2022
CHEMISTRY (Honours)
Paper Code : XII - A & B
(New Syllabus)

Full Marks : 65   **Time : Three Hours**

Paper Code : XII-A
(Marks : 15)

Group A (MCQ Questions)
Choose the correct answer. Each question carries 1 mark.

1. The raw materials used for the manufacture of cement are -

(A) Calcium carbonate

(B) Sandstone

(C) Gypsum

(D) All of the above

2. Pb_3O_4 is widely used as pigment. It is known as -

(A) White lead

(B) Lithopone

(C) Red lead

(D) Chrome green

3. A gas common both in water gas and producer gas -

(A) Ar

(B) CH_4

(C) N_2

(D) CO

4. Which among the following compounds is generally used to increase the refractive index of the glass?

(A) CuO

(B) PbO

(C) MnO_2

(D) K_2CO_3

5. Steel with 20% Ni, 12% Al, and 6% Co used for making powerful electromagnets is -

(A) Stainless steel

(B) Alnico

(C) Nichrome

(D) Monel metal

6. Composition of Mortar is -

(A) Portland cement + water

(B) Portland Cement + Water + Sand

(C) Portland Cement + Water + Sand + Gravel

(D) Water + Sand + Gravel

7. Nylon 66 is not a -

(A) Condensation polymer

(B) Polymide

(C) Co-polymer

(D) Homo polymer

8. Which of the following is not a natural fibre?

(A) Silk

(B) Wool

(C) Viscose rayon

(D) Cotton

9. The TGA-thermogram of calcium oxalate monohydrate shows -

(A) 1 weight losses

(B) 2weight losses

(C) 3 weight losses

(D) 4 weight losses

10. Impurities in reagents are -

(A) Systematic Errors

(B) Randoms Errors

(C) Absolute Errors

(D) Relative Errors.

11. If 20.0 mL of 0.600 M $MgCl_2$ reacts with 25.0 mL of 0.500 M NaOH, the expected mass of $Mg(OH)_2$ produced is -

(A) 0.729 g.

(B) 0.364 g.

(C) 0.700 g.

(D) 1.46 g.

12. In India, the most, commonly used pesticide BHC is -

(A) Carbamate

(B) Triazine

(C) Organochlorine

(D) Antibiotic

13. Which of the following possess zero octane number -

(A) Iso-octane

(B) petrol

(C) n-heptane

(D) LPG

14. Which of the following is/are used as carrier gases in gas chromatography?

(A) Helium

(B) Argon

(C) Nitrogen

(D) All the above

15. Which precipitant is most suitable for gravimetric estimation of Al^{3+}?

(A) Dimethylglyoxime

(B) 8-hydroxyquinoline

(C) α-Benzoinoxime (cupron)

(D) Ammonium nitrosophenylhydroxylamine (cupferron)

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Answer any *five* questions, taking at least *two* questions from each group.

Group – A

1. (a) The following replicate weighings were obtained: 29.8, 30.2, 28.6, and 29.7 mg. Calculate the standard deviation of the individual values and the standard deviation of the mean.

(b) Calculate the result of the following expression:

$$\frac{(137.6 \pm 0.3) + (203.3 \pm 0.1) - (117.7 \pm 0.1)}{(97.8 \pm 0.05) + (37.3 \pm 0.1)}$$

(c) What is bit and byte? Write the full forms of i) ASCII and ii) BASIC

(d) What do you mean by population standard deviation?   **2+ 3+(2+2)+1 = 10**

2. (a) What is the significance and use of T test and F test?

(b) In extraction of Cerium (IV) with oxine in chloroform, the volume of aquous and organic phase each were 25 ml with percentage of extraction 99.8%. Calculate the distribution ratio.

(c) What are the differences between post-precipitation and co-precipitation?

(d) What are 'stationary phase' and 'mobile phase' in gas chromatography?   **2+3+3+2 = 10**

3. (a) Which kind of information can be obtained from TGA analysis?

(b) What will be the composition of the effluent when a dilute solution of each of the following is passed through a cation exchange column in hydrogen form? (i) NaCl; (ii) Na_2SO_4; (iii) $KClO_4$; (iv) $FeSO_4$

(c) Compare reverse phase operation and normal phase operation in HPLC. Name one active material used in reverse phase column.

(d) Calculate the 'gravimetric factor' for estimation of nickel as its complex with dimethyl

glyoxime (DMG). (Given at wt. of Ni= 58.71, C = 12, N= 14, O=16 and H=1). **2+2+3+3 = 10**

4. (a) What are the differences between paper chromatography and thin layer chromatography?

(b) Briefly discuss the principal of liquid-liquid extraction and state its important field of application.

(c) What is peptization? How can it be avoided?

(d) Prove mathematically that multiple small scale extractions are more efficient than single extraction using all the solvent at a time. **2+2+(2+1)+3 = 10**

Group – B

5. (a) What is petroleum? Discuss the various steps of processing of petroleum to obtain gasoline and other important fractions.

(b) Discuss the manufacture of Portland cement with suitable flow diagram and mention the reactions in various steps of the process.

(c) Write the reactions involved in the production of synthetic urea.

(d) Chromium is the best suited alloying metal for iron to make steel – Comment.
(1+2)+3+2+2 = 10

6. (a) What is vulcanisation of rubber? Explain the advantages of vulcanised rubber over natural rubber.

(b) Describe the preparation, properties and uses of the following fibres.
    (i) Viscose rayon and (ii) Nylon 66

(c) What are the requirements of a good paint? Give the constituent of paint.

(d) What do you mean by contact insecticide? Give one example. **2+3+3+2 = 10**

7. (a) Write short notes on: (i) Importance of annealing and (ii) Borosilicate glass.

(b) How does BHC is prepared? Mention two important properties of it.

(c) Explain the factors effecting setting time of cement.

(d) Write down the preparation and uses of Dithion.   **3+(1+1)+2+3 = 10**

8. (a) Mention the approximate composition of stainless steel. Why it is called 'Stainless'?

(b) Why titanium dioxide is used as a common pigment in paint industry? What is the role of thinner?

(c) What are mixed fertilizer? Give example.

(d) What is significance of glassing of porcelain household materials and how is it achieved?
                                                                3+(1+1)+2+3 = 10