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Lemlem Kindergarten to Preparatory School.

Grade 12th Chemistry Model Examination

Time = 2:00

I. Choose the correct answer from the given alternatives

1. What is the most important solute solvent interaction in the solution of ethyl alcohol in water?

- A. Ion-dipole
- B. Dipole-dipole
- C. Hydrogen bonding
- D. London forces

2. The type of hybridization and the bond angle in BCl_3 molecule respectively are:

- A. Sp^3 and 109.5°
- B. Sp^2 and 120°
- C. Sp and 180°
- D. Sp^3d and 120°

3. Which one of the following statements describes observation according to the scientific method?

- A. Hana is one meter and 65 cm tall
- B. Our drinking water contains 2.0 ppm of fluoride ion
- C. U.V light causes cancer
- D. The sky is cloudy

4. Which of the following represents the correct electron pair geometry and molecular geometry of H_2O ?

- A. Linear, linear
- B. Trigonal planar, T-shaped
- C. Tetrahedral bent
- D. Square planar, linear

5. Which of the following molecules involves the hybridization of “d” orbitals?

- A. NH_3
- B. H_2O
- C. PCl_3
- D. XeF_4

6. Which one of the following is false statement?

- A. No two electrons in an atom have the same four quantum numbers
- B. Electrons fill in an atom from the lower to the higher energy level
- C. There are 16 possible numbers of orbitals in the 4th main energy level
- D. All electrons in a given main energy level have identical energy

7. Which one of the following is not permitted values of set of quantum numbers?

- A. $n = 4, l = 0, m_l = 0$ & $m_s = +1/2$
- B. $n = 1, l = 1, m_l = 0$ & $m_s = -1/2$
- C. $n = 3, l = 2, m_l = -2$ & $m_s = 1/2$
- D. $n = 2, l = 1, m_l = 1$ & $m_s = +1/2$

8. Which of the following is correct statement about the molecules having all bonding electrons around the central atom?

- A. They have the same electron pair geometry and molecular geometry
- B. All their bond angles are the same
- C. They are always non polar molecules
- D. They are always paramagnetic

9. Which of the following molecules has a dipole moment?

- A. BCl_3
- B. CH_4
- C. H_2O
- D. CO_2

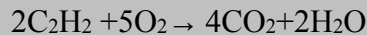
10. The molecular geometry of H_2O is

- A. linear
- B. v-shape
- C. Tetrahedral
- D. Bent

11. Which of the following ionic compounds is highly soluble in water?

- A. LiF
- B. LiCl
- C. LiBr
- D. LiI

12. What hybridization change does the carbon atom undergo in the combustion of acetylene?



- A. $\text{Sp} \rightarrow \text{Sp}^2$
- B. $\text{Sp}^2 \rightarrow \text{Sp}^3$
- C. $\text{Sp} \rightarrow \text{Sp}$
- D. $\text{Sp}^3 \rightarrow \text{Sp}^2$

13. Which of the following element has the highest melting point?
- A. Li B. Na C. K D. Rb
14. Which of the following is a non polar bond?
- A. H-Cl B. F-Cl C. I-I D. H-Br
15. Which of the following is a paramagnetic substance?
- A. Mg (Z=12) B. Si (Z=14) C. Ne (Z=10) D. Li^+ (Z=3)
16. Which of the following molecules/molecular ions is more stable?
- A. N_2 B. O_2 C. F_2 D. O_2^+
17. Which of the following molecules/molecular ions is paramagnetic?
- A. N_2 B. B_2 C. F_2 D. C_2
18. The S character in Sp^3 hybridization is
- A. 75% B. 33% C. 25% D. 50%
19. How many sigma (δ) and pi (π) bonds are there respectively in the molecule
- $(\text{CH}_3)_3\text{C}-\text{C}\equiv\text{C}-\text{CH}_3$?
- A. 12 & 2 B. 2 & 12 C. 18 & 2 D. 2 & 18
20. The strongest intermolecular force is shown by the molecule?
- A. NH_3 B. H_2O C. HF D. All of the above
21. Which of the following molecules does not form a covalent bond?
- A. AlCl_3 B. CO C. BeCl_2 D. None of the above
22. Which of the following orbitals can form a pi (π) bond?
- A. P_x B. S C. S- P_x D. P_y
23. The bond order of the molecule having 17 electrons is
- A. 2 B. 1.5 C. 3 D. 2.5

24. Which of the following atoms/ ions does not follow dual rule?

- A. H^- B. Li^+ C. Cl^- D. Be^{2+}

25. The hybridization of the molecule having octahedral electron pair geometry is

- A. Sp^3 B. Sp^3d C. Sp^3d^2 D. Sp

26. Which of the following does not involve in an increase in the entropy of the system?

- A. Boiling B. Freezing C. Melting D. Sublimation

27. If a gas absorbs 50 KJ of heat and does 25 KJ of work then what will be the change in the internal energy (ΔE) of the gas?

- A. 75 KJ B. -75 KJ C. 25 KJ D. 30 KJ

28. The temperature of a hypothetical reaction at equilibrium with $\Delta H = 30 \text{ KJ}$ and $\Delta S = 200 \text{ J/K}$ is

- A. 150 K B. 250 K C. 50 K D. 1.5 K

29. Which of the following is a state function?

- A. Work B. Heat C. Energy D. All of the above

30. The amount of heat required to raise the temperature of 1 kg of water from 1 g water from 25°C to 125°C (specific heat of water = 4.18 J/gK)

- A. 41.8 J B. 4.18 J C. 1442.7 J D. 418 J

31. Which one is correct statement with respect to the first law of thermodynamics?

- A. The total energy of the universe is zero
B. The total energy of the universe is constant
C. Work done by the system
D. All of the above

32. Boiled milk is preserved in thermo flask because the flask is

- A. Isolated system B. Closed system C. Open system D. Isothermal system

33. Which of the following is not a state function?

- A. Pressure B. Volume C. Temperature D. Work

34. Which of the following molecules has the largest dipole moment?

- A. CO B. HCN C. HF D. HCl

35. What is the molecular shape of ICl_4^- ?

- A. Square planar B. T-shaped C. Octahedral D. Trigonal bipyramid

36. Which of the following elements has the highest fifth ionization energy (IE_5)?

- A. Al B. S C. P D. Si

37. What does it mean by $\Delta H = \text{negative}$ for a given process?

- A. The process is endothermic C. The process is adiabatic
B. The process is equithermic D. The process is exothermic

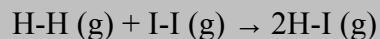
38. The oxidation state of chlorine in HClO_4 ?

- A. +7 B. +3 C. +5 D. +1

39. Which of the following compounds does not contain both ionic and covalent bond?

- A. NH_4NO_3 B. Na_2CO_3 C. CH_3COOH D. NH_4Cl

40. Calculate ΔH for the following reaction using the bond energies given below:



Bond energies: $\text{H-H} = 436 \text{ kJ/mol}$, $\text{I-I} = 151 \text{ kJ/mol}$, $\text{H-I} = 297 \text{ kJ/mol}$

- A. +290 kJ B. -7 kJ C. +7 kJ D. -290 kJ

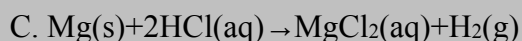
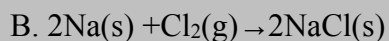
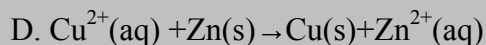
41. How many electrons are present in the δ_{2p_x} molecular orbital of N_2^+ ?

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

42. The number of resonance structures for CO_3^{2-} ?

- A. 3 B. 2 C. 6 D. 9

43. Which one of the following reactions is not a redox reaction?



44. A current of 0.2 A is passed through an aqueous solution of nickel (II) nitrates for 45 minutes. What mass of Ni metal (in grams) will be deposited?

- A. 0.16 B. 0.22 C. 0.33 D. 0.66

45. Which substance is reduced in the reaction, $\text{C}(\text{s}) + 2\text{N}_2\text{O}(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{N}_2(\text{g})$?

- A. C B. N_2O C. CO_2 D. N_2

46. A galvanic cell consists of a Mg electrode in 1 M $\text{Mg}(\text{NO}_3)_2$ solution and Ag electrode in 1 M AgNO_3 solution. What is the standard cell potential at 25°C ?

$$E^0_{\text{Mg}/\text{Mg}^{2+}} = 2.37 \text{ V}$$

$$E^0_{\text{Ag}^+/\text{Ag}} = 0.8 \text{ V}$$

- A. 2.17 V B. 1.17 V C. 3.17 V D. 1.5 V

47. The crystal with the highest melting point?

- A. Diamond B. Washing soda C. Iron D. Ice

48. Which electron is most electronegative?

- A. Sp^3 B. Sp^2 C. Sp D. Sp^3d

49. Which one of the following compounds violate the octet rule for the central atom?

- A. BCl_3 B. H_2O C. PCl_3 D. CH_4

50. Which of the following ions does not show a pseudo noble gas configuration?

- A. Al^{3+} B. Ga^{3+} C. Zn^{2+} D. Cu^{2+}

51. Which of the following molecules or ions will exhibit delocalized bonding?

- A. PCl_5 B. NH_4^+ C. O_3 D. H_2S

52. Which of the following molecules has the smallest bond angle?

- A. PCl_5 B. H_2O C. CO_2 D. BCl_3

53. One should expect which of the following compounds to have the highest melting point?

- A. MgCl_2 B. MgI_2 C. MgF_2 D. MgBr_2

54. Which of the following is most likely to be miscible in carbon tetra chloride, CCl_4 ?

- A. BCl_3 B. CH_3F C. H_2O D. NH_4Cl

55. If a gas absorbs 30 KJ of heat and does 10 KJ of work then what will be the change in the internal energy?

- A. 40 KJ B. -40 KJ C. 20 KJ D. -20 KJ

56. What is galvanized iron? iron coated with

- A. Sn B. Zn C. Cr D. Al

57. Which of the following is not a component of dry cell?

- A. H_2SO_4 B. NH_4Cl C. Zn D. Graphite

58. How many π bonds are present in C_2H_2 ?

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

59. Why are metals soft and malleable?

- A. Because they are very shiny
B. Because they experience electrostatic repulsion
C. Because of the presence of mobile electrons
D. Because the metal cations can slip over each other fairly easily

60. Under what conditions will the enthalpy change of a process equals the amount of heat transferred into or out of the system?

- A. Under constant volume C. Under constant temperature
B. Under constant pressure D. All of the above

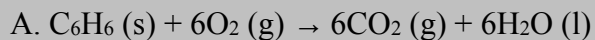
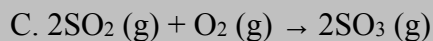
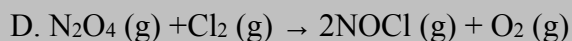
61. Internal energy is defined as the heat content of the system at constant?

- A. Heat B. Moles C. Pressure D. Volume

62. What is the quantity of heat required to raise the temperature of 80 g of ethanol from 25°C to 75°C? (specific heat of ethanol = 2.46 Jg⁻¹K⁻¹)

- A. 2.46 KJ B. 4 KJ C. 9.84 KJ D. 18.68 KJ

63. Which of the following reactions is expected to have negative value of entropy change (ΔS) ?

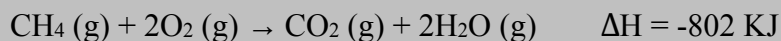


64. How many kilojoules of heat are absorbed when 20 g of NaCl (s) is decomposed into Na (s) and Cl₂ (g) at constant pressure according to the following reaction?



- A. -821 KJ B. -140.5 KJ C. +140.5 KJ D. +281 KJ

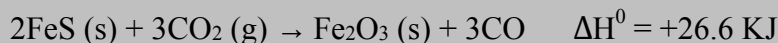
65. Consider the following gaseous reaction at 25°C:



Which energy change would occur if 3.2 moles of CH₄ is completely combusted?

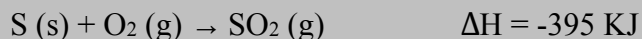
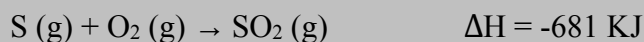
- A. 257 KJ will be released C. 6430 KJ will be released
B. 257 KJ will be absorbed D. 6430 KJ will be absorbed

66. Which statement about the following reaction is correct?



- A. 26.6 KJ of energy are released for every mole of Fe reacted.
- B. 26.6 KJ energy are absorbed for every mole of Fe reacted.
- C. 53.2 KJ of energy are released for every mole of Fe reacted.
- D. 13.3 KJ of energy are absorbed for every mole of Fe reacted.

67. What is the value of ΔH for the reaction $\text{S (s)} \rightarrow \text{S (g)}$?

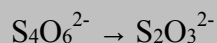


- A. -1013 KJ B. -223 KJ C. +233 KJ D. +1013 KJ

68. A system which can exchange both matter and energy with its surroundings is said to be a/an

- A. Isolated system B. Open system C. Ideal system D. Closed system

69. How many electrons will appear when the following half reaction is balanced?



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

70. The enthalpies of formation of gaseous N_2O and NO at 298 K are 82 and 90 KJ/mol, respectively. The enthalpy change for the reaction: $\text{N}_2\text{O (g)} + \frac{1}{2} \text{O}_2 \text{ (g)} \rightarrow 2\text{NO (g)}$ is

- A. -8 KJ B. 98 KJ C. -74 KJ D. 8 KJ

71. If the enthalpy change for a certain reaction: $\text{A} \rightarrow \text{B}$ is 300 K, what would be the entropy change in the surroundings?

- A. -40 J/K B. 40 J/K C. $-3.6 \times 10^6 \text{ J/K}$ D. $3.6 \times 10^6 \text{ J/K}$

72. During the electrolysis of an aqueous solution of copper sulphate using platinum electrodes, the reaction takes place at the anode is

- A. $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$ C. $2\text{H}_2\text{O} \rightarrow 4\text{H}^+ + \text{O}_2 + 4\text{e}^-$
B. $\text{Cu} \rightarrow \text{Cu} + 2\text{e}^-$ D. $4\text{H}^+ + \text{O}_2 + 4\text{e}^- \rightarrow \text{H}_2\text{O}$

A. Galvanic cells

B. Electrolytic cells

C. Voltaic cells

D. Electromotive cells

A. Cl_2 (g) B. Cl_2 (g) & H_2 (g) C. NaOH (aq) & Cl_2 (g) D. Cl_2 (g), H_2 (g) & NaOH (aq)

A. $\Delta S = 0$ B. $\Delta S < 0$ C. $\Delta S > 0$ D. has no relationship with entropy

A. $\text{H}_2\text{O (g)} \rightarrow \text{H}_2\text{O (s)}$

B. $\text{CaO (s)} + \text{CO}_2 \text{(g)} \rightarrow \text{CaCO}_3 \text{(s)}$

C. $\text{H}_2\text{O (s)} \rightarrow \text{H}_2\text{O (g)}$

D. $\text{H}_2\text{O (l)} \rightarrow \text{H}_2\text{O (s)}$

A. NaN B. Na_2N C. Na_3N D. Na_3N

A. Nickel B. Aluminum C. Mild steel D. Copper

A. Hypothesis B. Observation C. Experimentation D. Theory

A. 2 B. 6 C. 4 D. 8