AQA – Bonding – AS Chemistry P1

1. June/ 2020/Paper_1/No.6

This question is about shapes of molecules and ions.

Draw the shape of NCl_3 and of NCl_4^+

Include any lone pairs of electrons that influence the shape.

Name the shape of NCl_3

State and explain the bond angle in NCl_4^+

[5 marks]

Shape of NCl_3 **Shape of NCl_4^+**

Name of shape of NCl_3 _____

Bond angle in NCl_4^+ _____

Explanation of bond angle in NCl_4^+ _____

_____

_____

_____

_____

2. June/ 2020/Paper_1/No.10

Which species contains bonds that have different polarities?

[1 mark]

A NH_4^+ ⬭

B CCl_4 ⬭

C CH_3Cl ⬭

D H_3O^+ ⬭

3. June/ 2020/Paper_1/No.11

Which compound has hydrogen bonding?

[1 mark]

A NaH ⬭

B NH_3 ⬭

C HI ⬭

D SiH_4 ⬭

4. June/ 2020/Paper_1/No.15

Which represents the correct order of increasing radius of the ions?

[1 mark]

A F^- O^{2-} Li^+ Be^{2+} ⬭

B Li^+ Be^{2+} O^{2-} F^- ⬭

C Be^{2+} Li^+ F^- O^{2-} ⬭

D O^{2-} F^- Li^+ Be^{2+} ⬭

5. June/ 2020/Paper_1/No.16

Which compound contains a co-ordinate bond?

[1 mark]

A HF ⬭

B NH_3 ⬭

C $CHCl_3$ ⬭

D NH_4Cl ⬭

6. June/ 2020/Paper_1/No.23

Which molecule has a permanent dipole?

[1 mark]

A CF_4 ⬭

B PCl_5 ⬭

C CO_2 ⬭

D Cl_2O ⬭

7. June/ 2019/Paper_1/No.1

0 1 This question is about compounds that contain fluorine.

0 1 . 1 Sodium fluoride contains sodium ions (Na^+) and fluoride ions (F^-).
Na^+ and F^- have the same electron configuration.

Explain why a fluoride ion is larger than a sodium ion.

[2 marks]

0 1 . 2 Explain, in terms of structure and bonding, why the melting point of sodium fluoride is high.

[2 marks]

0 1 . 3 The ion H_2F^+ is formed when hydrogen fluoride gains a proton as shown in the equation

$$HF + H^+ \rightarrow H_2F^+$$

Name the type of bond formed when HF reacts with H^+
Explain how this bond is formed.

[2 marks]

Type of bond _____

Explanation _____

_____

_____

_____

_____

0 1 . 4 Fluoroantimonic acid contains two ions, SbF_6^- and H_2F^+

Draw the shape of the SbF_6^- ion and the shape of the H_2F^+ ion. Include any lone pairs that influence the shape.

Name the shape of each ion.

[4 marks]

	SbF_6^-	H_2F^+
Shape		
Name of shape		

0 1 . 5 Hydrogen fluoride reacts with ethyne (C_2H_2) as shown in the equation. All compounds are in the gaseous state.

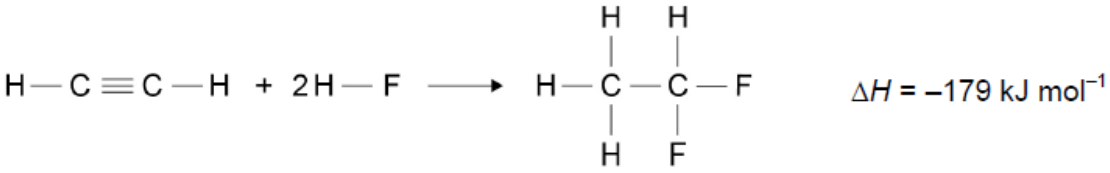

Table 1 shows some mean bond enthalpy data.

Table 1

Bond	C–H	C≡C	H–F	C–C
Mean bond enthalpy / kJ mol^{-1}	412	837	562	348

Use the data in **Table 1** to calculate a value for the bond enthalpy of a C–F bond in the product.

[3 marks]

C–F bond enthalpy _____ kJ mol^{-1}

8. June/ 2019/Paper_1/No.11

Which substance has delocalised electrons?

[1 mark]

A graphite ⬭

B iodine ⬭

C sodium chloride ⬭

D tetrachloromethane ⬭

9. June/ 2019/Paper_1/No.12

Which species is **not** pyramidal in shape?

[1 mark]

A PF_3 ⬭

B H_3O^+ ⬭

C CH_3^- ⬭

D BF_3 ⬭

10. June/ 2019/Paper_1/No.13

Which change occurs when water is vaporised?

[1 mark]

A An exothermic change occurs. ⬭

B Covalent bonds are broken. ⬭

C Intermolecular forces are overcome. ⬭

D The total energy of the molecules decreases. ⬭

11. June/ 2019/Paper_1/No.16

Which property would you expect the element radium, Ra, to possess?

[1 mark]

A It forms a soluble sulfate. ⬭

B It does not react with water. ⬭

C It is a good conductor of electricity. ⬭

D It forms a covalent fluoride. ⬭

12. June/ 2021/Paper_1/No.2

0 2 This question is about magnesium and its compounds.

0 2 . 1 State **one** observation when magnesium reacts with steam.

Give an equation, including state symbols, for this reaction.

[2 marks]

Observation _____

_____

Equation

_____

0 2 . 2 Describe the bonding in magnesium.

[2 marks]

_____

_____

_____

_____

0 2 . 3 Explain, in terms of structure and bonding, why magnesium chloride has a high melting point.

[3 marks]

_____

_____

_____

_____

_____

_____

0 2 . 4 Give **one** medical use for magnesium hydroxide.

[1 mark]

_____

_____

13. June/ 2021/Paper_1/No.13

Which molecule is **not** able to form a co-ordinate bond with another species?

[1 mark]

A BH_3 ○

B CH_4 ○

C NH_3 ○

D H_2O ○

14. June/ 2021/Paper_1/No.14

Which species has a square planar shape?

[1 mark]

A NH_4^+ ○

B SF_4 ○

C XeF_4 ○

D PCl_4^+ ○

15. June/ 2021/Paper_1/No.15

Which bond has the most unsymmetrical electron distribution?

[1 mark]

A H–O ○

B H–S ○

C H–N ○

D H–P ○

16. June/ 2021/Paper_1/No.17

Which element is classified as a d block element?

[1 mark]

A Antimony ⬭

B Molybdenum ⬭

C Strontium ⬭

D Uranium ⬭

17. June/ 2021/Paper_1/No.23

Which ion has the largest radius?

[1 mark]

A F^- ⬭

B Mg^{2+} ⬭

C Na^+ ⬭

D O^{2-} ⬭