KENDRIYA VIDYALAYA SANGATHAN, PATNA REGION
HALF YEARLY EXAMINATION, 2018-19

CLASS – XI
CHEMISTRY

Sl.No. _____ 929

TIME – 3 HOURS]
[MAX. MARKS – 70

General Instructions :

(i) All questions are compulsory.

(ii) Question numbers 1 to 5 are very short answer questions, carrying 1 mark each.

(iii) Question numbers 6 to 12 are short answer questions, carrying 2 marks each.

(iv) Question numbers 13 to 24 are also short answer questions, carrying 3 marks each.

(v) Question numbers 25 to 27 are long answer questions, carrying 5 marks each.

(vi) Use log table, if necessary. Use of Calculator is not permitted.

1. State the law of constant proportion.   1

2. Define bond enthalpy.   1

3. What do you mean by Extensive properties ? Give one example.   ½+½=1

4. Write Vander Waals equation for one mole of real gas.   1

5. If $Q_c > K_c$ in which direction the reaction will proceed ?   1

6. (a) How many significant figures are present in the following :   ½×2=1

   (i) 8.51030   (ii) 0.0029

   (b) Express the following in the scientific notation :   ½×2=1

   (i) 0.06942   (ii) 802.596

OR

Calculate the molarity of Sodium hydroxide in the solution prepared by dissolving its 4 g in enough water to form 250 ml of the solution.

7. Calculate the bond order of O_2 and O_2^+ and compare their stability.   2

8. (a) Give the IUPAC name and symbol of the element with atomic number 114.

   (b) Write the general outer electronic configuration of f- block elements.   2

9.   (a)   Write ideal gas equation for 'n' mole of gas.   1

      (b)   Write the type of van der Waals forces between following molecules :   ½×2=1

           (i)   HCl and Cl_2 (ii)   Two CH_3Cl molecules

10.   (a)   State the first law of thermodynamics.   1

      (b)   Write the sign of entropy change for unboiled egg → Boiled egg.   1

11.   The equilibrium constant for a reaction is 10. What will be the value of ΔG°.   2

     (R = 8.314 J K^{-1} mol-1 & T = 300 K)

12.   (a)   State Le Chatelier's Principle.   1

      (b)   Arrange the following in increasing acid strength :   1

           NH_3, HF, CH_4 and H_2O

13.   (a)   Write the electronic configuration of Cr^{3+}. [At. No = 24]   1

      (b)   Arrange 3p, 4s, 5s, 3d and 4p in order of decreasing energy.   1

      (c)   Find out the total no. of electron having azimuthal quantum number, l = 0 in an atom with Z = 29.   1

14.   The mass of electron is 9.1 × 10^{-31}kg. If its K.E. is 3 × 10^{-25} J, calculate its wavelength. (Given, h = 6.626 × 10^{-34} J s)   3

OR

Calculate the wave number for the shortest wave length transition in the Balmer Series of atomic hydrogen.

15.   (a)   Arrange B, C, N and O in increasing order of their ionization enthalpy.   1

      (b)   Fluorine has less negative electron gain enthalpy than chlorine. Why ?   1

      (c)   Name the group and period of the element having atomic number 20.   1

16.   (a)   How would you explain the fact that the first ionization enthalpy of Sodium is lower than that of Magnesium but its second ionization enthalpy is higher than that of Magnesium ?   2

      (b)   Why do second period elements show anomalous properties ?   1

17.   (a)   Using VSEPR model predict the shape and geometry of H_2O.   1×3=3

      (b)   State the hybridization & shape of NH_3 molecule.

      (c) CO_2 has a zero dipole moment. Explain why ?

18. (a) What will be the effect of rise in temperature of liquid on its :   1×3=3

    (i) Viscosity and   (ii) Surface tension.

    (b) Which conditions of temperature and pressure favour ideal behavior of gas ?

    (c) Define 'Critical Temperature'.

19. (a) Explain Charles' law.   1

    (b) At 0°C, the density of a certain oxide of a gas at 4 bar is same as that of dioxygen at 5 bar. What is the molecular mass of the oxide ?   2

20. (a) Under what conditions ΔH is greater than ΔU ?   1

    (b) The enthalpy change for the reaction :   2

    N_2 (g) + $3H_2$ (g) → $2NH_3$ (g), is –92.38 kJ at 298 K. Calculate the change of internal energy at 298 K.

21. For the reaction at 298 K, 2A + B → C, ΔH = 400 kJ mol^{-1} and ΔS = 0.2 $kJK^{-1}mol^{-1}$. At what temperature will the reaction become spontaneous considering ΔH and ΔS to be constant over the temperature range ?   3

22. (i) Write the conjugate acid and base of HSO_4^-.   1×3=3

    (ii) Write the relation between K_P And K_c.

    (iii) What is common ion effect ?

23. Explain the following terms :   1×3=3

    (a) Mole fraction (b) Limiting Reagent (c) Empirical formula

24. (a) How are 0.50 mol Na_2CO_3 and 0.50M Na_2CO_3 different ?   1½

    (b) Define molality and give its unit.   1½

25. (a) A sample of pure PCl_5 was introduced into an evacuated vessel at 473 K. After equilibrium was attained, concentration of PCl_5 was found to be 0.5 × 10^{-1} $molL^{-1}$. If value of K_c is 8.0 × 10^{-3}, what are the concentrations of PCl_3 and Cl_2 at equilibrium ?   3

    PCl_5 (g) ↔ PCl_3 (g) + Cl_2 (g)

    (b) Calculate the PH of 5 × 10^{-3} M NaOH solution.   2

OR

(a) Classify the following in Lewis acids and Lewis bases C_0^{3+}, H_2O, BF_3 and H^+ ? 2

(b) Equal volumes of 0.02M $CaCl_2$ and 0.0004M Na_2SO_4 are mixed. Will a precipitate of $CaSO_4$ be formed ? [Given : K_{sp} for $CaSO_4$ = 2.4 × 10^{-5}]   3

26. (a) Show that the circumference of the Bohr orbit for the Hydrogen atom is an integral multiple of the de Broglie wavelength associated with the electron revolving around the orbit. 2

(b) State Heisenberg Uncertainty Principle. 1

(c) Calculate the total number of angular nodes and radial nodes present in 3p orbital. 1

(d) Draw the boundary surface diagram of $dx^2 - y^2$. 1

OR

(a) Calculate the uncertainty in the position of an electron if uncertainty in its velocity is 3.3×10^5 m/s. (Given h = 6.6×10^{-34} Js) 2

(b) State Hund's rule of maximum multiplicity. 1

(c) What do you mean by Zeeman effect ? 1

(d) Draw the plot to show the variation of probability density Ψ^2 (r) as a function of distance 'r' of the electron from the nucleus for 2s orbital. 1

27. (a) Among o-nitrophenol and p-nitrophenol which has higher boiling point and why ? 1

(b) Find the total number of sigma and pi bonds in benzene (C_6H_6) molecule. 1

(c) Draw resonating structures of ozone. 1

(d) On the basis of Valence Bond Theory mention the hybridization involved and draw the structure of following molecules : (i) ClF_3 (ii) SF_6 2

OR

(a) Draw the Lewis representation of CO_3^{2-}. 1

(b) Define lattice enthalpy. How is it related to the stability of an ionic compound ? 1

(c) Which out of NH_3 and NF_3 has higher dipole moment and why ? 2

(d) Give the shape of following molecules using VSEPR model : ½×2=1

  (i) BCl_3 (ii) SF_4

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