



# G.C.E. A/L Examination November - 2018

Conducted by Field Work Centre, Thondaimanaru  
In Collaboration with  
Provincial Department of Education, Northern Province.

Grade :- 12 (2020)

Chemistry II

Time :- Two hours

## Part -II Structured essay - A

❖ Answer all questions on This paper itself.

01.

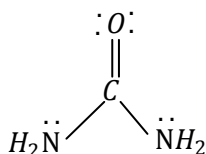
a) State whether the following statements true / False.

- (i) Positive rays originate from anode electrode. ....
- (ii) Energy of photon is directly proportional to its wave length .....  
.....
- (iii) Because of 3d subenergy level has higher energy than that of 4s, 3d subenergy level is filled after 4s sub energy level. ....  
.....
- (iv)  $CO_3^{2-}$  ion is trigonal planer in shape. ....  
.....
- (v) Boiling point of  $NH_3$  is greater than that of  $HF$ . ....
- (vi) Dipole moment of  $NH_3$  is greater than that of  $CCl_4$ . ....

b) i. Chromyl chloride vapour is reddish brown in colour ( $CrO_2Cl_2$ ). Draw the stable Lewis structure for this molecule.

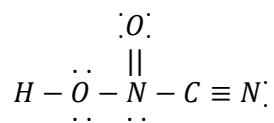
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ii. Lewis structure for urea is given below. Draw other 2 resonance structures for urea  $CO(NH_2)_2$ .

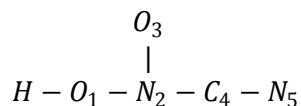


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iii. Complete the following table regarding O, N, C atoms with respect to the Lewis structure given below.



Atoms are numbered as follows.



VSEPR Pairs	O <sub>1</sub>	N <sub>2</sub>	C <sub>4</sub>	N <sub>5</sub>
Geometry of electron pairs.				
Shape				
Hybridization				

iv. Identify the atomic / hybrid orbitals involved in the formation of the following  $\delta$  bonds in the Lewis structure given in part (iii) above.

- $\text{N}_2 - \text{O}_3 = \text{N}_2 \dots\dots\dots \text{O}_3 \dots\dots\dots$
- $\text{C}_4 - \text{N}_5 = \text{C}_4 \dots\dots\dots \text{N}_5 \dots\dots\dots$
- $\text{O}_1 - \text{N}_2 = \text{O}_1 \dots\dots\dots \text{N}_2 \dots\dots\dots$
- $\text{N}_2 - \text{C}_4 = \text{N}_2 \dots\dots\dots \text{C}_4 \dots\dots\dots$

v. Identify the atomic orbitals involved in the formation of  $\pi$  bonds between the following atoms.

- $\text{N}_5 - \text{C}_4 = \text{N}_5 \dots\dots\dots \text{C}_4 \dots\dots\dots$
- $\text{O}_3 - \text{N}_2 = \text{O}_3 \dots\dots\dots \text{N}_2 \dots\dots\dots$

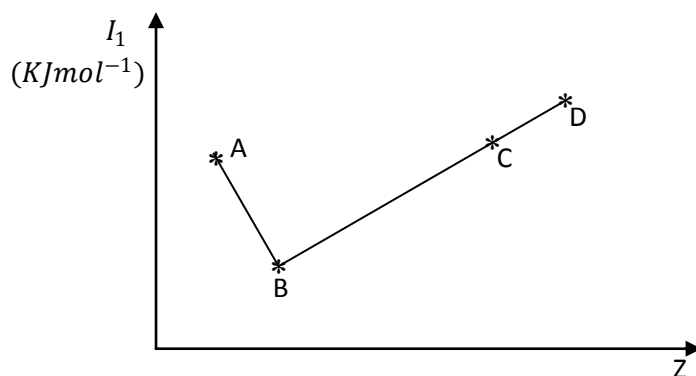
c) Arrange the following species in the increasing order of the character given in parenthesis.

- Polarizability of cations -  $\text{Mg}^{2+}, \text{Ca}^{2+}, \text{Sr}^{2+}, \text{Ba}^{2+}$   
.....

- Electro negativity of nitrogen atom -  $\text{N}_2\text{O}, \text{NO}_3^-, \text{N}_2\text{O}_3, \text{NO}_2, \text{NO}$   
.....

- Strength of dipole - dipole interaction -  $\text{O}_2, \text{H}_2\text{O}_2, \text{H}_2\text{O}, \text{O}_3$   
.....

02. (a) First Ionization enthalpy of 3<sup>rd</sup> period elements A,B,C,D is given below.



1. If C is gas at room temperature hence give the electronic configuration of A.  
 .....
2. What is the molecular formula of the compound formed by combination of B and hydrogen?  
 .....  
 .....
3. State the reason for  $I_1$  of A being higher than that of B.  
 .....  
 .....
4. Which of the above element has high electronegativity?  
 .....  
 .....
5. Element - D belongs to which group of the periodic table.  
 .....  
 .....
6. Give 2 formula of compounds formed by A & C together.  
 .....  
 .....

7. Give the formula of oxyacid of element B.

.....  
.....

8. Give two elements belongs to the same group of C in the periodic table.

.....  
.....

(b) Mention the observation for the following phenomena.

1. Cathode rays in magnetic field.

.....

2. Cathode rays in electric field.

.....

3. Excited electrons returning to ground state.

.....

03. (a). By using *VSEPR* theory derive the shape of following ions / molecules and draw the respective structure of them.

1.  $CrO_4^{2-}$

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.....  
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2.  $ICl_4^-$

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.....

3.  $Tecl_4$

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.....  
.....

4.  $PCl_3$

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.....

5.  $NO_3^-$

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.....

(b) State the main type of bond/bonds present in the following chemical species using the words given below. (Polar covalent, Non – polar covalent, Dative bond, Ionic bond, Metallic bond)

1.  $HCl$  →

2.  $NH_4Cl$  →

3.  $Ag_{(s)}$  →

4.  $Cl_{2(g)}$  →

5.  $LiCl_{(s)}$  →

(c) State the inter molecular interactions in the given molecules.

1.  $CH_3COOH$  →

2.  $KBr_{(aq)}$  →

3.  $KI / I_{2(aq)}$  →

4.  $SiCl_{4(l)}$  →

5.  $PCl_{3(s)}$  →

(d) Write the electronic configuration of given species.

1.  $Cu$  →

2.  $Zn^{2+}$  →

3.  $Na^+$  →

4.  $N^{3-}$  →

5.  $Cl^-$  →

04. (A). An organic compound A contains the following elements by weight composition.  
 $C = 40\%$   $H = 6.67\%$   $O = 5.33\%$

a. Derive the empirical formula of the compound A.

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

b. Hence find the molecule of the compound A if molar mass is  $90 \text{ gmol}^{-1}$ .

.....  
.....

(B). 4.68 g of Glucose was dissolved in 100 ml of water and the density of resultant solution was  $1.04 \text{ gmol}^{-1}$  therefore find the  $W/W$  % of the solute.

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(C). Find the mole fraction of the components  $C_6H_{12}O_6$  when 10.6 g of  $Na_2CO_3$ , is dissolved 90 g of  $H_2O$ . ( $Na = 23, C = 12, O = 16, H = 1$ )

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

(D). It is given that density of water is  $1 \text{ gmol}^{-1}$  therefore find the concentration of the solution above (c).

.....  
.....



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## Part - II Essay Question -B

❖ Answer two questions only.

05. a) How do the cathode rays are produced?  
b) What is meant by electromagnetic radiation & give examples for it.  
c) Name three series found in hydrogen emission spectrum.  
d) Calculate the following regarding the photons of wavelength 460 nm.  
i) Calculate the frequency of this radiation.  
ii) Calculate the energy of a photon.  
iii) Energy of 1 mol of photons.  
e) A bulb radiating photons of wave length 460 nm emits  $3.6 \times 10^{18}$  photons per second. If this bulb is operated to obtain 100 J of energy, for how long this bulb should work? (Give your answers in seconds)  
f) To which region of electromagnetic spectrum above radiation of 460 nm wavelength photons belong?
06. a). Explain the following.  
I. Melting point of  $Na_{(s)}$  is lesser than that of  $Mg_{(s)}$   
II. Boiling point of  $NO$  is greater than that of  $O_2$ .  
III. First electron affinity of  $Cl^-$ ,  $Cl$ ,  $Cl^+$  varies as  $Cl^- < Cl, < Cl^+$ .
- b). Balance the following reactions using oxidation number method.  
I.  $CuO + NH_3 \longrightarrow Cu + N_2 + H_2O$   
II.  $BrO_3(aq)^- + I^-(aq) + H^+(aq) \longrightarrow BrO(aq)^- + I_2(aq) + H_2O(l)$   
III.  $SO_2(g) + H_2O(l) + Br_2(aq) \longrightarrow H(aq)^+, SO_4(aq)^{2-} + Br(aq)^-$   
IV.  $NH_3(g) + O_2(g) \longrightarrow N_2(g) + H_2O(g)$   
V.  $NH_3(g) + O_2(g) \longrightarrow NO(g) + H_2O(g)$

- c). 25 ml of methyl alcohol ( $CH_3OH$ ) and 100 ml  $H_2O$  were mixed together. If the concentration of  $CH_3OH$  is  $0.8 \text{ g ml}^{-1}$ . Hence find the molarity of solution obtained.
07. a) How would you prepare  $0.1 \text{ mol dm}^{-3}$   $200 \text{ cm}^3$  of  $Na_2CO_3$  solution? ( $Na = 23, C = 12, O = 16$ ). Explain clearly. If the prepared solution is divided into 2 equal parts and diluted upto 500 ml what would be the molarity of final solution.
- b) You are given with  $1 \text{ mol dm}^{-3}$   $Na_2CO_3$  solution. By using this solution how do you prepare  $0.2 \text{ mol dm}^{-3}$ ,  $100 \text{ cm}^3$   $Na_2CO_3$  solution?
- c) A solution of  $Ba(OH)_2$  of unknown concentration was allowed to react with  $0.1 \text{ mol dm}^{-3}$   $HNO_3(aq)$  for the complete reaction of  $25 \text{ cm}^3$   $Ba(OH)_2$  Nitric acid of  $0.1 \text{ mol dm}^{-3}$   $34 \text{ cm}^3$  was required. Hence what is the concentration of  $Ba(OH)_2$ .
- d) Find the volume of  $0.6 \text{ mol dm}^{-3}$  Acidified  $KMnO_4$  solution required for the complete reaction with  $0.2 \text{ mol dm}^{-3}$   $27 \text{ cm}^3$   $Fe(NO_3)_2(aq)$  solution.