

HALF YEARLY EXAMINATION, 2018-19

CHEMISTRY

Time : 3 hrs.

Class - XI

M.M. : 70

Date-24.09.2018 (Monday)

Name of the student _____ Section _____

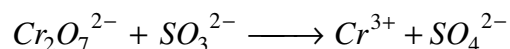
General instructions :

- All questions are compulsory. Internal choice is there in some questions.
- Question nos. 1 to 5 are very short answer questions carrying 1 mark each.
- Question nos. 6 to 12 are short answer questions carrying 2 marks each.
- Question nos. 13 to 24 are short answer questions carrying 3 marks each.
- Question nos. 25 to 27 are long answer questions carrying 5 marks each.
- Use of calculator is strictly prohibited.
- Use log table if necessary.

- Q.1 Why molality is preferred over molarity to express the concentration of a solution? (1)
- Q.2 Give the value of 'n' and 'l' for 4f orbital. (1)
- Q.3 Write the electronic configuration of Cu²⁺ ion. (atomic number of copper = 29) (1)
- Q.4 Write the IUPAC name and symbol for the element with atomic number 120. (1)
- Q.5 Give an example of disproportionation reaction. (1)
- Q.6 What do you understand by the following terms : (2)
- a) Water gas shift reaction b) Syn gas
- Q.7 What is smog? How is classical smog different from photochemical smog? (2)
- Q.8 Calculate the uncertainty in position of an electron if uncertainty in its velocity is 0.001%? (mass of electron = 9.1x10⁻³¹ Kg and velocity of electron is 300m/s) (2)
- Q.9 Balance the following redox reaction by ion electron method in basic medium : (2)
- $$MnO_4^- + I^- \longrightarrow MnO_2 + I_2$$

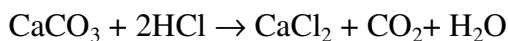
OR

Balance the following redox reaction by oxidation number method in acidic medium.



- Q.10 Write a brief note on ozone layer depletion along with chemical reactions involved. (2)
- Q.11 SO₂ and H₂O₂ can act as oxidizing agent as well as reducing agent in their reactions but ozone and HNO₃ only act as oxidizing agent. Why? (2)
- Q.12 Why is CO more dangerous than CO₂? Explain. (2)

- Q.13** CaCO_3 reacts with aqueous solution of HCl to give CaCl_2 and CO_2 according to the reaction. (3)



What mass of CaCO_3 is required to react completely with 25 ml of 0.75 M HCl ?
(atomic mass of $\text{Ca} = 40 \text{ u}$)

- Q.14** According to de Broglie, matter should exhibit dual behavior, that is both particle and wave like properties. However, a cricket ball of mass 100g does not move like a wave when it is thrown by a bowler at a speed of 100 km/h. Calculate the wavelength of the ball and also explain that why it does not show wave nature. (3)

- Q.15** Give reasons for the following. (3)

- Electron gain enthalpy of fluorine is less negative than that of chlorine.
- Anionic radius is always more than that of neutral atom.
- Ionization enthalpy of nitrogen is more than that of oxygen.

- Q.16** Calculate the concentration of nitric acid in moles per litre in a sample which has a density, 1.41 g/mL and the mass percent of nitric acid in it being 69% . (3)

- Q.17** The first IE_1 and second IE_2 ionisation enthalpies in kJ/mol of three elements I, II, III are given below: (3)

Element	IE_1	IE_2
I	403	2640
II	549	1060
III	1142	2080

Identify the element which is likely to be

- i) Non-metal ii) an alkali metal iii) an alkaline earth metal

- Q.18** Give reason - (3)

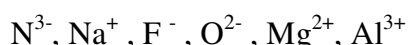
- o-nitro phenol is steam volatile whereas p-nitro phenol is not.
- The resultant dipole moment of BCl_3 is zero though individual B-Cl bonds are polar.
- All the bonds of PCl_5 are not same.

- Q.19** a) Explain the structure of NH_3 on the basis of hybridization. (3)

- b) How many sigma and pi bonds are present in ethyne?

- Q.20** a) Assign the position of the element having outer electronic configuration $ns^2 np^4$ for $n=3$. (3)

- b) Consider the following species.



What is common in them? Arrange them in order of increasing ionic radii.

- Q.21** Calculate. (3)
- Number of He atoms in 52 u
 - Number of electrons in 1 mole water.
 - State the law of multiple proportion.

- Q.22** a) Draw the structure and name the shape of - (3)
- IF₇
 - SF₄
- on the basis of VSEPR theory.
- b) LiCl is covalent whereas NaCl is ionic. Explain.

OR

- a) Draw the structure and name the geometry of the following molecules :
- SF₆
 - XeF₄
- b) What do you mean by polarisation ? Which ion is more polarized by Li⁺ ion, F⁻ or Br⁻ ? Give reason.
- Q.23** Arrange the following: (3)
- H-H , D-D , F-F in order of increasing bond dissociation energy.
 - NaH, MgH₂ and H₂O in order of increasing reducing power.
 - Complete the following reaction
$$\text{Ca}_3\text{N}_2 + \text{H}_2\text{O} \rightarrow$$

- Q.24** a) What do you mean by Hydride gap? (3)
- b) Discuss the principle and method of softening of hard water by synthetic ion exchange resins.
- Q.25** a) Show that circumference of the Bohr orbit for the hydrogen atom is an integral multiple of the de-Broglie wave length associated with the electron revolving around the orbit. (5)
- b) Calculate the wave length, frequency and wave number of a light wave whose period is 2×10^{-10} s.

OR

- Define Pauli's exclusion principle.
 - Calculate the wave number for the longest wavelength transition in the Balmer series of atomic Hydrogen.
 - Give the number of radial nodes for 2p orbital.
- Q.26** a) Why Be₂ molecule does not exist? Explain by using molecular orbital theory. (5)
- b) Draw lewis dot structure of SO₄²⁻ ion.

- c) Draw the resonance structures of CO_3^{2-} ion.
- d) Arrange the given molecules in increasing order of bond energy of C-C bonds
 C_2H_2 , C_2H_6 , C_2H_4

OR

- a) Draw the molecular orbital energy diagram of N_2 and compare the bond order and magnetic behaviour of
 N_2^+ , N_2^- , N_2^{2-}
- b) Explain why H_2O is a liquid but H_2S is a gas at room temperature.
- c) Write any one difference between bonding and antibonding molecular orbitals.

Q.27 a) Can we store CuSO_4 solution in Fe container ? Explain. (5)

$$E_{\text{Fe}^{2+}/\text{Fe}}^0 = -0.44\text{V} \qquad E_{\text{Cu}^{2+}/\text{Cu}}^0 = 0.34\text{V}$$

b) Calculate the oxidation number of Cr in CrO_5

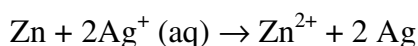
$$\text{c) } E_{\text{Fe}^{3+}/\text{Fe}^{2+}}^0 = 0.77\text{V}, \qquad E_{\text{Cu}^{2+}/\text{Cu}}^0 = 0.34\text{V}$$

$$E_{\text{Zn}^{2+}/\text{Zn}}^0 = -0.76\text{V} \qquad E_{\text{H}^+/\frac{1}{2}\text{H}_2}^0 = 0.00\text{V}$$

Which is the strongest oxidizing agent out of them?

OR

a) Depict the galvanic cell in which the following reaction takes place



Further show :

- i) Which of the electrode is negatively charged and also write the anode and cathode.
 - ii) Individual cell reaction at each electrode.
- b) Give two important functions of salt bridge.
- c) Predict the product of electrolysis of an aqueous solution of AgNO_3 with Ag electrodes.

