> Please check that this question paper contains **30** questions and **7** 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 all. Question 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, an internal choice has been provided in one question of two marks, one question of three marks and all the three questions of five marks each. You have to attempt only one of the choices in such questions.*

(iv) *Fifteen minutes have been allotted to read this paper. During this time, you will read the question paper only and will not write any answer on the answer script.*

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1. The atomic mass of silver atom is 108 u, the mass of a silver atom is :

    (a) 10.8 g

    (b) $108 \times 6.02 \times 10^{23}$ g

    (c) $\dfrac{108}{6.023 \times 10^{23}}$ g

    (d) $\dfrac{1 \cdot 08}{6.02 \times 10^{23}}$ g

2. Benzene was first isolated by :

    (a) August Kekule

    (b) Michael Faraday

    (c) F. Wöhler

    (d) John Dalton

3. Sodium Chlorie solution kept in a beaker is an example of :

    (a) Open system

    (b) Closed system

    (c) Isolated system

    (d) None of the above.

4. A standard hydrogen electrode has zero electrode potential because :

   (a) hydrogen is easiest to oxidize

   (b) this electrode potential is assumed to be zero

   (c) hydrogen atom has only one electron

   (d) hydrogen atom can gain or lose an electron

5. Pressure of a mixture of 4 g of O_2 and 2 g of H_2 confined in a bulb of 1 litre at 0°C is

   (a) 25.215 atm   (b) 31.205 atm

   (c) 45.215 atm   (d) 15.210 atm

6. Write the difference between atomic mass and mass number of an atom of an element.

7. What do you understand by atomic radius ?

8. Out of fluorine and chlorine which one is more electronegative ?

9. The following data are obtained when N_2 and O_2 react together to form different compounds :

	Mass of N_2	Mass of O_2
(i)	14 g	16 g
(ii)	14 g	32 g
(iii)	28 g	32 g
(iv)	28 g	80 g

Which law of chemical combination is obeyed by the above experiment ? Write its statement.

10. Calculate the density (in gL^{-1}) of a 3.60 M sulphuric acid solution which is 29% H_2SO_4 by mass (molar mass = 98 g mol^{-1})

11. Potassium dichromate is very important oxidising agent. Dichromate ions oxidise stannousions into stannic ions in the following redox reaction in acidic medium :

$$Cr_2O_7^{2-} + Sn^{2+} \longrightarrow Cr^{3+} + Sn^{4+}$$
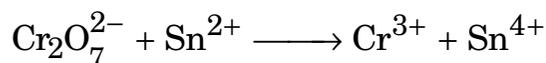
balance this redox reaction stepwise.

12. In estimation of sulphur by Carius method 0.468 g of an organic compound gave 0.668 g of barium sulphate. Find out the percentage of sulphur in the given organic compound. (Atomic mass of Ba = 137 u, S = 32 u and O = 16 u)

13. Write the balanced chemical equations for the following reactions :
    (i) Quick lime is heated with silica.
    (ii) Chlorine gas reacts with slakled lime.

14. (a) Why there are 14 elements in lanthanoid series ?
    (b) d-block elements are generally called as 'Transition elements'. Why?

15. Write IUPAC name of

    (i)

    $$H_3C-\underset{\underset{Cl}{|}}{CH}-CH-\overset{\overset{O}{\|}}{C}-OH$$

    (ii)
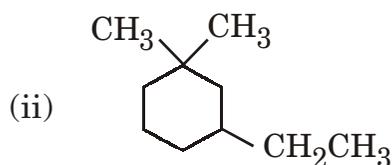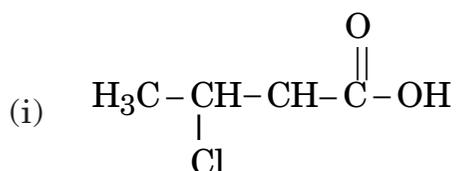
    OR

    Draw the structures of
    (i) Cyclopent-2-en-1-ol
    (ii) p-Nitroaniline

16. (a) How is producer gas prepared ? Write equation also.

(b) Why graphite conducts electricity although it is a non-metal ?

17. Define :

(a) Dipole moment with mathematical expression.

(b) Hybridisation of atomic orbitals.

18. (a) State Huckel Rule.

(b) Draw eclipsed and staggerd (saw horse) conformation of butane and explain which is more stable ?

19. (a) How is the heavy water prepared ? Write its one use.

(b) What causes the temporary and permanent hardness of water ?

(c) What is the basic principle of hydrogen economy ?

20. (a) What is compressibility factor (Z) for a gas ?

(b) 0.068 dm^3 of a sample of nitrogen is collected over water at $20°C$ and 0.92 bar. What will be the volume of dry nitrogen at NTP (Aqueous tension of water at $20°C = 0.023$ bar)

21. (a) What do you understand by common ion effect' ? Give an example.

(b) For the Contact process of manufacturing of sulphuric acid the following reaction is in equilibrium :

$$2SO_2 + O_2 \rightleftharpoons 2SO_3; \Delta H = -198 \text{ kJ}$$

Apply the effect of change of temperature and pressure on the above equation using Le Chatelier's principle to yield maximum amount of sulphur trioxide.

22. (a) What is the difference between ionic product and solubility product of a salt ?

(b) Calculate the H_3O^+ ion concentration of a water sample having pH 6.58.

OR

C   4

(a) Give an example of an acidic buffer and a basic buffer solution.

(b) Solubility of AgBr in water at 25°C is found to be 1.06×10^{-5} moles per litre. Calculate the solubility product of AgBr at this temperature.

23. (a) Which two gases are main cause of ozone depletion.

(b) What do you mean by green chemistry? How will it help decresase environmental pollution?

24. (a) Define metamerism with one example.

(b) Write Lassaignes test for detection of Iodine in organic compound. Why Lassaignes extract is boiled with concentrated nitric acid prior to performing the test.

25. (a) How Silicones can be prepared, also write equations?

(b) Draw the structure of diborane.

26. (a) Write the electronic configuration of O_2 molecule and predict its bond order and magnetic character.

(b) Explain briefly intramolecular hydrogen bonding. Give an example.

27. (a) Lithium has highest ionization enthalpy still it is the strongest reducing agent in alkali metals. Why?

(b) How do alkali metals behave when they are added in a solution of liquid ammonia?

(c) Write the raw materials required for making portland cement.

28. (a) In astronomical observations signals observed from distant stars are generally weak. If the photon detector receives a total of 3.15×10^{-18} J from the radiations of 600 nm. Calculate the number of photons received by detector.

(b) What do you mean by quantum mechanics?

(c) State Zeeman effect.

(d) Why is line emmision spectrum called finger prints of elements?

OR

(a) In an electron microscope used for obtaining highly magnified image of biological specimen, if the velocity of the electrons used in the microscope is 1.6×10^8 ms^{-1}. Calculate the de-broglie wavelength associated with the electrons. $(m^e = 9.1 \times 10^{-31}$ kg)

(b) Why the Bohr's orbits are also called stationary states ?

(c) What do you mean by 'quantum' ?

(d) What is the number of unpaired electrons in P (atomic number = 15) atom ?

29. (a) State Markonikov's rule, explain it with respect to following reaction :

$$CH_3 - CH = CH_2 + HBr$$
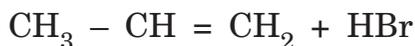
(b) Prepare benzene from

(i) Phenol

(ii) Acetylene gas

Write chemical equations for chemical reactions.

(c) Benzene is highly unsaturated compound but behaves like a saturated compound. Why ?

OR

(a) Illustrate the following reaction with chemical equations :

(i) Ozonolysis of propene

(ii) Friedal craft acylation reaction

(iii) Preparation of ethyne from calcium cabide

(b) What happens when n-hexane subjected to isomerisation.

30. (a) What is a thermochemical equation ?

(b) Write one application of Hess's law.

(c) State the difference between adiabatic and isothermal processes.

(d) Find out the value of equilibrium constant for the following reaction at 298 K

$$2\ NH_3\ (g) + CO_2\ (g) \rightleftharpoons NH_2\ CONH_2\ (g) + H_2O\ (l)$$

Standard Gibbs energy change $\Delta G°$ at the given temperature is -136 kJ mol^{-1}

(a) Why enthalpy of neutralization of a strong acid and a strong base is always constant e.g. -57.1 kJ mol^{-1} for HCl and NaOH ?

(b) What are the two factors on which the spontaneity of a given process depends ?

(c) State the difference between C_p and C_v how they are related to each other ?

(d) At 0°C ice and water are in equilibrium and enthalpy change for the process :

$$H_2O_{(s)} \rightleftharpoons H_2O \ (l) \text{ is } 6.0 \text{ kJ mol}^{-1}$$
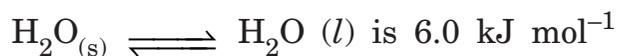
Calculate the entropy change for this conversion of ice into liquid water.