SHRI SHANTADURGA HIGHER SECONDARY SCHOOL

BICHOLIM - GOA

MID-TERM PRACTICE TEST (2020-21)

Subject: Chemistry **Date: 21 /11/2020** **Class: XI Science**

Maximum Marks: 20 **ANSWER KEY** **Duration: 1 hour**

Q.1	The number of water molecules present in 18g of water is __**6.022 x 10 ^{23}**__ * 1.2044 x 10 ^{24} * 6.022 x 10 ^{22} * 3.011 x 10 ^{23} * 6.022 x 10 ^{23}	01
Q.2	The frequency of an electromagnetic wave with wavelength ƛ=600nm is __**0.5x10^{15} s^{-1}**__. * 0.5x10^{15} s^{-1} * 5x10^{15} s^{-1} * 0.5x10^{16} s^{-1} * 5.5x10^{12} s^{-1}	01
Q.3	**Write the IUPAC nomenclature for the following.** a) The element which is named after scientist Dmitri Mendeleev. Mendelevium Additional information (Z=101 Name: Unnilunium= symbol= Unu) b) The element with highest atomic number present in Modern periodic table. Oganesson Additional information (Z=118 Name = Ununoctium symbol= Uuo)	01
Q.4	Write a point of difference between Orbit and Orbital. **Difference Between Orbit and Orbital** Orbit | Orbital Orbits represent the planner motion of the electron. | Orbitals represent the three-dimensional motion of the electron around the nucleus. They are Circular in shape. | They are Different in shapes from each other. It is a well-defined path that revolving electrons follow around a nucleus. | It is simply a region of space around a nucleus where the electron is present. The orbits theory doesn't satisfy the Heisenberg uncertainty principle. | Orbitals Concept completely complies with the Heisenberg uncertainty principle. Can accommodate 2n2electron in the shells where n is the number of orbits. | Only two electrons can be present in an orbital. the planner motion of electron can be designated by L, M, N, etc. | The 3D motion of electron by s, p, d, f orbitals. **OR**	01

Q.4	Write a point of difference between absorption spectrum and emission spectrum. **Emission Spectra** / **Absorption Spectra** Produced when atoms release energy / Produced when atoms absorb energy Comprise coloured lines in the spectrum / Comprise dark lines or gaps in the spectrum It is helpful in figuring out the composition of a certain matter / Can be used to figure out the ability of certain objects to retain heat and its absorption level The type of photons emitted is helpful in figuring out the kind of elements the substance is made of as each element radiates a different amount of energy and has a unique emission level / The wavelengths of light absorbed is helpful in figuring out the number of substances in the sample	01

SECTION - B

Q.5	How would you justify the presence of 18 elements in the 4th period of the Periodic Table? **Answer:** When we consider — n = 4, the orbitals 3d, 4s and 3p present in the (form of) outermost shells show the order of their increasing energies — i.e. 3p<4s<3d. Since the total number of orbitals available are 9 (1 from 4s, 3 from 3p & 5 from 3d orbital), the maximum number of electrons that can occupy the three orbitals is 18.	02
Q.6	Answer the following questions with respect to p block elements. a) Which group elements are coming under p block elements? **Elements from Group 3 to Group 12** b) Write the general electronic configuration of these elements. The **general electronic configuration of p-block elements** is **ns^2np^{1-6}** except for Helium (He)	02
Q.7	Write the four postulates of Bohr's model of atom.	02

Main postulates of Bohr's model of an atom are:

1. In an atom, the electrons revolve around the nucleus in certain definite circular paths called orbits, or shells.
2. Each shell or orbit corresponds to a definite energy. Therefore, these circular orbits are also known as energy levels or energy shells.
3. The orbits or energy levels are characterized by an integer not, where, n can have values 1, 2, 3, 4……. The integer not (= 1, 2, 3…) is called the quantum number of respective orbit. The orbits are numbered as 1, 2, 3, 4…… etc., starting from the nucleus side. Thus, the orbit for which n=1 is the lowest energy level.

The orbits corresponding to n = 1,2,3,4…..etc., are also designated as K,L,M,N… ….etc., shells. When the electron is in the lowest energy level, it is said to be in the ground state.

Since, electronics can be present only in these orbits, hence, these electrons can only have energies corresponding to these energy levels, i.e., electrons in an atom can have only certain permissible energies .

4. The electrons present in an atom can move from a lower energy level (Elower) to a level of higher energy (Ehigher) by absorbing the appropriate energy. Similarly, an electron can jump from a higher energy level (Ehigher) to a lower energy level (Elower) by losing the appropriate energy.

The energy absorbed or lost is equal to the difference between the energies of the two energy levels, i.e.,

ΔE= E (higher) - E (lower)

SECTION - C

Q.8	(i) An organic compound conatins 38.8% of Carbon; 16.2% of hydrogen ; 45.1% of nitrogen. Calculate its empirical formula. **ANSWER** Let $100\ \text{gm}$ of compound man of carbon $= 38.8\ \text{g}.$ man of hydrogen $= 16.2\ \text{g}$ man of nitrogen $= 45.1\ \text{g}$ number of mole of carbon $= \frac{38.8}{12} = 3.176$ number of mole of hydrogen $= \frac{16.2}{1} = 16.2$ number of mole of nitrogen $= \frac{45.1}{14} = 3.22$ $3.176 : 16.2 : 3.22$ $1 : 5 : 1$ Empirical formula CH_3N (ii) At STP, what volume of $H_{2\,(g)}$ is needed to react completely with 8.02×10^{23} molecules of $CO_{(g)}$? $CO_{(g)} + 2\ H_{2\,(g)} \rightarrow CH_3OH_{(g)}$ **Answer** $\frac{8.02 \times 10^{23}\ \text{molecules}}{6.02 \times 10^{23}\ \text{particles}} \times 1\ \text{mole CO(g)} = 1.33\ \text{moles CO(g)}$ $\frac{1.33\ \text{moles CO(g)}}{1\ \text{mole CO(g)}} \times 2\ \text{moles } H_2\text{(g)} = 2.66\ \text{moles } H_2\text{(g)}$ $\frac{2.66\ \text{moles } H_2\text{(g)}}{1\ \text{mole } H_2\text{(g)}} \times 22.4\ \text{L} = 59.7\ \text{L}$	03

Q.9	Answer the following: i) Designate the orbital notation for n=3 and l=2 **ANS**: 3d ii) Write electronic configuration for Ne (Z=10) **ANS**: $1s^2 2s^2 2p^6 3s^1$ = [**Ne**]$3s^1$ iii) State Heisenberg uncertainty principle with its mathematical expression **ANSWER** Heisenberg's uncertainty principle- It states that the position and momentum of microscopic moving particles cannot be determined simultaneously with accuracy or certainty. Mathematical expression- $\Delta x \times \Delta P > \text{or} = \frac{h}{4\pi}$ Δx = uncertainty in the position ΔP = uncertainty in the momentum h= Planck's constant.	03

SECTION - D

Q.10	Answer the following questions: i)Define Normality. Answer : Normality is defined as gram equivalent of solute dissolved per litre of solution. So, Normality (N) = $\frac{\text{Number of equivalents}}{\text{Volume in litres}}$ ii) 1.75g of NaOH is dissolved to make 550ml of solution. Determine Molarity of the solution. Density of solution = 2.13g/ml (H=1, 0=16, Na= 23) Molar mass of NaOH = 23+16+1= **40** **Molarity**= M = $\frac{\text{moles of solute}}{\text{Liters of solution}}$ Moles of solute=1.75/40 = **0.04355** moles $moles\ of\ solute = \frac{mass\ of\ solute}{Molar\ Mass\ solute}$ Volume of solution in litres = 550/1000 = **0.550** litres Therefore : Molarity= 0.04355/0.550 = 0.07955 M Therefore : Molarity of the solution is **0.07955 M**	04 04

Q.10	iii)For the reaction: $A + B_2 \rightarrow AB_2$ Identify the limiting reagent for the following reaction mixture. 6moles of A and 7 moles of B Ans: 6 mol A + 7 mol B: In this reaction, 1 molecule of A reacts with 1 molecule of B. hence, 6 molecules of A will react with 6 molecules of B. Here, 1 molecule of B will be left unreacted. **A is limiting reagent**. iv**)Balance the following chemical reaction:** $HgCl_2 + PH_3 \rightarrow Hg_3P_2 + HCl$ **ANS:** **$3HgCl_2 + 2PH_3 \rightarrow Hg_3P_2 + 6HCl$** **OR** **Answer the following questions:** i) **Define Limiting reagent.** The **limiting reagent** is the reactant that is completely used up in a reaction, and thus determines when the reaction stops. ... The **limiting reagent** is the one that is totally consumed; it limits the reaction from continuing because there is none left to react with the in-**excess** reactant. ii) The density of 4M solution of NaCl is 1.25g ml^{-1}. Calculate molality of the solution. **Answer:** Molatily of the solution is = 3.94m **Explanation:** molar mass of NaCl = 58.5 No. of moles = weight / molecular weight weight = no.of moles × molecular weight Mass of NaCl in 1 lit solution = 4× 58.5 = 234 Mass = density × volume Mass of 1 lit solution = 1000× 1.25 =1250g mass of water in solution = mass of solution - mass of solute = 1250 – 234 =1016g mass of water in solution = 1.016kg molality = no. of moles of solute /mass of solvent in kg = 4 / 1.016 =3.94 m Molality of the solution is = **3.94 m** iii) Calculate mass percentage of oxygen in $C_6H_{12}O_6$. (H=1, C =12, O=16) **ANSWER** Total molar mass of O-atoms present in $C_6H_{12}O_6$=6×16=96g/mol Percentage composition = 96/180×100=53.33% iv) Balance the following chemical reaction: $Ag + PCl_5 \rightarrow AgCl + PCl_3$ Answer : $2Ag + PCl_5 \rightarrow 2AgCl + PCl_3$ **********	