No.of Printed Pages/Questions: 06/ 37

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HALF YEARLY EXAMINATION (2019 – 20)

Class: XI **MM: 70**

Subject: CHEMISTRY **Time: 3 Hours**

General Instructions:

i.All questions are compulsory.

ii. Question numbers 1 to 10 are MCQ type questions ,carrying one mark each.

iii. Question numbers 11to 20 are very short answer type questions ,carrying one mark each.

iv. Question numbers 21 to 27 are short answer type questions ,carrying two marks each.

v. Question numbers 28 to 34 are short answer type questions ,carrying three marks each.

vi. Question number 35 to 37 are long answer type questions ,carrying five marks .

vii. There is no overall choice. However, an internal choice has been provided in some questions.

viii. Use of calculators is not permitted. However, you may use log tables ,if necessary

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SECTION-A(1 MARK)

1.The mass of 1.5 gram atoms of calcium is :

(a) 20g (b) 40g (c) 60g (d)80g

2.How many nodes are are present in 4d orbital ?

(a)1 (b) 2 (c) 3 (d) 4

3. An element X belongs to the 3rd period of the p-block elements.It has 4 electrons in the valence shell .Name the element .

(a)C (b) P (c) Ne (d) Si

OR

The recently discovered element with atomic number(Z=109)belongs to

(a)s-block (b) p-block (c)d-block (d)f-block

4.Mass of 2 L of nitrogen at NTP is :

(a) 28g (b) 2.5g (c) 1.25g (d)14g

5.The electronic configuration of the outermost shell of the most electronegative element is :

(a) $2s^2 2p^5$ (b) $3s^2 3p^5$ (c)$4s^2 4p^5$ (d) $5s^2 5p^5$

6.Neutrons are present in all atoms except :

(a)He (b) H (c) Ne (d) C

7. The penetration of electrons in any principal shell varies as:

(a) s > p > d > f (b) p > s > d >f

(c) f > P >d > s (d)d > s > p > f

8.One mole of oxygen gas at STP is equal to_____

(a)$6.022X10^{23}$ molecules of oxygen (b) $6.022X10^{23}$ atoms of oxygen

(c) 16 g of oxygen (d)18g of oxygen

OR

Which of the following has maximum number of atoms ?

(a)18g of water (b) 16g of O_2 (c)4.4g of CO_2 (d)16 g of CH_4

9.How many electrons are possible in all shells with n+l =5 ?

(a) 2 (b)8 (c) 18 (d) 32

OR

Maximum number of electrons present in a subshell of an atom is determined by the following:

(a)2l+1 (b) 4l -2 (c)$2n^2$ (d)4 l+2

10. Which of the following has linear structure ?

(a)CH_4 (b)C_2H_6 (c) C_2H_2 (d) C_3H_8

SECTION-B(1 MARK)

11. An element 'X' with atomic number 28. Predict the group number and period number of the element 'X'.

OR

An element 'Y' belongs to the third period of p-block.It has five electrons in the valence shell.Name the element and find out its valency?

12. Arrange H_2O,NH_3 and CH_4 in the decreasing order of bond angle.

13. How many σ bonds and π bonds are present in benzene ?

OR

Write any two difference between σ bond and π bond.

14. Define Avogadro's law.

15. An atomic orbital has n=3,what are the possible values of l ?

16. Why is $MgCl_2$ a good conductor of electricity in the aqueous state ?

17. Write the electronic configuration of the following (i) Copper (ii)Argon

18. Using the s, p, d notations, describe the orbital with following quantum numbers:
(i) n= 4, l=2 (ii) n=2, l=0.

19. Why falling liquid drops are spherical?

20. Write Lewis dot symbols for O and O^{2-}.

OR

Write the electron dot structure for nitrogen molecule.

SECTION-C(2 MARKS)

21. Show the formation of ionic bonds in MgO.

22 .Calculate the number of electrons ,protons and neutrons present in Na^+ ion.

OR

How are frequency and wave number related to each other ?

23. Find out the oxidation number of the under lined elements in the following :
(i) K $\underline{Mn}$ O_4 (ii) $\underline{Cr_2}O_7^{2-}$

OR

Find out the oxidation number of the under lined elements in the following :
(i) $\underline{Br}F_5$ (ii)H_2 $\underline{S}O_4$

24. A solution is prepared by mixing 20 g salt in 180 g of water. Calculate the concentration of the solution interms of mass by mass percentage.

OR

How many atoms of oxygen are present in 300g of $CaCO_3$?

\25. What would be the IUPAC name and symbol of the following elements with atomic numbers : (i) 123 (ii)108

26. Consider the following species: N^{3-} , O^{2-} , Al^{3+} , F^{-} , Mg^{2+} , Na^{+}

(i)What is common in them ?

(ii)Arrange them in the order of increasing ionic radii .

27. What subshells are possible in n=4 energy level?

SECTION-D(3 MARKS)

28. A compound contains 4.07% hydrogen,24.27%carbon and 71.65% chlorine.Its molecular mass is98.96.What are its empirical and molecular formulae .

29. A 100 watt bulb emits electromagnetic light of wave length 400 nm.Calculate the number of photons emitted per second by the bulb.

OR

Yellow light emitted from a sodium lamp has a wavelength of 580 nm.Calculate the frequency and wavenumer of this light.

30. How would you explain the fact that the first ionization enthalpy of sodium is lower than that of magnesium but its second ionization enthalpy is higher than that of magnesium ?

31. Draw the Lewis structure of carbonate ion and calculate the formal charge on each atom .

OR

What is hybridization? Explain sp^2 hybridization undergone by carbon in ethene molecule .

32. On a ship sailing in a pacific ocean where temperature is 23.4^{0} , a balloon is filled with 2L air. What will be the volume of the balloon when the ship reaches Indian ocean , where temperature is $26.1\ ^{0}C$?

OR

A vessel of 120 mL capacity contains certain amount of gas at $35^{0}C$ and 1.2 bar pressure . The gas is transferred to another vessel of volume 180 mL at $35^{0}C$.What would be its pressure ?

33. Balance the following redox reactions by ion- electron method :

$MnO_4^-(aq) + I^-(aq) \longrightarrow MnO_2(s) + I_2(s)$ (in basic medium)

OR

Balance the following redox reactions by oxidation number method :

$Cr_2O_7^{2-} + Fe^{2+} + H^+ \longrightarrow Cr^{3+} + Fe^{3+} + H_2O$

34. Explain by giving reasons, which of the following sets of quantum numbers are not possible: :

(i) n =0 , l =0 , m_l = 0 , , m_s = +1/2

(ii) n =1 , l =0 , m_l = 0 , , m_s = -1/2

(iii)) n =1 , l =1 , m_l = 0 , , m_s = +1/2

(iv) n =2 , l =1 , m_l = 0 , , m_s = -1/2

(v) n =3 , l =3 , m_l = -3 , , m_s = +1/2

(vi) n =3 , l =2 , m_l = -1 , , m_s = -1/2

SECTION -E(5 MARKS)

35. (i)On the basis of VSEPR theory ,explain the shapes of the following molecules :

(a) H_2O (b) SF_4 (c) ClF_3

(ii)XeF_2 molecule is a linear molecule but it is sp^3d hybridized.Why?

OR

(i)On the basis Molecular Orbital Theory, compare the relative stability of the following species and indicate their magnetic properties(diamagnetic or paramagnetic):

O_2 , O_2^- , O_2^+ , O_2^{2-}

(ii)Alcohols are highly soluble in water.Why?

36.(i)3.6g of glucose (molar mass=180) are dissolved in 100 g of water. Calculate the concentration of the solution formed in terms of molality.

(ii) Define law of multiple proportion and explain by giving one example.

OR

(i)How many moles of methane are required to produce 11 g of CO_2(g)after combustion ?

(ii)A solution of oxalic acid,$(COOH)_2.2H_2O$ is prepared by dissolving 0.63g of the acid in 250 mL of the solution. Calculate the (i) molarity and (ii)normality of the solution .

37. (i) Derive ideal gas equation

(ii)Calculate the density of ammonia (NH_3) at 30 ^{0}C and 20 bar pressure

OR

(i) Calcualte the root mean square speed of methane molecules at 25 ^{0}C .

(ii) A neon-dioxygen mixture contains 70.6 g of di-oxygen and 167.5 g of neon.If pressure of the mixture of the gases in the cylinder is 30 bar,what is the partial pressure of dioxygen and neon in the mixture?

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