Chemistry

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Choose the correct answer:

1. **The element $_{9}A$,$_{10}B$, $_{11}C$,the …….can combine together**

   a .C and B b .B and B c. B and A <u>d. A and C</u>

2. **The bond in hydrogen chloride is polar covalent bond ,since the two atoms are different in ……..**

   a .their location in periodic table b .electron affinity

   <u>c. electronegativity</u> c .ionization potential

3. **The chemical formula of the produced compound as combining of element Y:$[_{10}Ne],3S^2,3P^4$ with element X:$[_{10}Ne],3s^1$ is……**

   a.XY_2 <u>b.X_2Y</u> C.YX d. XY

4. **Aluminum chloride is a covalent compound because the difference in electronnegativity between chlorine and aluminum is ……**

   a .equal 1.7 b. more than 1.7 <u>c. less than1.7</u> d. equal zero

5. **The molten……..doesn't conduct electricity**

   a.LiCl <u>b.$AlCl_3$</u> c.$MgCl_2$ d. NaCl

6. **from the properties of hybrid orbital's SP that they are ……**

   a. three orbital's b. linear c. two orbital's <u>d.(b) and (c)</u>

7. **the type of hybridization in the carbon atom in the methane molecule is ……..**

   a.dsp^2 <u>b.sp^3</u> c.sp^2 d. sp

What is meant by:

1.**chemical reaction :**It is the breaking of bonds between atoms of reactants molecules and forming new bonds between atoms of the products molecules

2 .**lone pair of electrons**: electron pair which is found in one of the outer orbital's and doesn't share in bond formation

3. Octet rule [the electronic theory of valency 'Lewis and Kossel']:

Excluding hydrogen, lithium, and beryllium, the atoms of the elements tend to reach the octet structure of the nearest inert gas

4. The valence bond theory (V.B.T):

The formation of covalent bonds in the molecule is a result of the overlap of some atomic orbitals in the combined atoms, the rest of the atomic orbitals which did not take a part in the formation of bonds remain as they were in the free atom

5. The molecular orbital theory [M.O.T]: The molecule is one unit (or a big atom with multinuclei) in which all the atomic orbitals of the combined atoms are mixed or hybridized forming molecular orbitals

6.the pi bond (Π):it is the bond that is formed as a result of the overlap of two atomic orbitals 'collateral overlap' side by side

7.the sigma bond(σ):it is the bond that is formed as a result of the overlap of two atomic orbitals on one line 'collinear overlap''head to head

8.hydrogen bond: it is physical bond formed between hydrogen atom binds by a polar bond like N-H,O-H,H-F) with high electronegative bonded atom [like N,O,F]

9.Metallic bond: it is bond produced from the electron cloud of valence electrons which decreases the repulsive forces between the positive metal ions in the crystal lattice

Give reasons for:

1.Although chlorine is a nonmetal and aluminum is a metal, aluminum chloride has some characteristics of covalent bond

-because the differences in electronegativity between aluminum and chlorine atom is less than 1.7

2.Although the central atom of each of them is bonded to two atoms,BeF_2 molecule has a linear shape while SO_2 molecule has an angular shape

-because the central atom in BeF_2 molecule has no lone pairs of electrons so the repulsive force between bond pair increases then takes the linear shape while the central atom of SO_2 molecule has lone pair of electrons which repel strongly with the bond pair pair so the angle between the covalent bond decreases then takes the angular shape

3.Hydrogen bond between Hydrogen fluoride are stronger than that between water molecule

-because the difference in electronegativity between fluorine and hydrogen is more than that between oxygen and hydrogen

4.On dissolving strong acids in water ,positive hydrogen ions are not formed

-because hydrogen ions combine with water molecules by coordinate bonds thus forming the positive hydronium ions (H_3O^+)

5.Aluminum is much harder and its melting point is higher than that of sodium

-because the number of valence electrons in aluminum is three but in sodium is only one and the strength of metallic bond increases by increasing the number of valence electrons

6. The bonding in boron trifluoride and the phosphorous pentachloride can't be explained on the basis of the octet rule

-because in the boron triflouride molecule the boron atom is surrounded by only six electrons while in the phosphorous pentachloride molecule is surrounded by ten electrons and not eight as the theory proposed

Answer the following Questions

1.by using the following table which shows the elactronegativity of some elements

element	Na	Cl	Al	C	Br	S	N	P	O
electronegativity	0.9	3	1.5	2.5	2.8	1.8	3	2.1	3.5

Arrange the following in descending order according to the trends in

(a)Ionic bond

1- Br-Cl , Al-Cl , Na-Cl , C-Cl

(b)polar property:

2- P-O , S-O , C-O , N-O

Answer

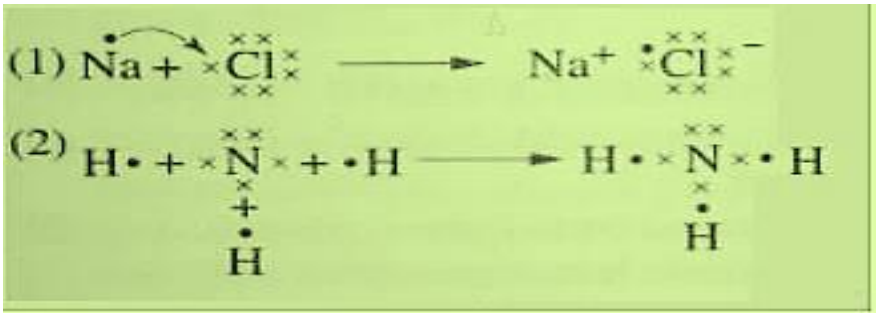
1.Na-Cl > Al-Cl > C-Cl > Cl-Br

2. S-O> P-O >C-O > N-O

2.Explain by drawing Lewis electron-dot symbol method to represent the reaction that occurs between

1 .sodium with chlorine for formation of NaCl [Na=11, Cl=17]

2.Nitrogen with hydrogen for formation of NH_3 molecule [N=7,H=1]



3 .Show the hyperdization type and the shape of the molecule in each of the following

1. Ethylene molecule **2.Acetylene molecule**

P.O.C	1.Ethylene	2.Acetylene
Hyberdization	Sp^2	Sp
Shape	Triangle planar	Linear

4. Compare between

Sp^3 hybridization of C atom in CH_4 molecule	Sp^2 hybridization of carbon atom C_2H_4	SP Hybridization of C atom in C_2H_2
1.Overlap of (2s)orbital and 3(2p) orbitals	1.overlap of 2s orbital with two 2p orbitals	1.overlap of 2s orbital and 2p orbital
2.number of hybrid orbitals =4	2.number of hybrid orbitals =3	2.number of hybrid orbitals =2
3.angle between orbitals =109.5	3.angle between orbitals =120°	3 angle between orbitals =180°
4.tetrahedron form	4.planar triangle	Linear