AGA KHAN UNIVERSITY EXAMINATION BOARD

HIGHER SECONDARY SCHOOL CERTIFICATE

CLASS XI

MODEL EXAMINATION PAPER 2023 AND ONWARDS

Chemistry Paper II

Time: 1 hour 30 minutes Marks: 35

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 EIGHT questions. Answer ALL questions. Questions 7 & 8 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)

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

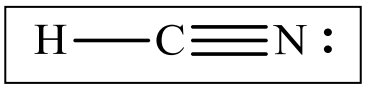
S. No.	Quantum Number	Type of Information
1	Azimuthal quantum number	
2	Magnetic quantum number	

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.2. (Total 2 Marks)

Given below is the linear structure of hydrogen cyanide molecule.



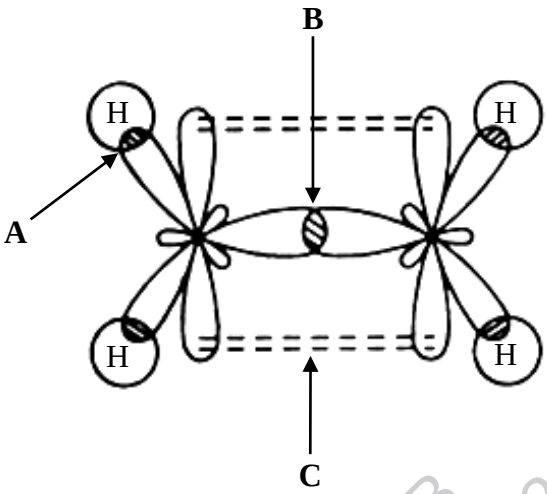
How many σ and π bonds are observed in the given molecule?

_____

_____

Q.3. (Total 3 Marks)

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



A: _____

B: _____

C: _____

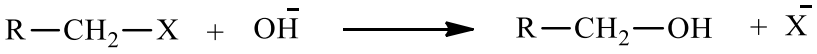
Q.4. (Total 4 Marks)

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.5. (Total 4 Marks)

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



Experiment	[R–CH₂–X]	[OH⁻]	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.6. (Total 4 Marks)

a. Define the following terms. (1 Mark)

i. Heat capacity

_____

_____

ii. Molar heat capacity (1 Mark)

_____

_____

b. If 650 J heat is absorbed by a system and 450 J work is done on the system, then find the change in internal energy (ΔE) of the system. (2 Marks)

_____

_____

_____

_____

Q.7. (Total 7 Marks)

EITHER

a. The combustion analysis of an organic compound with relative molar mass 99 g shows that it contains 4.04% hydrogen, 24.24% carbon and 71.72% chlorine.

(**Note**: Atomic mass of H = 1 amu, C = 12 amu and Cl = 35.5 amu)

What are the (i) empirical formula and (ii) molecular formula of the given compound? Show the steps of working clearly.

OR

b. The given reaction takes place in an acidic medium.

$$PbO_{2(s)} + I^-_{(aq)} \rightarrow Pb^{2+}_{(aq)} + I_{2(g)}$$

Balance the given equation using the half-reaction method.

(**Note**: Show all the steps of balancing in sequence.)

Q.8. (Total 7 Marks)

EITHER

a.

i. Describe the term ‘hydration’. (1 Mark)

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

OR

b. Explain in detail, with the help of an example and Raoult’s law statement (including mathematical representation), that lowering of vapour pressure is a colligative property. (7 Marks)

END OF PAPER

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