CLASS–XII (H.P.)

CHEMISTRY

(Theory)

SERIES—A

Time Allowed : 3 Hours **Maximum Marks : 60**

Candidates are required to give their answers in their own words as far as practicable.
Marks allotted to each question are indicated against it.

Special Instructions :

(1) You must write Question Paper Series in the circle at top left side of title page of your Answer-book.
(2) While answering your Questions, you must indicate on your Answer-book the same Question No. as appears in your Question Paper.
(3) Do not leave blank page/pages in your Answer-book.
(4) All questions are compulsory. Internal choices have been given in some questions.
(5) Question Nos. 1 to 6 are multiple choice type questions (MCQ) carrying 1 mark each. Choose one correct answer among four options.
(6) Question Nos. 7 to 10 are very short answer type questions carrying 1 mark each. Answer these in about one word or in one line.
(7) Question Nos. 11 to 17 are short answer type questions carrying 2 marks each. Answer these questions in about 30 words each.
(8) Questions Nos. 18 to 25 are short answer type questions carrying 3 marks each. Answer these questions in about 40 words each.
(9) Questions Nos. 26 to 28 are long answer type questions carrying 4 marks each. Answer these questions in about 50 words each.

1. The number of atoms in bcc arrangement is : 1
   (*a*) 1 (*b*) 2
   (*c*) 4 (*d*) 6.
2. The units of cell constant are : 1
   (*a*) $ohm^{-1}\ cm^{-1}$ (*b*) cm
   (*c*) $ohm^{-1}\ cm$ (*d*) cm^{-1}.
3. Which of the following are positively charged sols ? 1
   (*a*) $Fe(OH)_3$ (*b*) Sb_2S_3
   (*c*) TiO_2 (*d*) Silver sol.
4. Which of the following ore is best concentrated by froth floatation process ? 1
   (*a*) Magnetite (*b*) Galena
   (*c*) Malachite (*d*) Cassiterite.
5. The molarity of pure water is : 1
   (*a*) 18 (*b*) 5.56
   (*c*) 55.6 (*d*) 100.
6. Renitidine is used as : 1
   (*a*) Antiseptic (*b*) Antacid
   (*c*) Antihistamine (*d*) Disinfectant.
7. What is roasting ? 1
8. What is the order of a reaction whose rate constant has same units as the rate of reactions ? 1

9. What are the most common coordination numbers encountered in coordination complexes ? 1

10. Name a synthetic polymer which is an amide. 1

11. (*a*) What are Freons ?
(*b*) Why HF is weaker acid than HCl ? 1, 1

12. (*a*) OF_6 is not known whereas SF_6 is known. Explain it.
(*b*) Define inert pair effect. 2

13. With the help of valence bond theory, explain that tetracyanonickelate (II) ion is square planar or tetrahedral in nature. 2

14. What happens when phenol is treated with aqueous bromine water ? 2

15. Write four differences between adsorption and absorption. 2

16. What happens when potassium dichromate is heated with sodium chloride and conc. H_2SO_4 ? 2

17. Write a short note on Cannizzaro's reactions. 2

18. (a) In a cold climate water gets frozen causing damage to the radiator of a car. Ethylene glycol is used as an antifreezing agent. Calculate the amount of ethylene glycol to be added to 4 kg of water to prevent it from freezing at – 6°C (K_f for water 1.85 km^{-1}).
(*b*) Write the structure and IUPAC name of Aspirin. 2, 1

Or

(*a*) Give the four points of differences between Ideal and Non-ideal solution.
(*b*) What are the main constituents of Dettol ? 2, 1

19. Write short notes of the following :
(*a*) Hoffmann's bromamide reaction
(*b*) Carbylamine reaction
(*c*) Schotten Baumann reaction. 1, 1, 1

20. (*a*) Derive the following relation :

$$\log \frac{k_2}{k_1} = \frac{Ea}{2.302\ R}\left[\frac{T_2 - T_1}{T_1\ T_2}\right].$$

(*b*) The half-life for radioactive decay of ^{14}C is 5730 years. An archaeological artifact containing wood had only 80% of the ^{14}C found in a living tree. Estimate the age of the sample. 1½, 1½

21. (*a*) Why NCl_5 is not known while PCl_5 is known ? Explain.
(*b*) Why oxygen is gas while sulphur is a solid at room temperature ? 1½, 1½

Or

Describe Ostwald's process for the manufacture of nitric acid. 3

22. (*a*) What is Nernst equation ? Write the mathematical relation.
(*b*) How many coulombs of electricity are required for reduction of 1 mol of Cu^{2+} to Cu ? 1½, 1½

23. (*a*) What happens when ammonia is treated with formaldehyde ?
(*b*) Complete the following reaction :

$$RCOOH + PCl_3 \rightarrow \xrightarrow{?} + \xrightarrow{?}$$ 2, 1

24. (*a*) Why transition metals form coloured ions or salts ? Explain.
(*b*) Which of two ferrous or ferric ion has larger magnetic moment ? Explain. 1½, 1½

25. (*a*) What are reducing and non-reducing sugars ? What is the structural feature characterising reducing sugars ?
(*b*) What are the constituents of starch ? 2, 1

26. (*a*) Write the difference between Schottky and Frenkel defects.
(*b*) How will you convert Aniline to Chlorobenzene ?
(*c*) What is an Azo dye ? 2, 1, 1

Or

(*a*) Arrange the following in increasing order of their basic strength : $C_2H_5NH_2$, $C_6H_5NH_2$, $C_6H_5CH_2NH_2$ and $(C_2H_5)_2NH$.

(*b*) Write short note on Mendius reaction.

(*c*) Methyl amine in water reacts with ferric chloride to precipitate ferric hydroxide. Explain.

27. (*a*) Why is chloroform stored in dark coloured bottles ? 1, 1, 2

(*b*) How will you convert chlorobenzene to phenol ?

(*c*) (*i*) What are thermoplastics ?

(*ii*) What are isotonic solutions ?

28. (*a*) What is the effect of temperature and pressure on conductivity ? 1, 1, 2

(*b*) How will you prepare Glyptal polymer ? Give its chemical reaction.

(*c*) How phenol is stronger acid than alcohol ? Explain. 1, 1, 2

CHEMISTRY
(Theory)

SERIES—B

Time Allowed : 3 Hours **Maximum Marks : 60**

Special Instructions : Same as in Series-A.

1. If the alignment of magnetic moments in a substance is in a compensatory way so as to give zero net magnetic moment, then the substance is said to be :
   (*a*) Ferromagnetism (*b*) Anti-ferromagnetism
   (*c*) Ferrimagnetism (*d*) Diamagnetism. 1
2. The units of conductivity are :
   (*a*) $ohm^{-1}\ cm^{-1}$ (*b*) $ohm^{-1}\ cm^2$
   (*c*) ohm^{-1} (*d*) $ohm^{-2}\ cm^2\ equiv^{-1}$. 1
3. The colloidal system in which the disperse phase and dispersion medium are both liquids is known as :
   (*a*) a gel (*b*) an aerosol
   (*c*) an emulsion (*d*) a foam. 1
4. Magnetic separation is used in the concentration of :
   (*a*) Copper pyrites (*b*) Chromite
   (*c*) Bauxite (*d*) Cinnabar. 1
5. The basicity of phosphorus acid is :
   (*a*) Two (*b*) Three
   (*c*) One (*d*) Zero. 1
6. Chloramphenicol is :
   (*a*) Antipyretic (*b*) Broad spectrum antibiotic
   (*c*) Azo dye (*d*) Tranquillizer. 1
7. Why Aluminium cannot be reduced by Carbon ? 1
8. Can overall order of a reaction be negative ? Explain. 1
9. Name the central atom present in haemoglobin and chlorophyll. 1
10. Give the common and IUPAC name of the monomer of natural rubber. 2
11. What is the difference between Schottky and Frenkel defect ? 2
12. What is Van't Hoff's factor ? Under what conditions Van't Hoff's factor "i" is less than 1 and greater than 1 ? Explain. 2
13. Account for the following :
    $[Fe(CN)_6]^{3-}$ is weakly paramagnetic while $[Fe(CN)_6]^{4-}$ is diamagnetic in nature. Explain. 2

14. How phenol is stronger acid than alcohol ? Explain. 2
15. What is Tyndall effect ? Give its causes. 2
16. What is Lanthanoid contraction ? What are the consequences of lanthanoid contraction ? 2
17. What happens when ethanoyl chloride is reduced with H_2 in the presence of $Pd \mid BaSO_4$? 2

18. (*a*) A solution containing 12.5 g of a non-electrolyte substance in 175 g of water gave boiling point elevation of 0.70 K. Calculate the molar mass of the substance. (K_b for water = 0.52 K Kg mol^{-1}. 2, 1
    (*b*) What are antacids ? Give one example.

Or

    (*a*) Define the following terms :
    (1) Mole fraction (2) Molality. 2, 1
    (*b*) What are antiseptics ? Give one example.

19. Write short notes on the following :
    (*a*) Hunsdiecker reaction
    (*b*) Elastomers 1, 1, 1
    (*c*) Sandmeyer reaction.

20. (*a*) Give four differences between rate of reaction and rate constant.
    (*b*) Calculate two-thirds life of a first order reaction having $k = 5.48 \times 10^{-14}\ S^{-1}$. 1½, 1½

21. (*a*) Why electron affinity of F is less than that of Cl ? Explain.
    (*b*) How are XeO_3 and XeO_2F_2 prepared ? Describe their molecular shapes. 1½, 1½

Or

Describe the contact process for the manufacture of Sulphuric acid. 3

22. (*a*) State reason for the following "Rusting of Iron" is said to be an electrochemical theory. Explain.
    (*b*) How many coulombs of electricity are required for oxidation of 1 mol of FeO to Fe_2O_3 ? 1½, 1½

23. (*a*) Give aldol condensation reaction of acetaldehyde and explain, why formaldehyde does not give this reaction.
    (*b*) Complete the following reaction :

$$RCOOH + SOCl_2 \rightarrow \xrightarrow{?} + \xrightarrow{?} + \xrightarrow{?}$$ 2, 1

24. (*a*) Give three differences between Lanthanoids and Actinoids.
    (*b*) Why do Zr and Hf exhibit similar properties ? 1½, 1½

25. (*a*) What are the essential and non-essential amino acids ?
    (*b*) What is the biotin Vitamin ? 2, 1

26. (*a*) Which is more basic, Aliphatic amines or Ammonia and why ?
    (*b*) How Aniline will be converted into Acetanilide ?
    (*c*) Complete the following addition reactions with Isocyanides :

(1) $CH_3 - N = C + S \rightarrow \xrightarrow{?}$

$\rightarrow$

(2) $CH_3 - N = C + O_3 \rightarrow \xrightarrow{?}$

$\rightarrow$ 2, 1, 1

Or

    (*a*) Why boiling point of Alkyl cyanides are higher than those of Isomeric isocyanides ?
    (*b*) Write a short note on carbylamine reaction.
    (*c*) Why does the Silver chloride dissolve in Methylamine solution ? 1, 1, 2

27. (*a*) Haloarenes are insoluble in water but are soluble in benzene. Explain.
(*b*) How will you convert Iodoform to Propyne ?
(*c*) (1) What is the hybridisation of Xenon in XeF_2 and XeF_4 ?
(2) Write the structure of IF_7.

28. (*a*) Write the mathematical relation for equivalent conductance. 1, 1, 2
(*b*) How will you prepare polymer dacron ? Give its chemical reaction.
(*c*) Out of phenol and benzene, which is more easily nitrated and why ? 1, 1, 2

CHEMISTRY
(Theory)

SERIES—C

Time Allowed : 3 Hours **Maximum Marks : 60**

Special Instructions : Same as in Series-A.

1. The number of atoms present in a F.C.C. unit cell is :
(*a*) 6 (*b*) 8
(*c*) 4 (*d*) 12. 1

2. For a redox reaction to proceed in a cell, the e.m.f. must be :
(*a*) Positive (*b*) Negative
(*c*) Fixed (*d*) Zero. 1

3. The Zig-zag motion of colloidal particles was first observed by :
(*a*) John Tyndall (*b*) Robert Brown
(*c*) Zsigmondy (*d*) Ostwald. 1

4. Which of the following is magnetite ?
(*a*) Fe_3O_4 (*b*) Fe_2O_3
(*c*) $Fe_2O_3 3H_2O$ (*d*) Fe_2CO_3. 1

5. Which one of the following is tailing of mercury ?
(*a*) N_2O (*b*) SiO_2
(*c*) Hg_2O (*d*) None of these. 1

6. Which of the following is not an antipyretic ?
(*a*) Paracetamol (*b*) Aspirin
(*c*) Phenacetin (*d*) Chloramphenicol. 1

7. What is the composition of "Bell Metal" ? 1
8. A reaction if found to be zero order, will its molecularity be zero ? 1
9. Name the compound used for measuring the hardness of water *i.e.* for estimation of Ca^{2+} and Mg^{2+} ions. 1
10. Give the name of the polymer which is used for making non-stick utensils. 1
11. Write short notes on the following : 2
(*a*) What are F centres ?
(*b*) What is a space lattice ?
12. State Raoult's law. Using this law how would you distinguish between an ideal solution and non-ideal solution ? 2
13. By using Valence bond theory discuss the geometry and magnetic nature of $[Cr(NH_3)_6]^{3+}$ given the atomic number of Cr = 24. 2
14. What happens when a freshly precipitated $Fe(OH)_3$ is shaken with little amount of dilute solution of $FeCl_3$? 2
15. What happens when phenol is treated with concentrated HNO_3 ? Explain. 2
16. (*a*) What is the basic difference between the electronic configuration of transition and inner transition elements ? 1, 1
(*b*) Why O_2 exists as a gas whereas Sulphur as a solid ? 2
17. Write short note on Hoffmann bromamide reaction.

18. (*a*) A Sugar syrup of weight 214.2 gm contains 34.2 gm of sugar ($C_{12}H_{22}O_{11}$), calculate the mole fraction of sugar.

(*b*) What are Antioxidants ? Give one example. 2, 1

Or

(*a*) What is the effect of temperature on the solubility of a gas in a liquid ?

(*b*) What are Tranquillizers ? Give one example. 2, 1

19. (*a*) How is DDT prepared from Chlorobenzene ? Give the chemical equation only.

(*b*) What happens when Iodoform is heated with Silver powder ? Give equation. 1½, 1½

20. (*a*) Distinguish between order of a reaction and molecularity.

(*b*) The rate of a particular reaction triples, when temperature changes from 50°C to 100°C. Calculate the activation energy of the reaction. 1½, 1½

21. (*a*) Why Ammonia is good complexing agent ? Explain.

(*b*) Discuss the structures of Phosphorus trichlorides. 1½, 1½

Or

(*a*) Explain the preparation of Ozone from Siemen's ozoniser.

(*b*) How does ozone react with (*i*) $FeSO_4$ and (*ii*) PbS ? 2, 1

22. (*a*) Give three differences between e.m.f. and potential difference.

(*b*) How many coulombs of electricity are required for reduction of 1 mol of Al^{3+} to Al ? 1½, 1½

23. (*a*) Why acid amides are amphoteric in nature ? Explain.

(*b*) Complete the following reaction :

$$RCOOH + PCl_5 \rightarrow \xrightarrow{?} + \xrightarrow{?} + \xrightarrow{?}$$ 2, 1

24. (*a*) Why do transition elements exhibit variable oxidation states and form complex compounds ?

(*b*) Fe^{3+} is more stable than Fe^{2+}. Explain. 1½, 1½

25. (*a*) State the difference between primary and secondary structure of proteins.

(*b*) What is Zwitter ion ? 2, 1

26. (*a*) Explain by giving reason that Aniline is weaker base than Ethylamine.

(*b*) How will you convert Methylamine into Ethylamine ?

(*c*) Describe Gattermann reaction. 2, 1, 1

Or

(*a*) How will you distinguish between primary, secondary and tertiary amines ?

(*b*) How is aniline diazotised ? Write chemical reactions. How does aniline react with nitrous acid at 5°C ?

(*c*) Why is Methylamine stronger base than Ammonia ? 2, 1, 1

27. (*a*) Why chloroform contains chlorine but gives no reaction with $AgNO_3$ solution ?

(*b*) How will you convert ethyl alcohol to propanoic acid ?

(*c*) Write notes on the following :

(1) Thermosetting polymers

(2) Reimer-Tiemann reaction. 1, 1, 2

28. (*a*) Define galvanisation of iron.

(*b*) How will you prepare polymer PAN (Polyacrylonitrile) ? Give its chemical reaction.

(*c*) Why is R—O—R bond angle in ether is more than H—O—H bond angle in water, though oxygen atom is sp^3 hybridised in both the cases ? Explain. 1, 1, 2
