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General Instructions:

A. All **Questions** are **Compulsory**.

B. Questions Number **1 to 5** are **Very Short Answer** Questions and carry **1 Mark** each.

C. Questions Number **6 to 10** are **Short Answer** Questions and carry **2 Marks** each.

D. Questions Number **11 to 22** are also **Short Answer Questions** and carry **3 Marks** each.

E. Question Number **23** is a **Value Based Question** and carry **4 Marks**.

F. Questions Number **24 to 26** are **Long Answer Questions** and carry **5 Marks** each.

G. Use log tables, if necessary. Use of **Calculators** is **Not** allowed.

Section A

1

What is the maximum possible coordination number of an atom in an hcp crystal structure of an element?

[1]

2

What do you mean by sorption?

[1]

3

How does NaCN act as a depressant in preventive ZnS from forming the froth?

[1]

4

What happens when $CH3CH_2Cl$ is boiled with alcholoic KOH?

[1]

5

Write IUPAC name of:

$CH_3O—CH_2—CH—OCH_3$

[1]

6

When is value of Van't Hoff factor more than one?

[2]

7

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What is the rate and order of a reaction of the mechanism is

$2NO + H_2 \rightarrow N_2 + H_2O_2$ (slow)

Following by $H_2O_2 + H_2 \rightarrow 2H_2O$ (fast)

[2]

8

Write the chemical reactions involved in the extraction of metallic silver from argentite.

[2]

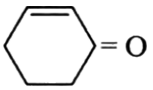
9

Are all the five bonds in PCl_5 molecule equivalent? Justify your answer.

[2]

10

What is the expected product from the reaction of



with

(i) $LiAlH_4$, (ii) H_2/Pt?

[2]

11

An element E crystallizes in body centred cubic structure. If the edge length of the cell is 1.469 x 10^{-10} m and the density is 19.3 g cm^{-3}, calculate the atomic mass of this element. Also calculate the radius of this element.

[3]

12

A possible mechanism for the reaction

$$2H_2 + 2NO \rightarrow N_2 + 2H_2O \text{ is}$$

$$(a)\ 2NO \underset{}{\overset{k_1}{\rightleftharpoons}} N_2O_2$$

$$(b)\ N_2O_2 + H_2 \overset{k_2}{\rightleftharpoons} N_2O + H_2O$$

$$(c)\ N_2O + H_2 \overset{k_3}{\rightleftharpoons} N_2 + H_2O$$

If the second step is the rate determining step, what is the rate law for this reaction?

[3]

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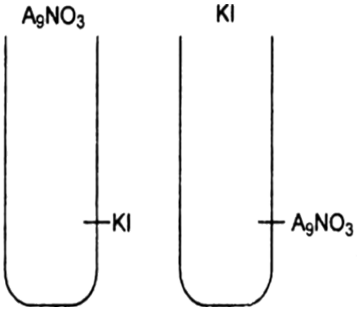
13

How does osmotic pressure depend on molality of the solution?

[3]

14

A colloidal solution of AgI is prepared by two different methods shown below:



(i) What is the charge of AgI colloidal particles in the two test tube (A) and (B).

(ii) Give reason for the origin of change.

[3]

15

Describe the general characteristics of the transition elements with special reference to their tendency to:

(i) Exhibit paramagnetism.

(ii) Form complex compounds.

(iii) Their catalytic behaviour.

[3]

16

A hydocarbon (Z) has molecular formula C_8H_{10}. It does not decolourise bromine water and is oxidised to benzoic acid on heating with $K_2Cr_2O_7$. It can also have the three other isomers A, B and C. Write the structure of A, B and C.

[3]

17

Complete the following chemical equations:

i) $MnO_4^- + C_2O_4^{2-} + H^+ \rightarrow$

ii) $KMnO_4 \xrightarrow{\Delta}$

iii) $Cr_2O_7^{2-} + H_2S + H^+ \rightarrow$

[3]

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18a

Using IUPAC norms write the formulae for the following coordination compounds:

(i) Hexaamminecobalt (III) chloride

(ii) Potassium tetrachloridonickelate (II)

[2]

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18b

On adding NaOH to ammonium sulphate, a colourless gas with pungent odour is evolved, which forms a blue-coloured complex with Cu^{2+} ion. Identify the gas.

[1]

OR

What is meant by crystal field splitting energy? On the basis of crystal field theory, write the electronic configuration of d^4 in terms of t_{2g} and e_g in an octahedral field when

(i) $\Delta_0 > P$

(ii) $\Delta_0 < P$

[3]

19

A substance (X) has a molecular formula C_3H_9N. This substance gives a unpleasant smell with chloroform and caustic potash. Write the structure of this organic substances (X). Write their IUPAC names also.

[3]

20

Comment on:

(a) PVC is a hard plastic but polyethylene is soft wax-like.

(b) Addition of sulphur to nutural rubber improves its properties.

(c) Polypropylene is preferred ever polyethylene.

[3]

21

Describe the following with suitable examples:

(i) Preservative

(ii) Artificial sweeteners

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(iii) Antioxidants

(iv) Edible colours.

[3]

22

(a) For the complex $[Fe(CN)_6]^{3-}$, write the hybridization type, magnetic character and spin nature of the complex. (At. number : Fe = 26).

(b) Draw one of the geometrical isomers of the complex $[Pt(en)_2Cl_2]^{2+}$ which is optically active.

[3]

23

Shanti, a domestic helper of Mrs. Anuradha, fainted while mopping the floor. Mrs. Anuradha immediately took her to the nearby hospital where she was diagnosed to be severely 'anaemic'. The doctor prescribed an iron rich diet and multivitamins supplement to her. Mrs. Anuradha supported her financially to get the medicines. After a month, Shanti was diagnosed to be normal.

(i) What values are displayed by Mrs. Anuradha?

(ii) Name the vitamin whose deficiency causes 'pernicious anaemia'.

(iii) Give an example of a water soluble vitamin.

[4]

24

Three electrolytic cells A, B and C containing solutions of $ZnSO_4$(zinc sulphate), $AgNO_3$ (silver nitrate) and $CuSO_4$ (copper sulphate), respectively are connected in series. A steady current of 1.5 ampere was passed through them until 1.45 g of silver is deposited at the cathode of cell B. How long did the current flow? What mass of copper and zinc were deposited? (Atomic masses: Ag = 108, Zn = 65.4, Cu = 63.5, all in amu).

[5]

OR

We can use aluminium in place of zinc for cathodic protection of rusting. Comment.

[2]

OR

How is cathodic protection of Iron different from its galvanisation?

[3]

25

Give reasons for :

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(i) Ozone is more reactive than oxygen.

(ii) An acidified $K_2Cr_2O_7$ paper on being exposed to SO_2 turns green.

(iii) Sulphuric acid never acts as a reducing agent.

(iv) Noble gases are mostly chemically inert.

(v) Nitrogen is fairly inert.

[5]

OR

Describe the following about halogen family (group 17 elements):

(i) Relative oxidising power.

(ii) Relative acidic strength of their hydrides.

(iii) Oxyacids and their relative oxidising ability.

[3]

OR

What is the basicity of H_3PO_4?

[2]

26a

Account for the following:

(i) Chloroacetic acid has higher pKa value than acetic acid.

(ii) Electrophilic substitution in benzoic acid takes place at meta position.

(iii) Carboxylic acids have higher boiling points than alcohols of comparable molecular masses.

[3]

26b

discuss hell -vollhard -zelinsky reaction (HVZ) ?

[2]

OR

Write equations and conditions to show how the following conversions are carried out: 4

(i) Benzaldehyde to acetophenone.

(ii) Malonic acid to acetic acid.

(iii) Acetaldehyde to 2-butenal.

[3]

OR

Discuss Rosenmud's reaction.

[2]