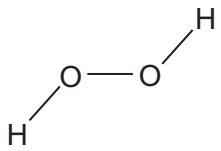
5 A hydrogen peroxide molecule can be represented by the structure shown.



5 (a) Suggest a value for the H–O–O bond angle.

[1 mark]

.....

5 (b) Hydrogen peroxide dissolves in water.

5 (b) (i) State the strongest type of interaction that occurs between molecules of hydrogen peroxide and water.

[1 mark]

.....

5 (b) (ii) Draw a diagram to show how one molecule of hydrogen peroxide interacts with one molecule of water.
Include all lone pairs and partial charges in your diagram.

[3 marks]

5 (c) Explain, in terms of electronegativity, why the boiling point of H_2S_2 is lower than H_2O_2.

[2 marks]

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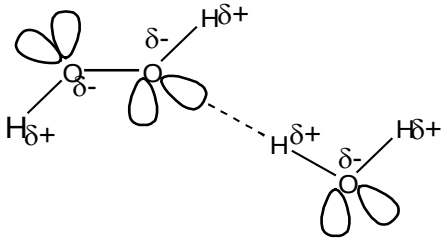
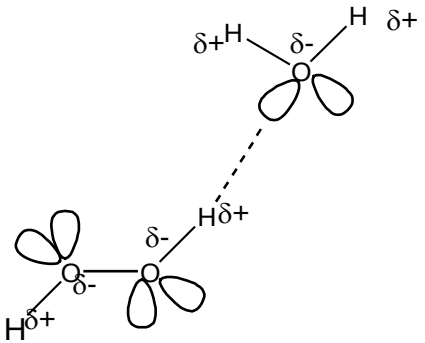
.....

7

Turn over for the next question

			M1: record an IR spectrum M2: peak between 3230 and 3550 (cm^{-1})

Question	Marking Guidance	Mark	Comments
5(a)	94–105.5^{o}	1	
5(b)(i)	Hydrogen bond(ing) / H bonding/H bonds	1	Not just hydrogen

5(b)(ii)	 **OR** 	3	1 mark for all lone pairs 1 mark for partial charges on the O and the H that are involved in H bonding 1 mark for the H-bond, from Hδ+ on one molecule to lone pair on O of other molecule
5(c)	Electronegativity of S lower than O or electronegativity difference between H and S is lower No hydrogen bonding <u>between H_2S_2 molecules</u> Or <u>only</u> van der Waals / <u>only</u> dipole-dipole forces <u>between H_2S_2 molecules</u>	1 1	Mark independently If breaking covalent bonds CE = 0