weak acid and its salt is:
A) $pH = pK_a + \log([salt] / [acid])$
B) $pH = -\ pK_a + \log([salt] / [acid])$
C) $pH = pK_a + \log([salt] \times [acid])$
D) $pH = pK_a + \log([acid] / [salt])$

38. The solubility product expression for tin(II) hydroxide, $Sn(OH)_2$, is:
A) $[Sn^{2+}]^2\ [OH^-]$ B) $[Sn^{2+}]\ [OH^-]^2$ C) $[Sn^{2+}]\ [OH^-]^3$ D) none of these

39. The solubility of Ag_2SO_4 in water at 100 °C is approximately 1.4 g per 100 mL. What is the solubility product of this salt at 100 °C? (molar mass of Ag_2SO_4 is 311.8 g/mol)
A) 5.7×10^{-8} B) 4.1×10^{-5} C) 3.6×10^{-4} D) none of these

40. The volume of the reaction vessel containing an equilibrium mixture is increased in the following reaction: $SO_2Cl_{2(g)} \rightleftharpoons SO_{2(g)} + Cl_{2(g)}$. When equilibrium is re-established:
A) The amount of $Cl_{2(g)}$ remains unchanged
B) The amount of $SO_{2(g)}$ decreases
C) The amount of $SO_2Cl_{2(g)}$ increases
D) The amount of $Cl_{2(g)}$ increases

41. Which of the following solutions has the lowest pH at 25 °C? (No calculations required)
A) 0.2 *M* sodium hydroxide
B) 0.2 *M* benzoic acid
C) Pure water
D) 0.1 *M* ammonium hydroxide

Please turn over for the rest of questions

42. When we mix together, from separate sources, the ions of a slightly soluble ionic salt, the salt will precipitate if Q_{sp} ..... K_{sp}, and will continue to precipitate until Q_{sp} ..... K_{sp}.
A) is greater than; equals
B) is less than; is greater than
C) is less than; equals
D) is less than; is less than

43. According to Brønsted definition of acids and bases, water can act as a/an
A) Base
B) Salt
C) Acid
D) Acid and base both

44. Buffer solution is prepared by mixing:
A) Weak acid + its salt of weak base
B) Strong acid + its salt of strong base
C) Weak acid + its salt of strong base
D) Strong acid + its salt of weak base

45. You have a sample of 1.28 *M* acetic acid ($K_a = 1.8 \times 10^{-5}$). The pH of this solution is:
A) 7.00
B) 4.64
C) 2.32
D) 9.26

46. A solution obtained by dissolving a salt consisting of a weak acid and weak base will be:
A) Neutral if $K_a = K_b$
B) Acidic if $K_b > K_a$
C) Basic if $K_a > K_b$
D) None of these

47. For the reaction $A_{(g)} + 3B_{(g)} \rightleftharpoons 2C_{(g)}$ at 27 °C, 2 moles of A, 4 moles of B and 6 moles of C are present in 2 liter vessel, If K_c for the reaction is 4.2, the reaction will proceed in:
A) Forward direction
B) Backward direction
C) Neither direction
D) None of these

48. For the reaction: $CO_{(g)} + Cl_{2(g)} \rightleftharpoons COCl_{2(g)}$, the value of K_c/K_p is equal to:
A) $\sqrt{RT}$
B) 1.0
C) 1/RT
D) RT

49. At a certain temperature, only 50 % HI is dissociated at equilibrium in the following reaction: $2HI_{(g)} \rightleftharpoons H_{2(g)} + I_{2(g)}$, the equilibrium constant for this reaction is:
A) 0.25
B) 1.0
C) 3.0
D) 0.5

50. Given the following equilibrium, $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$. Some inert gas at constant pressure is added to the system. In which of the following facts the equilibrium will be affected?
A) More $NH_{3(g)}$ is produced
B) Less $NH_{3(g)}$ is produced
C) No effect on the equilibrium
D) K_p of the reaction is increased

Q2: Mid-term, Oral, Activity (Organic and Analytical Chemistry) "30 Marks"

Shade (T) for True statements or (F) for False statements: (1 Mark each)

51) The C— H bond of ethyne is a polar covalent bond. ( )

52) A double headed straight arow between structures indicates that are in equilibrium. ( )

53) Nucleophiles are electron poor reagents. ( )

54) In exothermic reactions, the products are higher in energy than reactants. ( )

55) Cyclopropane has both high angle and torsional strains. ( )

56) Molecules that have the same molecular formula called isomers. ( )

57) Heat is required to break C—C bond of ethane to give two ethyl radicals. ( )

58) SP^3 orbitals of oxygen in H_2O are directed to the corners of tetrahedral structure. ( )

Please turn over for the rest of questions

59) Hydration of ethyne gave ethane. ( )

60) Chlorination of methane gave a trace amount of ethane in propagation steps. ( )

61) The eclipsed conformation of ethane is easily separated from staggered conformation. ( )

62) In termination step, a radical is consumed without formation of a new radical. ( )

63) The length and strength of C —H bonds vary depending on the hybridization of the carbon atom. ( )

64) 1,3-Butadiene and 1- butyene are isomers. ( )

65) Each C—O bond in carbonate ion is neither single nor double. ( )

66) The common ion effect in acid-base equilibria is to suppress the ionization of a weak acid or a weak base. ( )

67) For the system: $NH_4HS_{(s)} \rightleftharpoons NH_{3\,(g)} + H_2S_{(g)}$, the $K_c = [NH_3]\,[H_2S]$. ( )

68) A strong acid has a large pK_a value. ( )

69) The ion is completely precipitated if 99.0 % of it is precipitated and only about 1.0 % is left in solution. ( )

70) The $[H^+]$ in a 0.050 *M* solution of $Ba(OH)_2$ is: 5.0×10^{-2} *M*. ( )

71) A very large value of equilibrium constant means that the backward reaction can take place. ( )

72) Conjugate acid is a compound formed when a base gain a hydrogen ion. ( )

73) The equilibrium constant varies only with the temperature of the reaction. ( )

74) An aqueous solution of CH_3COONa will be acidic. ( )

75) The pH of a buffer solution has an equal concentrations of B^- and HB ($K_b = 10^{-10}$ for B^-) is 7. ( )

76) In heterogeneous equilibria, no change in the equilibrium conditions will occur as a result of adding or removing pure liquid or solid phase. ( )

77) The K_{sp} value of $Ag_2Cr_2O_4$ is given by: $K_{sp} = [Ag^+]\,[Cr_2O_4^{2-}]^2$. ( )

78) The molar solubility of silver sulfate in water increases on adding of sodium sulfate solution. ( )

79) If $Q_c < k_c$ then the forward reaction must occur to reach equilibrium. ( )

80) The pH value of a weak base can be calculated using the formula: $pH = \log\sqrt{K_a \times [HA]}$. ( )

Examiners: ***Prof. Hassan A.H. El-sherief, Prof. Ali A. Abdel-Hafez Gomaa, Prof. Bahaa M. Abu-Zied, Prof. Talaat I. El-Emary, Dr. Ahmed K. Youssef, Dr. Mohamed I. Said, Dr. Doaa A. Abdel-Kader, Dr. Ahmed M. Sayed***

GOOD LUCK

Assiut University
Industrial Chemistry
Program

Chemical Manufacturing processes

Faculty of Science
Date: 3/7/2021
Time: 2 hrs.

Answer the following questions:

Describe briefly the main steps to manufacture the following materials, taking into the consideration the input and output materials, the main chemical and physical changes, the operating conditions and support your answers by flow sheet diagrams.

1. Cement by dry process. (20 points)
2. Sponge iron by Midrex's process. (20 points)
3. Glass. (20 points)
4. Superphosphate. (20 points)
5. Al_2O_3 by Bayer's process. (20 points)

Prof. Dr. Gomma A. Elsayed

Assiut University
Faculty of Science
Chemistry Department

June: 2021
Time: 2 hrs.
Total Degree: (50+30)

Second Semester Final Examination
Subject: General Chemistry I (C-100)
Students: First Level "Credit Hours System"

Final Exam (50 mark)

Q1: Answer the following statements with sign (√) or (×): (20 x 1= 20 marks)

1. A gas consists of molecules separated wide apart in empty space. The molecules are free to move about throughout the container. ( )
2. Charles' Law stated that "At constant temperature, the volume of a fixed weight of gas is inversely proportional to its pressure''. ( )
3. The conditions of standard temperature and pressure are abbreviated as STP. ( )
4. Dalton law visualized that in a mixture of gases, each component gas of gases exerted pressure as if it were alone in the container. ( )
5. Density of a liquid is the resistance of a fluid to flow. ( )
6. Solids are of two types; Crystalline solids and Amorphous solids. ( )
7. Redox process involves only one operation; oxidation or reduction. ( )
8. Calomel electrode isn't a reference electrode. ( )
9. Anisotropy is observed in crystalline solids because the concentration of the atoms is different in different directions of the unit cell. ( )
10. The effect of light scattering on particles of colloidal systems is called the Tyndall effect.( )
11. A p orbital is spherically symmetrical around the nucleus. ( )
12. Bonding orbitals are lower in energy than their corresponding anti-bonding orbitals. ( )
13. The electron structure for a carbon atom (6 e) is $1s^2\ 2s^2\ 2p_x^2$. ( )
14. Zeeman Effect is the effect of splitting of a spectral line into several components in the presence of a static magnetic field. ( )
15. When the frequency of a wave increases, the wavelength increases. ( )
16. First spectral series of hydrogen atom was discovered by Lyman. ( )
17. The axial overlap between the two orbitals leads to the formation of a sigma bond. ( )
18. The concept of formal charges is useful in determining the most acceptable Lewis structures ( )
19. The angular quantum number, ℓ, specifies the shape of the electron cloud around the nucleus. ( )
20. A nonpolar covalent bond results from the unequal sharing of a pair of electrons between atoms in a molecule. ( )

Please turn over for the rest of questions

Q2: Circle the one correct answer from the choices listed: (20 x 1.5 = 30 mark)

1. The matter is defined as anything that has ..... and volume.
   (a) electron (b) mass (c) atom (d) molecules

2. A .....molecules are touching each other. However, the intermolecular space permits the movement of molecules.
   (a) gas (b) liquid (c) solid (d) matter

3. 1-liter equals cc
   (a) 1000 (b) 1000.028 (c) 1000.28 (d) 1000.8

4. The pressure of air that can support 760 mm Hg column at sea level is called one.....
   (a) Bar (b) atm (c) torr (d) Pascal

5. The no. of moles of 4 g of N_2 (N = 14) is .....
   (a) 0.114 (b) 0.14 (c) 0.15 (d) 0.17

6. The average kinetic energy of a hydrogen molecule at 0°C is ... ($R = 8.314 \times 10^7$ erg mol^{-1} k^{-1})
   (a) 5.6×10^{-14} erg (b) 5.6×10^{-12} erg (c) 5.6×10^{-11} erg (d) 5.6×10^{-10} erg

7. Density of a liquid is the mass per unit .....
   (a) area (b) space (c) volume (d) moles

8. Sugar and salt can be considered as .....solid
   (a) amorphous (b) isomorphism (c) crystalline (d) polymorphism

9. If the dispersion medium for colloidal is water, they are called .....
   (a) hydrosols (b) aqua sols (c) hydrophobic (d) a and b

10. .....can be used as a reference electrode in electrochemical cells.
    (a) SHE (b) SCE (c) Ag/AgCl (d) all of these

11. Which one of the following types of radiation has the longest wavelength?
    (a) gamma rays (b) visible light rays (c) ultraviolet rays (d) X- rays

12. Which of the following is not an allowed value for the angular momentum quantum number of an atom?
    (a) -1 (b) 0 (c) +1 (d) all of these

13. What is the total number of valence electrons in the chlorate ion, ClO_3^- ?
    (a) 24 (b) 26 (c) 28 (d) 32

14. Which of the following are permissible sets of quantum numbers?
    (a) $n = 4$, $\ell = 4$, $m_\ell = 0$, $m_s = \frac{1}{2}$ (b) $n = 3$, $\ell = 2$, $m_\ell = 1$, $m_s = -\frac{1}{2}$
    (c) $n = 2$, $\ell = 0$ $m_\ell = 0$, $m_s = {}^3/_2$ (d) none of these

Please turn over for the rest of questions

15. One resonance structure for OCN− ion is drawn below. What is the formal charge on each atom?

(a) O atom = 0, C atom = 0, and N atom = 0 (b) O atom = 0, C atom = 0, and N atom = -1
(c) O atom = -1, C atom = 0, and N atom = 0 (d) O atom =+1, C atom = 0, and N atom = -2

16. According to molecular orbital theory, what is the bond order of oxygen, O_2?
(a) 1 (b) 3/2 (c) 2 (d) 3

17. Which molecule has a Lewis structure that does not obey the octet rule?
(a) CO_2 (b) PCl_3 (c) SF_6 (d) HCN

18. Which molecule exhibits resonance?
(a) O_3 (b) $BeCl_2$ (c) CO_2 (d) NF_3

19. The geometry of NH_3 on the basis of VSEPR model is
(a) trigonal planar (b) trigonal pyramidal (c) tetrahedral (d) linear

20. The configuration $(\sigma_{2s})^2 (\sigma_{2s}^*)^2 (\pi_{2p})^2$ is the molecular orbital description for:
(a) Li^{2+} (b) Be_2 (c) H_2 (d) B_2

Mid Term and Oral Exam: (30 marks)

Q1: Answer the following statements with sign (√) or (×): (12 x1= 12 mark)

1. Gases are easily compressed by applying pressure to a movable piston fitted in the container. ( )
2. The molar gas volume for 1 mole of a gas at STP equals 22.4 L. ( )
3. Reduction is the process of losing electrons. ( )
4. When two gases are placed in contact, they mix spontaneously. This process of mixing of gases by the random motion of the molecules is called Diffusion. ( )
5. When solids are allowed to remain in contact with a gas, a film of gas molecules accumulates on the surface. ( )
6. A gas can be liquefied by lowering the temperature and increasing the pressure. ( )
7. The energy level of a 3d electron is higher than that of a 4s electron. ( )
8. The Hund principle states that electrons occupy the lowest-energy orbitals available before entering the higher-energy orbitals. ( )
9. All the elements in a group possess essentially the same outer-shell electron structure. ( )

Please turn over for the rest of questions

10. The half of the difference between the number of electrons in bonding MO and anti-bonding MO is called molecule order. ( )

11. The bond angle in NH_3 is smaller than that in H_2O. ( )

12. The idea that it is impossible to know both the exact position and momentum of an object at the same time is the cuncertainty principle proposed by Heisenberg. ( )

Q2: Circle the one correct answer from the choices listed: (12 x 1.5 = 18 marks)

1. Adsorption process can be classified according to their interactions to.....
   (a) physical (b) chemical (c) coordination (d) a and b

2. 30 ^{o}C equals .... K
   (a) 298 (b) 303 (c) 237 (d) 320

3. The compressibility factor for an ideal gas equals.....
   (a) 0.2 (b) 0.3 (c) 0.5 (d) 1

4. The unit of pressure, millimeter of mercury, is also called .....
   (a) Bar (b) atm (c) torr (d) Pascal

5. Gas exhibits general characters of
   (a) expansibility (b) compressibility (c) diffusibility (d) all of these

6. ..... is the process of losing an electron.
   (a) Oxidation (b) Reduction (c) Redox (d) none of these

7. What is the hybridization of the carbon atoms in benzene, C_6H_6 ?
   (a) sp (b) sp^2 (c) sp^3 (d) spd

8. The distance between two successive peaks on adjacent waves is its:
   (a) wavelength (b) velocity (c) quantum number (d) amplitude

9. Which of the following compounds has an ionic bond?
   (a) H_2O (b) NH_4Cl (c) CH_3Li (d) HF

10. The electron configuration for Fe^{2+} is $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^6$. Therefore Fe^{2+} is:
    (a) paramagnetic with three unpaired electrons (b) diamagnetic
    (c) paramagnetic with four unpaired electrons (d) none of these

11. Paschen series lies in the:
    (a) visible region (b) far-ultraviolet region (c) ultraviolet region (d) infrared region

12. De Broglie assumed that the relation between circumference of allowed orbit ($2\pi r$) and wavelength (λ) is:
    (a) $2\pi r = n\lambda$ (b) $2\pi r = n/\lambda$ (c) $2\pi r = h/\lambda$ (d) none of these

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(Atomic no: H=1, He = 2, Li=3, Be = 4, B = 5, C = 6, N =7, O = 8, F = 9, P=15, S=16, Cl = 17)

Good Luck

Dr. Mervat I. Abdel Hamid , Dr. Hani N. Abdel Hamid