



- (10) If  $25\text{cm}^3$  of  $0.1\text{mol dm}^{-3}\text{H}_2\text{SO}_4$  and  $50\text{cm}^3$ ,  $0.1\text{mol dm}^{-3}\text{HCl}_{(aq)}$  is mixed together the concentration of  $\text{H}^+_{(aq)}$  in  $\text{mol dm}^{-3}$  in the resultant solution is
- 1) 0.08
  - 2) 0.13
  - 3) 0.75
  - 4) 1.3
  - 5) 0.1
- (11) Electron pair geometry and molecular shape of  $\text{XeO}_3$  is respectively
- 1) Pyramidal, tetrahedral
  - 2) Pyramidal, trigonal planer
  - 3) Tetrahedral, Pyramidal,
  - 4) Trigonal planer, Pyramidal
  - 5) Trigonal planer, tetrahedral
- (12) Number of oxygen atoms in  $300\text{g CaCO}_3$   
( $C = 12, O = 16, Ca = 40$ )
- 1)  $6.69 \times 10^{23}$
  - 2)  $5.42 \times 10^{24}$
  - 3)  $1.81 \times 10^{24}$
  - 4)  $8.25 \times 10^{23}$
  - 5)  $8.01 \times 10^{24}$
- (13) Which of the following is not iso electronic with  $\text{F}^-$ ?
- 1)  $\text{Ne}$
  - 2)  $\text{H}_2\text{O}$
  - 3)  $\text{Na}^+$
  - 4)  $\text{Al}^{3+}$
  - 5)  $\text{Li}^+$
- (14) The orbitals of  $\text{O}$  atom in a water molecule have undergone the hybridization?
- 1)  $\text{SP}^2$
  - 2)  $\text{SP}$
  - 3)  $\text{dsp}^2$
  - 4)  $\text{SP}^3$
  - 5) Have not undergone any hybridization
- (15) Select the answer which correctly represents the ascending order of the dipole moment of the following species.
- 1)  $\text{H}_2\text{S} < \text{NH}_3 < \text{H}_2\text{O} < \text{HF}$
  - 2)  $\text{HF} < \text{H}_2\text{O} < \text{NH}_3 < \text{H}_2\text{S}$
  - 3)  $\text{H}_2\text{S} < \text{HF} < \text{H}_2\text{O} < \text{NH}_3$
  - 4)  $\text{NH}_3 < \text{HF} < \text{H}_2\text{S} < \text{H}_2\text{O}$
  - 5)  $\text{NH}_3 < \text{H}_2\text{O} < \text{HF} < \text{H}_2\text{S}$

#### Instructions for questions 16 to 20

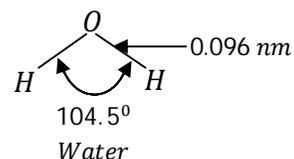
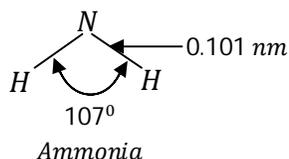
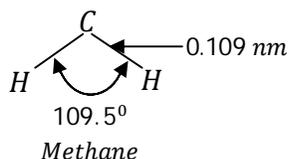
For each of the questions No 16 – 20 four responses (a), (b), (c) and (d) given, out of which one or more is/ are correct. Select the correct response / responses in accordance with instructions given on your answer sheet, mark

- (1) If only (a) and (b) are correct
- (2) If only (b) and (c) are correct
- (3) If only (c) and (d) are correct
- (4) If only (d) and (a) are correct
- (5) If any other number or combination of responses is correct

Summary of above instructions.

(1)	(2)	(3)	(4)	(5)
Only (a) and (b) Correct	Only (b) and (c) Correct	Only (c) and (d) Correct	Only (d) and (a) Correct	Any other number or Combination of responses is correct

- (16) Which of the following statement is / are true
- Ionic radius of  $H^-$  ion is larger than the atomic radius
  - He has the highest 1<sup>st</sup> ionization energy in all elements
  - Fluorine can show positive oxidation state
  - O does not show positive oxidation state
- (17) The correct statement(s) regarding Hydrogen bonds
- Hydrogen bond can be present even if there is no OH group
  - bond energy of H – bond is nearly equal to C – H bond energy
  - Special hydrogen bond is present in hydrogen molecule
  - Hydrogen bond is most essential for existence of life
- (18) Which of the following statements is / are true
- Li has the most smallest atomic radius
  - Electronegativity increases from Li to F
  - Oxidation state of N varies between –3 to +5
  - Oxygen only shows –2 oxidation state except  $O_2$  gas
- (19) Which of the following is / are disproportionation reaction
- $H_2O_2 \rightarrow 2H_2O + O_2$
  - $Cu^{2+} + Zn \rightarrow Cu + Zn^{2+}$
  - $Cl_2 + OH^- \rightarrow HOCl + Cl^-$
  - $2NO_2 + H_2O \rightarrow HNO_2 + HNO_3$
- (20) The main reasons for the variation of the bond lengths and bond angles in the bonds with H in the give 3 molecules are



- The electron pairs get closer to the nucleus when the electronegativity of the central atom increases
- The bond pair – bond pair repulsive forces are minimum in water molecules
- There are 3 N – H bond in ammonia
- The repulsive forces among lone pair electrons increase with the increase in the number of lone pair electrons

**Instruction for questions no 21 – to 25**

**In questions no 21 to 25 two statements are given in respect of each question from the table given below. Select the response out of the response (1), (2), (3), (4) and (5) that best fits the two statements given for each of the questions and mark appropriately on your answer sheet.**

Response	First statement	Second statement
(1)	True	True and correctly explains the first statement
(2)	True	True, but does not explain the first statement
(3)	True	False
(4)	False	True
(5)	False	False

1 <sup>st</sup> Statement	2 <sup>nd</sup> Statement
(21) In hydrogen spectrum all the emissions related to Lyman series ends in	Bohr's model is used to explain the basis of Hydrogen spectrum
(22) One $N - H$ bond in $NH_4^+$ is different from other three	One $N - H$ bond in $NH_4^+$ can be identified as a dative bond
(23) Oxidation and reductions reaction takes place simultaneously	All reactions are disproportionation reaction
(24) $NaI$ has more covalent nature than $NaF$	If the cation is smaller and has high charge, the polarizing ability is greater
(25) Molecular shape of $NH_3$ and $NF_3$ is trigonalbipyramidal	$NF_3$ has greater dipolemoment than $NH_3$



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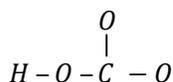
**Grade :- 12 (2017)**

**CHEMISTRY**

**PART – II (A)**  
**Structured Essay**

- (01) A) i) How the cathode rays are formed?  
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- ii) List 3 characters of cathode rays?  
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- iii) Give the experiments to prove the above mentioned characters?  
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.....
- iv) Name the scientist who mentioned the cathode ray particle as a basic particle?  
.....  
.....
- v) Why positive rays are not called as anodic rays?  
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.....

B) The following parts (i) → (vi) are based on the bicarbonate ion,  $HCO_3^-$ . The skeleton of  $HCO_3^-$  is given below



i) Draw the most acceptable Lewis structure for this

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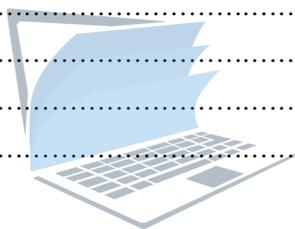
ii) Draw resonance structures for this ion and comment on their relative stabilities

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iii) Deduce the shapes around the following atoms using VSEPR theory

i) C

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ii) O attached to H

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iv) Indicate the electron pair geometry (arrangement of electron pairs) around the following atoms

i) C

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ii) O attached to H

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v) Indicate the hybridization of the following atoms

i) C

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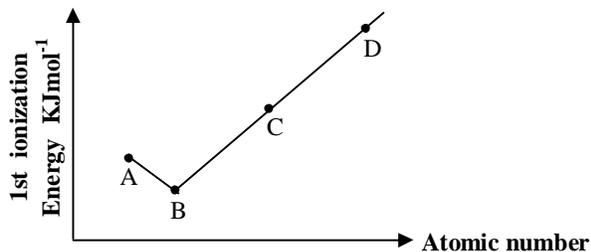
ii) O attached to H

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.....

(02) A) Fill in the blanks using appropriate terms.

The lines in the hydrogen spectrum ..... in the wavelength increasing direction this spectrum is formed by the emission of ..... . When electrons return to ground state from excited state. When the excited state electrons return to  $n = 2$  energy level ..... is formed. This series is present in the ..... range. The energy which is emitted when an electron return from  $n = 5$  to  $n = 2$  is ..... than the energy emitted when an electron return from  $n = 4$  to  $n = 2$ . The emission spectrum and absorption spectrum are evidence for ..... when they are joined ..... is obtained.

B) The variation of 1<sup>st</sup> ionization energy of consecutive elements in periodic table A, B, C, D is given below. (belongs to 3<sup>rd</sup> period)



i) If C is gas at room temperature write down the electronic configuration of element A in  $1s^2 2s^2$  format?

.....  
.....

ii) Give the chemical formula of the compound formed by B with Hydrogen?

.....  
.....

iii) Explain why the 1<sup>st</sup> ionization energy of A is higher than B?

.....  
.....  
.....  
.....

iv) Which is the most electronegative species in these elements?

.....  
.....

v) Write down the group to which element D belongs to?

.....

vi) Write down the molecular formula of two compound formed by A and C

.....  
.....

vii) Give the molecular formula of the oxyacid of B?

.....  
.....

viii) Mention two elements which belongs to the group of C in the periodic table?

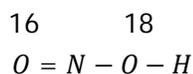
.....

(03) A)  $SiO_2$ , Graphite, Ice,  $Li_{(s)}$ ,  $KF_{(s)}$ , Iodine, He, Fluorine,  $CH_3OH$ ,  $MgCl_2$

Answer the following questions by using the above mentioned compounds / species only

- i) ..... has the highest melting point
- ii) ..... can be present as homoatomic lattice?
- iii) ..... can be present as hetero atomic lattice
- iv) ..... can be present as non polar molecular lattice
- v) ..... can be present as polar molecular lattice
- vi) ..... can be present as ionic lattice?
- vii) ..... can be present as metallic lattice?
- viii) ..... has hydrogen bonds

B) Fill the following table, regarding the compounds.



Using only the following terms.

$\sigma$ ,  $\pi$ ,  $2P$ ,  $|S\rangle$  Linear over lapping , Lateral over lapping

Bond	Type of Bond	Overlapping orbitals	Type of overlapping
$O^{16} - N$	$\sigma$		
$O^{16} - N$	$\pi$		
$O^{18} - N$			
$O^{18} - H$			

C) i) Give 4 examples for electromagnetic radiations?

.....  
 .....  
 .....  
 .....

ii) Calculate the energy of a photon with wave length of 900 nm

$c = 3 \times 10^8 \text{ms}^{-1}$        $h = 6.626 \times 10^{-34} \text{Js}$

.....  
 .....  
 .....  
 .....

iii) Calculate the energy of one mole of above photon?

.....  
 .....  
 .....

(04) A) Consider  $H_2SO_4(aq) | KMnO_4(aq) | Na_2C_2O_4(aq)$  system

i) Give the half ionic equation for oxidation?

.....  
 .....

ii) Give the half ionic equation for reduction?

.....  
 .....

iii) Give the ionic equation by using the above equations?

.....  
.....  
.....

iv) Give the balanced chemical equation

.....  
.....

v) Calculate the volume of  $CO_2$  formed in STP condition as a result of oxidation by 0.9g of  $KMnO_4$   
( $k = 39, Mn = 55, O = 16$ )

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B) i) When potassium phosphate solution is added to the Barium chloride solution barium phosphate is formed as the precipitate give a balanced chemical equation for the reaction between the above solutions?

.....  
.....

ii) If Barium chloride is reacted completely and forms 6.01 g Barium phosphate. Calculate the moles of Barium phosphate.  
( $Ba = 137, Cl = 35.5, P = 31, O = 16$ )

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iii) If 100ml of  $BaCl_2$  solution is used in the above reaction calculate the concentration of  $BaCl_2$  used?

.....  
.....  
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**Grade :- 12 (2017)**

**CHEMISTRY**

**PART- II (B)**  
**Essay Questions**

**Answer two questions only**

**Explain the following**

- (01) A) i) Describe the Rutherford's  $\alpha$  Scattering experiment?  
ii) What are the observations in this experiment?  
iii) What are the conclusions from this experiment?
- B) Explain the following  
i) Importance of hydrogen bonds in living organisms  
ii) Melting point of  $Mg$  is greater than  $Na$   
iii)  $Br_2$  and  $ICl$  has the same molar mass (nearly) but they differ in boiling point explain this
- C) Consider the following species and given the bond pair electron, lone pair electron, VSEPR notation and shape.  
i)  $BF_3$   
ii)  $CrO_4^{2-}$   
iii)  $H_2S$   
iv)  $NH_3$   
v)  $CO_2$
- (02) A) Consider 18 g of  $C_6H_{12}O_6$   
i) What is the amount of substance?  
ii) What is the total number of molecules?  
iii) Calculate the total number of atoms?  
iv) State the number of O atoms present?  
v) State the number of H atoms present?  
vi) State the number of C atoms present?

B) An organic compound A contains following elements in the given mass ratio

$$C = 40\%$$

$$H = 6.67\%$$

$$O = 53.33\%$$

What is the empirical formula of A?

If relative molar mass of A is 90 find out the molecular formula of A?

C) A Solution is made by dissolving 6g of Urea  $\{CO(NH_2)_2\}$  in 90 g of water

i) What is the mole fraction of urea?

ii) What is the mole fraction of water?

iii) If the density of water is  $1 \text{ gml}^{-1}$

What is the concentration of above solution

(03) A) Explain the following

i) Covalent radius of  $Na$  is greater than the covalent radius of  $Cl$

ii) 2<sup>nd</sup> Ionization energy of  $Mg$  is greater than its 1<sup>st</sup> ionization energy

iii) 1<sup>st</sup> Ionization energy of  $Mg$  is greater than 1<sup>st</sup> ionization energy of  $Al$

B) Hydrated  $Al_2(SO_4)_3 \cdot X H_2O$  contains 8.1% of Al by weight

$$Al = 27 > S = 32 > O = 16 > H = 1$$

a) What is the molar mass of hydrated compound?

b) What is the molar mass of unhydrated compound?

c) What is the value of X

d) What is the mass percentage of water in the above compound?

e) What is the mass percentage of Al in the unhydrated compound?