EXAM PAPERS PRACTICE

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Detailed mark scheme

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Level: CIE AS and A Level (9701)
Subject: Chemistry
Topic: CIE Chemistry
Type: Mark Scheme

Chemistry CIE AS & A Level
To be used for all exam preparation for 2025+

CHEMISTRY AS and A

This to be used by all students studying CIE AS and A level Chemistry (9701) But students of other boards may find it useful

Mark Scheme

Answer 1

The correct answer is A because:

- The thermal stability of the hydrogen halides decreases as you go down the group
- Thermal decomposition is an endothermic reaction and requires the input of energy

B is incorrect as the activation energy of HI is less than the activation energy of HCl so; therefore, more particles will have at least the activation energy when heated

C is incorrect as this is because the hydrogen halide bond gets weaker, so the HCl bond is stronger than the HI bond

D is incorrect as the the atomic radius of iodine is greater than chlorine, so the HI bond is longer and therefore weaker

Answer 2

The correct answer is C because:

- The thermal stability of the hydrogen halides decreases as you go down the group. This is because the hydrogen halide bond is weaker.
- The bond gets weaker as you go down the group as the halogen atoms are getting bigger and the bond length is longer, and the bonding pair of electrons is getting further from the halogen nucleus.
- Therefore, hydrogen iodide will more readily decompose.

A is incorrect as high temperatures (450˚C) are needed to decompose ammonia.

B is incorrect as very high temperatures or electrolysis is required to split H_2O into its elements.

D is incorrect as hydrogen chloride will not decompose as readily as hydrogen iodide as the bond strength is larger.

Answer 3

The correct answer is C because:

- The electronegativity of the halogen atoms decreases down Group 7
- This creates a polar H-X bond
- This is not a factor that will influence the thermal stability of the halogen halides
    - It is the length and strength of the bond that does
- The thermal stability of the hydrogen halides decreases as you go down the group
- This is because the hydrogen halide bond is weaker

A is incorrect as the bond gets weaker as you go down the group as the halogen atoms are getting bigger and the bond length is longer, and the bonding pair of electrons is getting further from the halogen nucleus

B is incorrect as the enthalpy of formation of iodine is less than chlorine and therefore will need less energy once decomposed to the ions to form the diatomic elements

D is incorrect as the size of the halogen atom directly influences the length of the H-X bond