Roll No. _____ **Code : 112011-043-A**

Please check that this question paper contains **30** questions and **5** printed pages.

CLASS-XI
CHEMISTRY

Time Allowed : 3 Hrs. **Maximum Marks : 70**

General Instructions :

(i) All questions are compulsory.

(ii) There are 30 questions in total. Questions 1 to 8 carry one mark each, questions 9 to 18 carry two marks each, questions 19 to 27 carry three marks each and questions 28 to 30 carry five marks each.

(iii) There is no overall choice. However, internal choices have been provided in one question of two marks, one question of three marks and all three questions of five marks. You have to attempt only one of the choices in such questions.

(iv) Use of calculator is not permitted.

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1. Diamond is used as abrasive for sharpening of tools and cutting of rocks because of its (1)
   (a) High density (b) Extreme hardness
   (c) High melting point (d) High refractive index.

2. The first organic compound synthesised by the scientist F. Wohler was (1)
   (a) Benzene (b) Acetic acid
   (c) Urea (d) Ammonium cyanate.

3. The Enthalpies of all elements in their standard state are (1)
   (a) Unity (b) Zero
   (c) < 0 (d) > 0.

4. Metal ions like Ag^{+}, Cu^{2+} etc. act as (1)
   (a) Bronsted acids (b) Bronsted bases
   (c) Lewis acids (d) Lewis bases.

5. Express the following in 3 significant figures (½+½)
   (i) 0.007838 (ii) 25000.

6. Write electronic configuration of (½+½)
   (i) Chromium (At. No. 24) and (ii) Copper (At. No. 29).

7. Write the two factors on which the ionization enthalpy of an element depends. (1)

8. What is the critical temperature of a gas? (1)

9. (a) Define Stoichiometry of a chemical reaction.
   (b) State Gay Lussac's law of gaseous volumes. (1+1)

10. Calculate the concentration of nitric acid in moles per litre in a sample which has density of 1.41 g ml^{-1} and mass percent of nitric acid in it being 69%. (2)

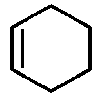
11. Write two tests performed with Lassaignese extract for detection of sulphur in an organic compound with reactions involved. Assume nitrogen is absent in the organic compound. (1+1)

12. 0.380 g of an organic compound gave 0.570 g of silver chloride in Carius estimation. Calculate the percentage of chlorine present in the compound. (2)

13. Draw a labelled molecular orbital diagram to explain that Neon molecule does not exist. (2)

14. (a) Write IUPAC name of

(i) $CH_3 - CH_2 - \overset{\overset{O}{\|}}{C} - CH_2 - \overset{\overset{O}{\|}}{C} - OH$

(ii) 

(1+1)

OR

Draw structures of

(i) 3, 4-Dimethylphenol

(ii) 6-Hydroxyheptanal. (1+1)

15. What are conformations? Draw the Sawhorse and Newman projections of ethane. (1+1)

16. The equilibrium constant for a reaction is 10 at 27°C. What will be the value of ΔG^0? (R = 8.314 JK^{-1} mol^{-1}) (2)

17. What are Zeolites? Give their any one use. (1+1)

18. (a) How can the fullerenes be prepared?
   (b) Write the difference between silicons and silicates. (1+1)

19. (a) Permangnate ions oxidise ferrous to ferric ions in the following redox reaction in an acidic medium.

$$MnO_4^- + Fe^{2+} \longrightarrow Mn^{2+} + Fe^{3+}$$

Balance this redox reaction stepwise. (2)

(b) What is a disproportionation reaction? Give an example. (½+½)

20. (a) For the reaction at 298 K

$$2A + B \longrightarrow C$$

$\Delta H = 400$ kJ mol^{-1}, $\Delta S = 0.2$ kJ K^{-1} mol^{-1}

At what temperature will the reaction become spontaneous considering ΔH and ΔS to be constant?

(b) State Hess's law of constant heat summation. (2+1)

21. (a) How is hydrogen peroxide prepared industrially from 2-Ethylanthraquinol? Write equation for the reaction involved. (2)

(b) What is the difference between hard water and heavy water? (1)

22. (a) Out of Ne and Na^+ which has more ionization enthalply and why? (1)

(b) What is the cause of similarities in the chemical properties of elements lying in a group? (1)

(c) In the periodic table about 80% of elements are metals. Why ? (1)

23. (a) State Markonikov's rule and give one example to explain it.

(b) Define the rule which helps us to predict whether the given organic compound is aromatic or not. (2+1)

24. (a) A student forgot to put the reaction mixture in the round bottomed flask at 27°C but he placed the flask on the flame. After a lapse of time he realized his mistake and using a pyrometer he found that temperature of the flask was 477°C. What fraction of air would have expelled out?

(b) Why Dalton's law of partial pressure is not applicable to a gaseous mixture of NH_3 and HCl? (2+1)

OR

(a) A gas cylinder which can withstand a pressure of 3 atm is filled with butane gas at 27°C and 760 mmHg pressure. Due to sudden fire in the building it burst out. Find the temperature in degree Celsius at which it would have happened.

(b) Why are falling rain drops spherical?

25. What is Hybridization? Explain the formation of acetylene (ethyne) molecule on the basis of hybridization. (1+2)

26, Write the chemical reactions for

(i) Friedel-Crafts alkylation reaction

(ii) Ozonolysis of an alkene

(iii) Decarboxylation reaction. (1×3=3)

27. (a) How is Green chemistry useful for bleaching of paper?

(b) Carbon monoxide gas is more dangerous than CO_2 gas. Why?

(c) Which gas is the main cause of Global Warming? (1×3=3)

28. (a) How long will it take for a radio wave, of frequency 6×10^{13} Hz, sent by a path finder to travel from Mars to Earth over a distance of 8×10^7 km?

(b) Why was pressure of air inside the tube reduced to 10^{-2} atm in cathode ray experiment?

(c) What are degenerate orbitals?

(d) State Heisenberg's Uncertainty Principle.

(e) What information do you get from the principal quantum number about an atom? (1×5)

OR

(a) Calculate the mass of a photon moving with a wavelength of 7.2 A°.

(b) What is Quantum mechanics?

(c) State Hund's rule of maximum multiplicity.

(d) What is a Black body?

(e) State Aufbau principle. (1×5)

29. (a) Explain manufacturing of $Na_2CO_3.10H_2O$ by Solvay's process. Write the brief procedure with chemical reactions involved. (2+1)

(b) Give reasons :

(i) LiCl is more soluble in ethanol than KI.

(ii) Ca imparts colour to the flame while Mg does not. (1+1)

OR

(a) Explain briefly the manufacturing of cement. Write materials required and average composition of cement. (½+½+2)

(b) Write any one use of beryllium. (1)

(c) Why do Alkali metals occur as salts in sea water and are never found in free state? (1)

30. (a) State Le Chatelier's principle. Apply this principle on the following reaction in terms of pressure, temperature, concentration and catalyst to obtain maximum yield of ammonia.

$$N_2(g) + 3H_2(g) \overset{Fe}{\rightleftharpoons} 2NH_3(g)\ ;\ \Delta H = -92.38\,kJ\,mol^{-1}$$

(b) The concentration of hydrogen ions in a sample of soft drink is 3.8×10^{-3} M. What is its pH? (3+2)

OR

(a) State common ion effect. Cite an example in which you apply it in salt analysis in the laboratory.

(b) What is a Buffer solution?

(c) Silver chloride is a sparingly soluble salt. The solubility product of silver chloride is 1.2×10^{-10} at 298 K. Calculate the solubility of silver chloride at this temperature. (2+1+2)