2021

CHEMISTRY (Honours)

Paper Code : XII - A & B

(Analytical & Industrial)

[New Syllabus]

Important Instructions
for Multiple Choice Question (MCQ)

- Write Subject Name and Code, Registration number, Session and Roll number in the space provided on the Answer Script.

  Example : Such as for Paper III-A (MCQ) and III-B (Descriptive).

  Subject Code : | III | A | & | B |

  Subject Name : [   ]

- Candidates are required to attempt all questions (MCQ). Below each question, four alternatives are given [i.e. (A), (B), (C), (D)]. Only one of these alternatives is 'CORRECT' answer. The candidate has to write the Correct Alternative [i.e. (A)/(B)/(C)/(D)] against each Question No. in the Answer Script.

  Example — If alternative A of 1 is correct, then write :
      1. — A

- There is no negative marking for wrong answer.

মাল্টিপল চয়েস প্রশ্নের (MCQ) জন্য জরুরী নির্দেশাবলী

- উত্তরপত্রে নির্দেশিত স্থানে বিষয়ের (Subject) নাম এবং কোড, রেজিস্ট্রেশন নম্বর, সেশন এবং রোল নম্বর লিখতে হবে।

  উদাহরণ — যেমন Paper III-A (MCQ) এবং III-B (Descriptive)।

  Subject Code : | III | A | & | B |

  Subject Name : | |

- পরীক্ষার্থীদের সবগুলি প্রশ্নের (MCQ) উত্তর দিতে হবে। প্রতিটি প্রশ্নে চারটি করে সম্ভাব্য উত্তর, যথাক্রমে (A), (B), (C) এবং (D) করে দেওয়া আছে। পরীক্ষার্থীকে তার উত্তরের স্বপক্ষে (A) / (B) / (C) / (D) সঠিক বিকল্পটিকে প্রশ্ন নম্বর উল্লেখসহ উত্তরপত্রে লিখতে হবে।

  উদাহরণ — যদি 1 নম্বর প্রশ্নের সঠিক উত্তর **A** হয় তবে লিখতে হবে :

  1. — A

- ভুল উত্তরের জন্য কোন নেগেটিভ মার্কিং নেই।

Paper Code : XII - A

Full Marks : 15   Time : Thirty Minutes

Choose the correct answer.

Each question carries 1 mark.

1. During manufacturing of glasses MnO_2 is added to remove —

    (A) Traces of Fe-Compounds and Carbon

    (B) Traces of Ca-Compounds and Carbon

    (C) Traces of Ca-Compounds and Fe-Compounds.

    (D) None of these

2. The greater the distribution ratio in favour of the organic solvent, the _____ will be the amount extracted in any one operation.

    (A) greater

    (B) lesser

    (C) equal

    (D) none of these

3. ROM stands for _____.

    (A) Read Only Method

    (B) Read On Memory

    (C) Read Only Memory

    (D) Remember Only Memory

4. CdO imparts which colour to glass?

    (A) Red

    (B) Ruby gold

    (C) Deep blue

    (D) Amber

5. Which of the following functional group is present in strong base anion exchanger?

 (A) sulphonic acid

 (B) carboxylic acid

 (C) quaternary amine

 (D) none of the above

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. Terylene is a condensation polymer of ethylene glycol and —

 (A) Benzoic acid

 (B) Terephthalic acid

 (C) Salicylic acid

 (D) Phthalic acid

8. During determination of Calorific value of any fuel —

 (A) Heat is absorbed by water at atmospheric temperature and pressure

 (B) Heat is absorbed by methanol at atmospheric temperature and pressure

 (C) Heat is absorbed by water at any temperature and pressure

 (D) Heat is absorbed by methanol at any temperature and pressure

9. The square of the standard deviation is known as —

    (A) co-efficient of variance

    (B) absolute deviation

    (C) variance

    (D) relative standard deviation

10. After conversion "894_{10}" to hexacode we shall obtain —

    (A) 42B

    (B) 37E

    (C) 26E

    (D) 12C

11. Impurities in reagents are —

    (A) Systematic Errors

    (B) Random Errors

    (C) Absolute Errors

    (D) Relative Errors

12. Which one among the following is usually used as a precipitant to precipitate Fe^{3+} ions in gravimetric analysis?

    (A) dimethyl glyoxime

    (B) cupferron

    (C) sodium tetraphenylborate

    (D) 1-nitroso-2-naphthol

13. Which of the following materials is employed as a reducing agent in metallurgy?

   (A) Hydrogen and Palladium

   (B) Charcoal

   (C) Lithium aluminium hydride

   (D) Sodium borohydride

14. During the purification process by liquid-liquid extraction choice of solvent depends on the role of —

   (A) Dielectric Constant

   (B) Partition Coefficient

   (C) Both (A) and (B)

   (D) None of them

15. C, C— and JAVA are the example of —

   (A) Internal parts of a computer

   (B) Secondary memory device

   (C) Commercial computer brands

   (D) Programming Language

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2021

CHEMISTRY (Honours)

Paper Code : XII - B

(Analytical & Industrial)

[New Syllabus]

Full Marks : 50   Time : Two Hours Thirty Minutes

The figures in the margin indicate full marks.

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

Group - A

1. (a) With the help of gaussian distribution curve explain the following facts qualitatively :

   (i) Systematic Error, (ii) Random Error, (iii) Total Analytical Error, (iv) High precession does not always signify high accuracy.

   (b) Convert the binary "110110" to hexadecimal. Show the calculation in detail. What is difference between variance and standard deviation? What is the advantage of variance over standard deviation?

   (c) Find the binary equivalent of $(214.75)_{10}$ 5+1+2+2=10

2. (a) Elucidate the principle of gas-liquid chromatography.

   (b) What do you mean by 'isocratic elution technique' and 'gradient elution technique' in column chromatography?

   (c) Mention an advantage and a disadvantage of TLC over paper chromatography.

   (d) Explain the terms 'plate height' in column chromatography.   3+2+3+2=10

3. (a) Calculate the result of the following expression :

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

(b) What are the most common methods for obtaining good precipitation during analytical experiments? Describe categorically.

(c) Discuss the qualities of a good washing liquid in gravimetric analysis.

(d) What do you mean by 'confidence interval'?   3+3+3+1=10

4. (a) Suppose X and Y are two numbers associated with σ_x and σ_y standard deviations respectively. Calculate the standard deviation of the resultant in the following two operations : $U = X \pm Y$ and $\mu = X.Y$.

(b) Based on the value of supersaturation during precipitation how the rate of nucleation changes? Point out different cases.

(c) What is Weimarn's equation about the velocity of the precipitation? Explain its implications.

(d) What do you mean by 'separation factor (β)' in solvent extraction?

                                                                 3+2+3+2=10

Group - B

5. (a) Through a simple flow chart diagram show the important steps involved during carbonization process of coal. What are the basic differences between coke and coal?

(b) Between "Flash Point" and "Ignition Temperature" which is higher and why?

(c) During glass manufacturing "Annealing" and "Tampering" are two important processes at two different stages". Justify this statement in a very simple way.   2+2+2+4=10

6. (a) Write down the advantages of catalytic cracking.

(b) What are causes of knocking in diesel engine and petrol engine? For Diesel engine diesel oil with low cetane number is preferred while for petrol engine petrol with high octane number is preferred. Explain.

(c) What is 'white cement' and 'coloured cement'?

(d) Discuss the function of gypsum in Portland cement.

(e) What do you mean by calorific value of a fuel?   2+3+2+2+1=10

7. (a) Write down the structure of Viscose Rayan. Explain the manufacturing process of Viscose Rayan through a simple flow chart diagram and explain the principle of the steps.

(b) Why Nylon 6,6 has highly strained structure?

(c) What is foam rubber and how it is manufactured? What are its commercial uses?   1+4+2+2+1=10

8. (a) Calculate the gross and net calorific value of a coal sample having the following composition :

$C = 82\%$, $H_2 = 8\%$, $O_2 = 5\%$, $S = 2.5\%$, $N_2 = 1.4\%$ and ash = 2.1%

(b) Explain the action of urea as a fertilizer.

(c) Differentiate between paint and varnishes.

(d) Prove that single extraction with 10 mL of aqueous phase and 20 mL of organic phase is not efficient as compared to twice extraction with 10 mL of aqueous phase and 20 mL of organic phase.   3+2+2+3=10

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