SHRI SHIVAJI EDUCATION SOCIETY, AMRAVATI'S

SCIENCE COLLEGE, CONGRESS NAGAR, NAGPUR

FIRST TERM EXAMINATION 2021-2022

SUBJECT: CHEMISTRY

MARKS : 70 CLASS – XII TIME: 3 HOURS

General Instructions:

The question paper is divided into four sections

1) **SECTION A:**

   Q.No.**1** contains **TEN** multiple choice type of questions carrying **ONE** mark each

   Q.No.**2** contains **EIGHT** very short answer type of questions carrying **ONE** mark each

2) **SECTION B:**
   Q.No. **3** to Q.No.**14** are **TWELVE** short answer type of questions carrying **TWO** marks each(Attempt **any EIGHT**)
3) **SECTION C:**
   Q.No. **15** to Q.No.**26** are **TWELVE** short answer type of questions carrying **THREE** marks each(Attempt **any EIGHT**)
4) **SECTION D:**
   Q.No.**27** to Q.No.**31** are **FIVE** long answer type of questions carrying **FOUR** marks each(Attempt **any THREE**)
5) Use of log table is allowed. Use of calculator isn't allowed
6) Figures to the right indicates full marks
7) For each multiple choice type of question, it's mandatory to write the correct answer along with its alphabet e.g. (a)…… /(b)……/(c)……../(d)…….
   No mark(s) shall be given if **ONLY** the correct answer or alphabet of correct answer is written.

Only the **first** attempt will be considered for evaluation.

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SECTION – A

Q.1. Select and write the correct answer for the following MCQs [10]

i) What is the percentage dissociation of 0.1 M Solution of acetic acid? [Ka(CH3COOH) = 10^{-5}]

a) 0.01% b) 1% C) 10% d) 100%

ii) An intensive property amongst the following is.....

a) Mass b) Volume

c) Number of moles d) Temperature

iii) When molten ionic compound is electrolyzed, a metal is formed at ___

a) Negative electrode b) Positive electrode

c) Salt bridge d)Electrolyte

iv) Order of reaction for which unit of rate constant is mol $dm^{-3}s^{-1}$ is

a)1 b) 3 c) 0 d)2

v) The following pair of elements has half-filled d-orbitals

(a) chromium and cobalt (b) manganese and nickel

(c) chromium and manganese (d) cobalt and nickel

vi) The IUPAC name of $Na3[AlF6]$ is.....

a) Hexafluorosodiumaluminate

b) Sodium hexafluoroaluminate(III)

c) Sodium hexafluoroaluminate(II)

d) Sodium hexafluoroaluminium (III)

vii) Aromatic electrophilic substitution with iodine can be carried out using

a) HNO_3 b) HCl c) HI d) H_3PO_4

viii) When vapors of tert.butyl alcohol are passed over hot copper, it gives ….

a) butanal b) butanoic acid c) butanone d) isobutylene

ix) The reaction in which diazonium salt is used

a) Sandmeyer reaction b) Mendius reaction

c) Hofmann rearrangement d) Carbylamine reaction

x) Nylon 6, 6 is a condensation polymer of hexamethylenediamine and-------

a) picric acid b) adipic acid

c)terephthalic acid d) ϵ caprolactam

Q.2. Answer the following questions [8]

i) Name the catalyst used to manufacture of H_2SO_4 by contact process

ii) Write the structure of Zwitterion of alanine.

iii) Write the name of the product when ketones react with 1,2-diol in presence of dry HCl

iv) Write chemical formula of ore of zinc.

v) Complete the following reaction

$SO_2(g) + Cl_2(g)$ ------$\underline{\text{charcoal}}$--------- ?

vi) Give one example of pseudo first order reaction.

vii) What is the sign convention when work is done on the system by the surrounding?

viii) Give the percentage of empty space in bcc lattice.

SECTION-B

Attempt ANY EIGHT of the following questions

Q.3 Derive relationship between pH and pOH

Q.4 How is benzophenone prepared from benzonitrile?

Q.5 What are bidentate ligands? Give one example

Q.6 Write a note on Kolbe reaction

Q.7 Draw the structure of sulphurous acid. Write two uses of Helium

Q.8 Distinguish between crystalline solids and amorphous solids.

Q.9 When 50 g of a nonvolatile solute is dissolved in a certain quantity of solvent, the elevation of boiling point is 2.0 K. What will be the elevation of boiling point when 30 g of solute is dissolved in the same amount of the same solvent?

Q.10 Write solubility product of following sparingly soluble salt.

i) $BaSO_4$ ii) CaF_2

Q.11 Calculate the standard enthalpy of combustion of $CH_4(g)$ if $\Delta_f H^0 (CH_4) = -74.8$ kJ mol^{-1}, $\Delta_f H^0(CO_2) = -393.5$ kJ mol^{-1} and $\Delta_f H^0(H_2O) = -285.8$ kJ mol^{-1}

Q.12 What is cell constant? Write its SI unit.

Q.13 Salt of Sc^{3+} and Ti^{4+} are colourless. Explain why ?

Q.14 Define i) Green chemistry ii) Nano chemistry

SECTION-C

Attempt any EIGHT of the following questions [24]

Q.15 A substance crystallizes in fcc structure. The unit cell edge length is 367.8pm. Calculate the molar mass of the substance if its density is 21.5 g/cm^3**.**

Q.16 Write IUPAC name of $H_2N\text{-}(CH2)_6\text{-}NH_2$.

Write reactions to bring about the following conversions.

a) Acetamide to Ethylamine

b) Acetamide to methylamine

Q.17 What is the action of following reagents on ethanoic acid?

a) $SOCl_2$ / heat b) sodalime / heat

Write reactions for the conversion of Benzene to Benzaldehyde

Q.18 0.022 kg of CO_2 is compressed isothermally and reversibly at 298 K from initial pressure of 100 kPa.When the work obtained is 1200 J, calculate the final pressure.

Q.19 Define buffer solution.

A buffer solution contains 0.3 mol dm^{-3} NH_4OH is

1.8 $x10^{-5}$.Calculate pOH of the solution**.**

Q.20 What is the action of following reagents on glucose ?

a) acetic anhydride b) hydroxylamine c) hydrogen iodide

Q.21 With the help of vapour pressure-temperature curves for solution and solvent, explain why boiling point of solvent is elevated when a nonvolatile solute is dissolved into it.

Q.22 Explain why fluorine shows only +1 oxidation state while other halogens show higher positive oxidation state? Write chemical reaction of action of Cl2 on excess NH3

Q.23 What is Grignard reagent? How is it prepared? Why are they prepared under anhydrous condition?

Q.24 Discuss the position of d-block elements, lanthanoids and actinoids in the periodic table. Write two applications of catalytic properties of transition metals and compounds

Q.25 An unknown alcohol is treated with Lucas reagent. Explain how you will determine whether the alcohol is primary , secondary or tertiary . Indicate by chemical equation the reaction between isopropyl alcohol and Lucas reagent

Q.26 Define (i) Anionic sphere complex (ii) coordination number. Draw optical isomers of $[Co(en)_3]^{3+}$

SECTION – D

Attempt any THREE of the following questions [12]

Q.27 Define isomorphism. Derive Integrated rate law expression for first order reaction

Q.28 State Kohlrausch law of independent migration of ions.

Write and explain two applications of electrochemical series.

Write a mathematical expression for Standard Cell Potential.

Q.29 Draw structure of chloric acid and chlorous acid **.**
Discuss two points of anomalous behavior of fluorine.

What is nucleotide? Write reaction for preparation of Polyacrylonitrile(PAN)

Q.30 Ground state electronic configurations of gadolinium(Gd) and lawrencium(Lr) are different than expected. Explain why?

Write chemical equations indicating the action of following on bromobenzene .

a) CH3COCl / anhy. AlCl3 b) conc. HNO3 / conc. H2SO4

Q.31 Define the following terms: -

(i) Bond Enthalpy (ii) Enthalpy of ionisation.

How much heat is evolved when 12 g of CO reacts with NO_2?

The reaction is $4\ CO(g) + 2\ NO_2\ (g) \text{----------}> 4\ CO_2\ (g) + N_2\ (g)$

$\Delta_r H^0 = -1200$ kJ

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