VAN DER WAALS FORCES

1. a) Part of the attractions between hydrogen chloride molecules, HCl, are due to van der Waals dipole-dipole interactions. Using hydrogen chloride as your example, explain how these arise.

   b) In chlorine gas, Cl_2, there are no permanent dipole-dipole interactions. Explain why these are absent in chlorine.

   c) Instead, the attractions between chlorine molecules consist entirely of van der Waals dispersion forces (also known as London forces). Explain *briefly* the origin of these attractions.

2. The stronger the intermolecular attractions, the greater the boiling point of a molecular substance. Explain the trend in boiling points of the halogens:

	F_2	Cl_2	Br_2	I_2
boiling point (K)	85	238	332	457

3. Without referring to a data book, sort the following molecules into order of *increasing* boiling point, and explain your reasoning.