

ANNUAL EXAMINATION, 2018-19

CHEMISTRY

Time : 3 hrs.

Class - XI

M.M. : 70

Name of the student _____ Section _____ Date-14.02.2019 (Thursday)

General instructions :

- All questions are compulsory.
- Marks for each question are indicated against it.
- Question numbers **1 to 5** are very short answer questions, carrying **1 mark** each. Answer these in one word or about one sentence each.
- Question numbers **6 to 12** are short answer questions, carrying **2 marks** each. Answer these in about 30 words each.
- Question numbers **13 to 24** are also short answer questions, carrying **3 marks** each. Answer these in about 40 words each.
- Question numbers **25 to 27** are also long answer questions, carrying **5 marks** each. Answer these in about 70 words each.
- Use log tables, if necessary. Use of calculator is not permitted

Q.1 Arrange the following in increasing order of ionic radii: (1)



OR

Give the general electronic configuration of f- block elements.

Q.2 Define Boyle temperature. (1)

Q.3 Why is phosphine a weaker base than ammonia? (1)

OR

What is the basicity of H_3PO_4 .

Q.4 State the law of multiple proportion. (1)

Q.5 Under what conditions is a substance precipitated from its solution? (1)

Q.6 10g of Ag reacts with 1 g of S. Calculate the mass of Ag_2S formed. Will any of the two reactants remain unreacted? If yes, which one and what would be its mass? (2)

[Atomic mass of Ag = 108u, S = 32u]

OR

Calculate the molarity of oxalic acid in the solution prepared by dissolving its 2.52 g in enough water to form 250 mL of the solution.

Q.7 Explain the non-linear shape of H_2S and non-planar shape of PCl_3 using valence shell electron pair repulsion theory. (2)

OR

Define hybridization. Explain the structure of C_2H_2 with orbital diagram.

Q.8 Calculate the enthalpy of formation of acetic acid if its enthalpy of combustion is -867 kJ/mol. The enthalpy of formation of $CO_2(g)$ and $H_2O(l)$ are -393.5 kJ/mol and -285.9 kJ / mol respectively. (2)

- Q.9** (a) Identify the most stable species in the following set of ions giving reason: (2)
 CH_3^+ , $\text{C}^+\text{H}_2\text{Br}$, C^+HBr_2 , C^+Br_3
- (b) Write the structural formula for the compound named 5-Bromoheptanoic acid.
- Q.10** Balance the following redox reaction by ion –electron method:- (2)
 $\text{MnO}_4^- (\text{aq}) + \text{Br}^- (\text{aq}) \rightarrow \text{MnO}_2 (\text{s}) + \text{BrO}_3^- (\text{aq})$ (in basic medium)
- Q.11** Give reason:- (2)
- (a) Beryllium and magnesium do not give colour to flame whereas other alkaline earth metals do so.
- (b) LiI is more soluble than KI in ethanol.
- Q.12** (a) State Heisenberg's uncertainty principle. (2)
- (b) A golf ball has a mass of 40g and speed of 45m/s. If the speed can be measured with inaccuracy of 2%, calculate the uncertainty in the position.
- Q.13** Give reason for following:- (3)
- (a) Chlorine has higher electron gain enthalpy (negative) than fluorine.
- (b) Nitrogen has higher first ionization enthalpy than O-atom.
- (c) Noble gases have large positive electron gain enthalpies.
- Q.14** (a) Write all the four quantum numbers of an electron in the valence shell of Rb(37). (3)
- (b) Calculate the ratio of velocities of electron and proton if both have equal wavelength.
 $[m_e = 9.1 \times 10^{-31} \text{ kg}, m_p = 1.675 \times 10^{-27} \text{ kg}]$
- Q.15** (a) Critical temperature of H_2 , He, O_2 , N_2 are 33.2K, 5.3K, 154.3K and 126K (3)
 respectively. Arrange them in the order in which they liquefy.
- (b) How is the viscosity affected by increase in temperature?
- (c) Under what conditions, a gas deviates most from an ideal gas behaviour?
- Q.16** Calculate the bond order of H_2^+ , He_2^+ and O_2 after writing their Molecular Orbital configuration. Predict their magnetic behavior also. (3)

OR

- (a) Although both CO_2 and H_2O are tri-atomic molecules, the shape of H_2O molecule is bent while that of CO_2 is linear. Explain this on the basis of dipole moment.
- (b) Explain why N_2 has greater bond dissociation enthalpy than N_2^+ .
- Q.17** (a) For the equilibrium : $\text{PCl}_5 (\text{g}) \leftrightarrow \text{PCl}_3 (\text{g}) + \text{Cl}_2 (\text{g})$ (3)
 at 298 K, Equilibrium Constant is 1.8×10^{-7} . Calculate ΔG^0 for the reaction.
- (b) What will be the sign of ΔS for the spontaneous reaction:
 $\text{N}_2 (\text{g}) + \text{O}_2 (\text{g}) \leftrightarrow 2\text{NO} (\text{g}) - \text{Heat}$.
 Give reason in support of your answer.

- Q.18** (a) What is the oxidation state of each 'N' in NH_4NO_3 ? (3)
 (b) Balance the following equation by oxidation number method in acidic medium:
 (i) $\text{Fe}^{2+} + \text{Cr}_2\text{O}_7^{2-} \rightarrow \text{Cr}^{3+} + \text{Fe}^{3+}$
 (c) Write the formulae for following:
 (i) Mercury (II) chloride
 (ii) Tin(IV) oxide

- Q.19** Give reasons for the following:- (3)
 (a) A solution of Na_2CO_3 is alkaline.
 (b) Alkali metals are prepared by electrolysis of their fused chlorides.
 (c) Potassium carbonate cannot be prepared by Solvay's process.

OR

- (a) Why are group 2 elements harder than group 1 elements.
 (b) Write balanced equations for the reaction between :
 (i) KO_2 and H_2O (ii) K_2O and CO_2

- Q.20** 2.9 g of gas at 95°C occupied the same volume as 0.184 g of dihydrogen at 17°C at the same pressure. What is molar mass of the gas? (3)

OR

An element with molar mass 27 gmol^{-1} forms a cubic unit cell with edge length $4.05 \times 10^{-8} \text{ cm}$. If its density is 2.7 gcm^{-3} , what is the nature of the cubic unit cell?

- Q.21** How will you convert:- (3)
 (a) Ethyne to Benzene (b) Benzene to p-nitrotoluene (c) Methyl bromide to Ethane.

- Q.22** (a) What is hyper-conjugation effect? How does it differ from resonance effect? (3)
 Write an application of hyper-conjugation effect.
 (b) Write bond line formulae for:
 2,3-Dimethylbutanal, heptan-4-one.

OR

- (a) Explain electrophiles and nucleophiles with one example each.
 (b) What type of isomerism is shown by Pentane and 2-Methylbutane.
 (c) Draw resonating structures of $\text{C}_6\text{H}_5\text{NO}_2$.

- Q.23** (a) What are soft water and hard water? What is the disadvantage of hard water? (4)
 (b) Write chemical reactions to justify that Hydrogen peroxide can function as an oxidizing as well as reducing agent.

- Q.24** Explain the following terms:- (5)
 (a) Photochemical smog (b) Acid rain (c) Eutrophication

- Q.25** (a) The concentration of hydrogen ion in sample of soft drink is $4.5 \times 10^{-3} \text{ M}$. Find its pH? (5)
 (b) At 450K : $K_p = 2 \times 10^{10} \text{ bar}^{-1}$ for the given reaction at equilibrium:
 $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \leftrightarrow 2\text{SO}_3(\text{g})$
 Find K_c at this temperature?

- (c) Predict the acidic, basic and neutral nature of the following salts:
NaCN, KBr, NaNO₂, NH₄NO₃

OR

- (a) The ionization constant of chloroacetic acid is 1.35×10^{-3} . What will be pH of 0.1M acid and its 0.1 M sodium salt solution?
- (b) What do you understand by:
(i) Common ion effect (ii) Buffer solution.

Q.26 (a) Explain: **(5)**

- (i) CCl₄ doesn't hydrolyse unlike SiCl₄.
(ii) Ga has a lower atomic radius compared to Al.
- (b) Write balanced equation for:
(i) H₃PO₃ is heated.
(ii) Boric acid is added to water.
(iii) Diborane reacts with NH₃ followed by heating.

OR

Explain the following :

- (a) PCl₅ is more covalent than PCl₃.
(b) Boron does not form B³⁺ ions.
(c) Why does NO₂ dimerise?
(d) Carbon forms covalent compounds while lead forms ionic compounds.
(e) Graphite is used as a lubricant

Q.27 (a) Out of benzene, m-dinitrobenzene and toluene, which will undergo nitration most easily and why? **(5)**

- (b) Arrange benzene, n-hexane and ethyne in decreasing order of acidic behavior. Also give reason for this behavior.
(c) Explain with example:
(a) Wurtz reaction.
(b) Friedel-Crafts alkylation.
(d) Convert Propyne to propanone.

OR

- (a) Give a chemical test to distinguish between ethane and ethyne.
(b) An alkene C₄H₆ upon ozonolysis gives two moles of formaldehyde and 1 mole of glyoxal. What is the name of alkene. Also write the reaction.
(c) Explain why does Benzene not undergo addition reaction?
(d) Write short note on Kolbe's electrolytic method.

