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 Cu^{2+} 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 = 9.1×10^{-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.

$$Cr_2O_7^{2-} + SO_3^{2-} \longrightarrow Cr^{3+} + SO_4^{2-}$$

Q.10 Write a brief note on ozone layer depletion along with chemical reactions involved. **(2)**

Q.11 SO_2 and H_2O_2 can act as oxidizing agent as well as reducing agent in their reactions but ozone and HNO_3 only act as oxidizing agent. Why? **(2)**

Q.12 Why is CO more dangerous than CO_2? Explain. **(2)**

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

$CaCO_3 + 2HCl \rightarrow CaCl_2 + CO_2 + H_2O$

What mass of $CaCO_3$ is required to react completely with 25 ml of 0.75 M HCl? (atomic mass of Ca = 40 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)**

a) Electron gain enthalpy of fluorine is less negative than that of chlorine.

b) Anionic radius is always more than that of neutral atom.

c) 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)**

a) o-nitro phenol is steam volatile whereas p-nitro phenol is not.

b) The resultant dipole moment of BCl_3 is zero though individual B-Cl bonds are polar.

c) 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.

N^{3-}, Na^+ , F^- , O^{2-} , Mg^{2+}, Al^{3+}

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

Q.21 Calculate. **(3)**

a) Number of He atoms in 52 u

b) Number of electrons in 1 mole water.

c) State the law of multiple proportion.

Q.22 a) Draw the structure and name the shape of - **(3)**

i) IF_7 ii) SF_4

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 :

i) SF_6 ii) XeF_4

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)**

a) H-H , D-D , F-F in order of increasing bond dissociation energy.

b) NaH, MgH_2 and H_2O in order of increasing reducing power.

c) Complete the following reaction

$Ca_3N_2 + H_2O \rightarrow$

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

a) Define Pauli's exclusion principle.

b) Calculate the wave number for the longest wavelength transition in the Balmer series of atomic Hydrogen.

c) Give the number of radial nodes for 2p orbital.

Q.26 a) Why Be_2 molecule does not exist? Explain by using molecular orbital theory. **(5)**

b) Draw lewis dot structure of SO_4^{2-} 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)**

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

b) Calculate the oxidation number of Cr in CrO_5

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

$E^0_{Zn^{2+}/Zn} = -0.76V$ $\qquad$ $E^0_{H^+/\frac{1}{2}H_2} = 0.00\ V$

Which is the strongest oxidizing agent out of them?

OR

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

$Zn + 2Ag^+ (aq) \rightarrow Zn^{2+} + 2\ Ag$

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.