# The Jammu & Kashmir State Board of School Education
## Rehari Colony, Jammu

**Class XI Chemistry**

Time: 3 Hours                                                      Total Marks: 70

General Instructions

1. All questions are compulsory
2. Question nos. 1 to 5 are very short answer questions and carry 1 mark each.
3. Question nos. 6 to 12 are short answer questions and carry 2 marks each.
4. Question nos. 13 to 24 are also short answer questions and carry 3 marks each
5. Question nos. 25 to 27 are long answer questions and carry 5 marks each
6. Use log tables if necessary, use of calculators is not allowed.

Q. 1 Write the formula of the compound Nickel (II) sulphate?                    [1]

Q. 2 The following reaction is an example of a                                  [1]

$$4NH_{3(g)} + 5O_{2(g)} \longrightarrow 4NO_{(g)} + 6H_2O_{(g)}$$

   i)     Displacement reaction
   ii)    Combination reaction
   iii)   Redox reaction
   iv)   Neutralisation reaction

      (a) (i) and(iv)      (b) (ii) and (iii)
      (c) (i) and (iii)     (d) and (iv)

Q. 3 Give the values for principal quantum number and magnetic quantum number for 19th electron of K (Potassium).                                            [1]

Q. 4 What shapes are associated with $sp^3d$ and $sp^3d^2$ hybrid orbitals?      [1]

Q. 5 $2A_{(g)} + B_{(g)} \longrightarrow 4C_{(g)} + Heat$                        [1]
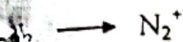
    What is the effect of adding Heat a constant volume on above equilibrium?

Q. 6 Which of the following has largest size? Mg, $Mg^{2+}$, $Al^{3+}$, Al       [2]

Q. 7 Give IUPAC name and symbol of element with atomic number 110 and 115.       [2]

Q. 8 Give reasons:                                                              [2]

    (i) Anhydrous $AlCl_3$ is covalent but hydrated $AlCl_3$ is electrovalent. Explain

$$N_2 \longrightarrow N_2^+ \qquad\qquad O_2 \longrightarrow O_2^+$$

[2]

Why is there an increase in bond order in going from $O_2$ to $O_2^+$ while a decrease in going from $N_2$ to $N_2^+$?

) Calculate the total pressure of a mixture of 8g of $O_2$ (g) and 4g of $H_2$ (g) in a vessel of 1dm$^3$ at 7$^0$C. (Atomic mass of O=16gmol$^{-1}$ and H=1 gmol$^{-1}$. R=0.083bar dm$^3$/K mol). [2]
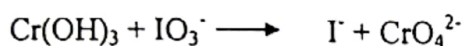
11 Give equations to prove amphoteric nature of water. *in organic* [2]

OR

Arrange benzene, hexane and ethyne in decreasing order of acidic behavior. *organic*

Also give reasons for this behaviour.

Q. 12 Balance the following equation in an alkaline medium by half reaction method. [2]

$$Cr(OH)_3 + IO_3^- \longrightarrow I^- + CrO_4^{2-}$$

Q. 13 The wavelength of first spectral line in Balmer series is 6561 Å. Calculate the wavelength of second spectral line in Balmer series. [3]

Q. 14 On a ship sailing in Pacific Ocean where temperature is 23.4°C, a balloon is filled with 2 L air. What will be the volume of the balloon when the ship reaches Indian Ocean, where temperature is 26.1°C? [3]

Q. 15 All C-O bond lengths in $CO_3^{2-}$ are equal. Account for this observation. [3]

Q. 16 (a): Which of the two is more concentrated and why? 1 M or 1 m aqueous solution of a solute. [3]

(b) Calculate the total number of molecules of methane present in 1.6 g?

Q. 17 At 60°C, dinitrogen tetroxide is fifty percent dissociated. Calculate the standard free energy change at this temperature and at one atmosphere. [3]

Q. 18 What type of isomerism is exhibited by following pair of compounds? [3]

(i) Ethanol and Methoxy methane

(ii) o-cresol and m-cresol

(iii)Pentan-3-one and pentan-2-one

Q. 19 When a metal X is treated with sodium hydroxide, a white precipitate A is obtained, which is soluble in an excess of NaOH to give soluble complex B. Compound A is soluble in diluted HCl to form compound C. The compound A when heated strongly gives D, which is used to extract metal. Identify X, A, B, C and D. Write suitable equations to support their identities. [3]

Calculate the energy associated with the first orbit of $He^+$. What is the radius of this orbit?

[3]

Rashmi and Rekha are doing a research on the people working with coal tar. According to the ... prepared by them, people who work under prolonged exposure to coal tar suffers from skin ... cer and asks the authorities to vacant the factories.
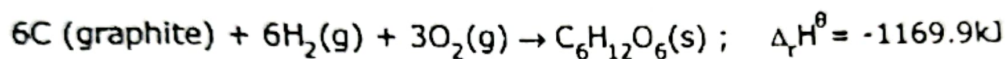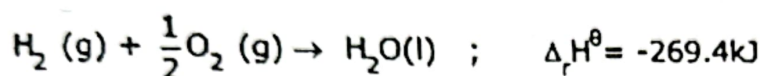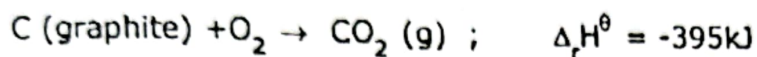
[3]

(a) What is the reason behind the people getting infected with skin cancer?

(b) What values are associated with it?

Q. 22 Calculate the enthalpy of combustion of glucose from the following data          [3]

$$C \text{ (graphite)} + O_2 \rightarrow CO_2 \text{ (g)} ; \qquad \Delta_r H^\theta = -395kJ$$

$$H_2 \text{ (g)} + \frac{1}{2}O_2 \text{ (g)} \rightarrow H_2O(l) ; \qquad \Delta_r H^\theta = -269.4kJ$$

$$6C \text{ (graphite)} + 6H_2(g) + 3O_2(g) \rightarrow C_6H_{12}O_6(s) ; \qquad \Delta_r H^\theta = -1169.9kJ$$

Q. 23          [3]

(a) Fish do not grow as well in warm water as in cold water. Why?

(b) Why does rain water normally have a pH about 5.6?

(c) Name two major greenhouse gases.

Q. 24     0.2325g of an organic compound was analysed for nitrogen by Duma's method. 31.7mL of moist nitrogen was collected at $25^0C$ and 755.8mm Hg pressure. Calculate the percentage of N in the sample. (Aq. Tension of water at $25^0C$ is 23.8mm).

[3]

OR

(a) Why cannot sulphuric acid be used to acidify sodium extract for testing S using lead acetate solution?

(b) Which of the carbocations is most stable and why?

$$(CH_3)_3\overset{+}{C} , \quad CH_3CH_2\overset{+}{CH_2} , \quad CH_3\overset{+}{CH}CH_2CH_3$$
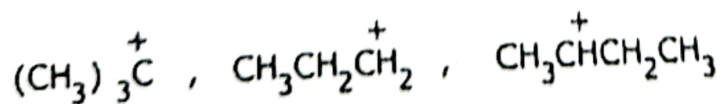
(c) Why does a liquid vaporize below its boiling point in steam distillation process?

[5

Q. 25

(a) Convert:
    (i) Propene to propane-1,2-diol
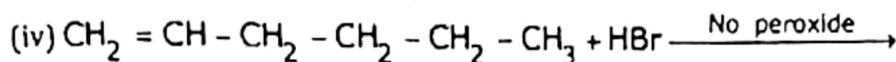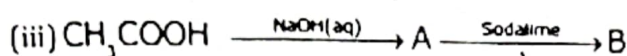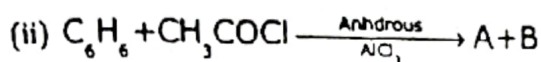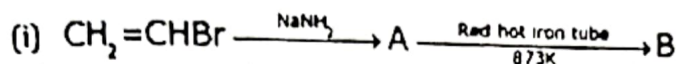
(b) An alkene on ozonolysis gives butan-2-one and 2-methylpropanal. Give the structure and IUPAC name of Alkene. What products will be obtained when it is treated with hot, concentrated $KMnO_4$?

OR

Complete the equations:

(i) $CH_2=CHBr \xrightarrow{NaNH_2} A \xrightarrow[873K]{Red\ hot\ iron\ tube} B$

(ii) $C_6H_6 + CH_3COCl \xrightarrow[AlCl_3]{Anhdrous} A+B$

(iii) $CH_3COOH \xrightarrow{NaOH(aq)} A \xrightarrow[\Lambda]{Sodalime} B$

(iv) $CH_2 = CH - CH_2 - CH_2 - CH_2 - CH_3 + HBr \xrightarrow{No\ peroxide}$

(v) $CH_2 = CH - CH_2 - CH_2 - CH_2 - CH_3 + HBr \xrightarrow{Peroxide}$
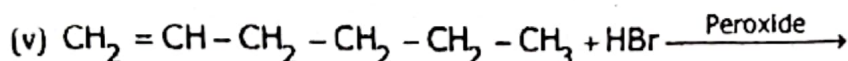
Q. 26 Calculate the pH of a 0.10M ammonia solution. Calculate the pH after 50.0 mL of this solution if treated with 25.0 mL of 0.10M HCl. The dissociation constant of ammonia, $K_b = 1.77 \times 10^{-5}$.

[5]

OR

Calculate the pH of the resultant mixtures:
10mL of 0.2M $Ca(OH)_2$ + 25 mL of 0.1 M HCl

[5]

Q. 27 Give reasons for the following

(a) Unlike $Na_2CO_3$, $K_2CO_3$ cannot be prepared by Solvay process. Why?
(b) Why are alkali metals not found in nature?
(c) Sodium is less reactive than potassium, why?
(d) Alkali metals are good reducing agents, Why?
(e) Alkali metals are paramagnetic but their salts are diamagnetic. Why?

OR

Complete the following reactions:

(a) Why does the solubility of alkaline earth metal carbonates and sulphates in water decrease down the group?
(b) Arrange the following alkali metal ions in decreasing order of their mobility:
$Li^+, Na^+, K^+, Rb^+, Cs^+$ .Explain
(c) NaOH is a stronger base than LiOH. Explain
(d) Why are alkali metals kept in paraffin or kerosene ?
(e) Why does lithium show properties uncommon to the rest of the alkali metals?