AGA KHAN UNIVERSITY EXAMINATION BOARD

HIGHER SECONDARY SCHOOL CERTIFICATE

CLASS XI

MODEL EXAMINATION PAPER 2018

Chemistry Paper II

Time: 2 hours 10 minutes Marks: 50

INSTRUCTIONS

Please read the following instructions carefully.

1. Check your name and school information. Sign if it is accurate.

I agree that this is my name and school. **Candidate's Signature**

RUBRIC

2. There are ELEVEN questions. Answer ALL questions. Questions 10 & 11 each offer TWO choices. Attempt any ONE choice from each.

3. When answering the questions:

   Read each question carefully.
   Use a black pointer to write your answers. DO NOT write your answers in pencil.
   Use a black pencil for diagrams. DO NOT use coloured pencils.
   DO NOT use staples, paper clips, glue correcting fluid, or ink erasers.
   Complete your answer in the allocated space only. DO NOT write outside the answer box.

4. The marks for the questions are shown in brackets ( ).

5. You may use a scientific calculator if you wish.

Q.1. (Total 4 Marks)

If the combustion analysis of 0.80 g of an unknown organic compound yields 1.63 g of CO_2 and 0.97 g of H_2O, then what will be the percentages of carbon, hydrogen and oxygen present in the organic compound?

(**Note**: Atomic mass of H = 1 amu, C = 12 amu, O = 16 amu)

Q.2. (Total 4 Marks)

a. Complete the following table with the type of information that each of the given quantum numbers specify. (2 Marks)

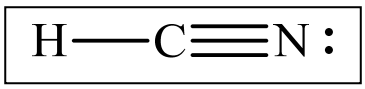
S. No.	Quantum Number	Type of Information
1	Azimuthal quantum number	
2	Magnetic quantum number	

b. Complete the given table by mentioning the quantum numbers for each orbital. (2 Marks)

Quantum Number	Orbital	
	2p	3d
Azimuthal quantum number		
Magnetic quantum number		

Q.3. (Total 3 Marks)

Given below is the linear structure of hydrogen cyanide molecule.



a. What is the hybridisation of carbon atom in hydrogen cyanide molecule? (1 Mark)

_____

_____

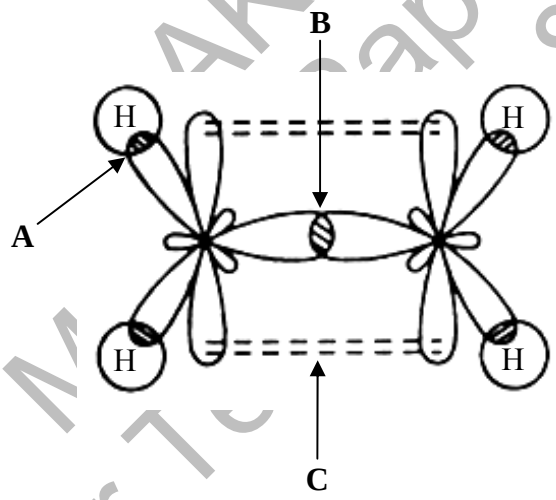
b. How many σ and π bonds are observed in the given molecule? (2 Marks)

_____

_____

Q.4. (Total 3 Marks)

Identify the type of orbital overlap at **A**, **B** and **C** in the given structure of ethene.



A: _____

B: _____

C: _____

Q.5. (Total 4 Marks)

a. If 0.25 moles of water vapours occupy a volume of 2.46 dm^3 at 27°C and 2.5 atmospheric pressure, then calculate the value of ideal gas constant (R). (2 Marks)

b. Give a reason why the surface tension of

i. water is higher than that of ethers. (1 Mark)

ii. liquids decrease with the increase in temperature. (1 Mark)

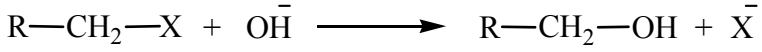
Q.6. (Total 4 Marks)

Calculate the solubility product (K_{sp}) of AgCl, if the solubility of AgCl is 1.2×10^{-3} g dm^{-3} at 25°C.

(**Note**: Atomic mass of Ag = 107.86 amu and Cl = 35.5 amu)

Q.7. (Total 4 Marks)

Following results are obtained for the given nucleophilic substitution reaction between alkyl halide ($R–CH_2–X$) and a base (NaOH).



Experiment	[R–CH_2–X]	[NaOH]	Initial Rate
1	0.030	0.2	1.5
2	0.045	0.2	2.25
3	0.040	0.4	3.75

a. What is the order of reaction with respect to alkyl halide and base. (1 Mark)

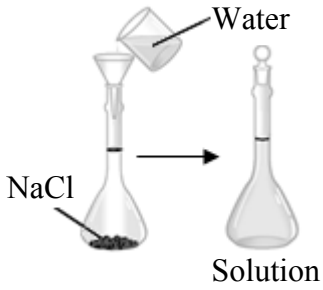
b. Give TWO reasons to support your answer in part a. (2 Marks)

c. Write an overall rate equation for the given reaction. (1 Mark)

Q.8. (Total 5 Marks)

a. A solution is prepared by dissolving 1250 mg of NaCl in 1000 mL of water. Calculate the concentration of prepared solution in ppm. (3 Marks)

(**Note**: Atomic mass of Na = 23 amu and Cl = 35.5 amu)



b. Describe the following terms. (1 Mark)

i. Heat capacity

ii. Molar heat capacity (1 Mark)

Q.9. (Total 4 Marks)

Find the oxidation number of:

i. Cr in $K_2Cr_2O_7$ (2 Marks)

ii. S in $Na_2S_2O_3$ (2 Marks)

Q.10. (Total 7 Marks)

EITHER

a.

i. Describe the main points of Bohr's atomic theory. (5 Marks)

ii. Calculate the radius of the 3rd orbit of an electron in a hydrogen atom. (2 Marks)

(**Note**: $a° = \frac{\in_{\circ} h^2}{\pi m e^2} = 0.529A°$)

OR

b.

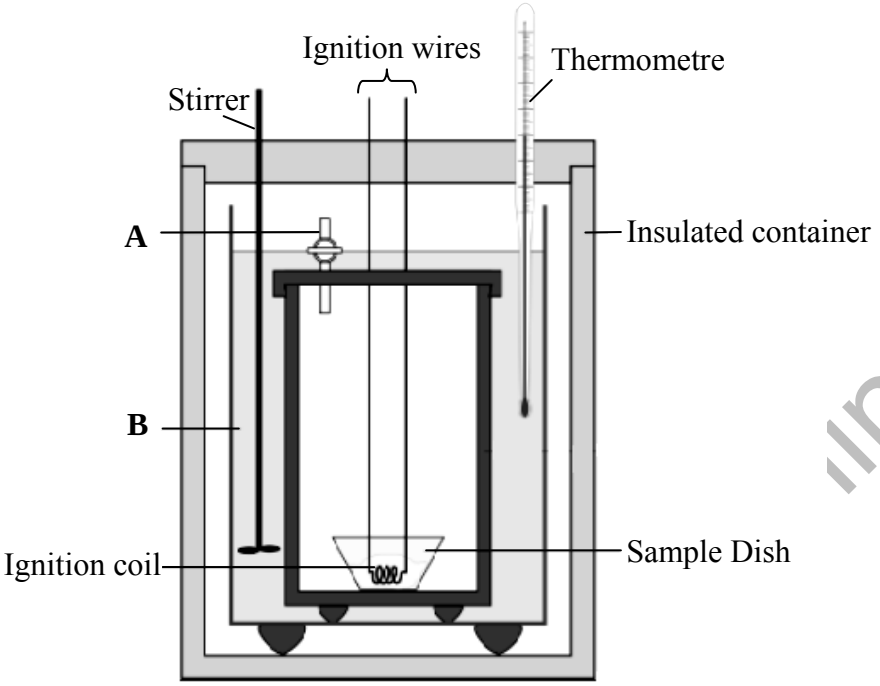
i. Describe the term 'hydration'. (1 Mark)

ii. Describe THREE types of salt which undergo hydrolysis. Give ONE example of each type. (6 Marks)

Q.11. (Total 8 Marks)

EITHER

a. Given is the diagram of a bomb calorimetre.

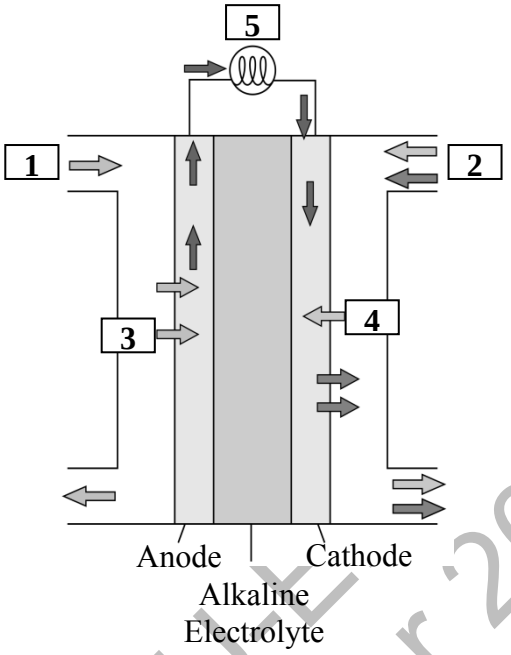


i. Identify the labelled components, **A** and **B** in the given diagram. (2 Marks)

ii. Write the steps that will need to be followed in order to determine the heat of combustion of 1g of food sample using bomb calorimetre. (6 Marks)

OR

b. An alkaline, hydrogen-oxygen fuel cell is shown in the given diagram.



i. Name the type of electrodes and electrolyte used in this cell. (3 Marks)

ii. Identifying the steps labelled as **1** to **5** in the given diagram, describe the process of conversion of chemical energy into electrical energy by the fuel cell. Write equations for the chemical reactions to support your answer. (5 Marks)

END OF PAPER

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