Chemistry II - Intermolecular Forces and Properties of Liquids

Compound	Period of non-H	Group of non-H	Boiling Point (°C)
H_2O (water)	2	16	100
HF	2	17	2.5
NH_3	2	15	-33.4
CH_4	2	14	-161.4
H_2S	3	16	-60.3
HCl	3	17	-85
PH_3	3	15	-87.7
SiH_4	3	14	-112
H_2Se	4	16	-41.3
AsH_3	4	15	-62.5
HBr	4	17	-66.8
GeH_4	4	14	-90
H_2Te	5	16	-2
SbH_3	5	15	-18.4
HI	5	17	-35.1
SnH_4	5	14	-52

- Make a graph of boiling points (y-axis) vs. period (x-axis)
- Label each point with its chemical formula
- Once all points are plotted, connect the elements in the same group with a line (so there will be 4 lines)
- Note any observations or patterns:

Practice problems:

1) Identify the most important types of interparticle forces present in the solids of each of the following substances:

   a) Ar

   b) HCl

   c) HF

   d) $CaCl_2$

   e) CH_4

   f) CO

   g) $NaNO_3$

2) Predict which substance in each of the following pairs would have the greater intermolecular forces:

   a) CO_2 or OCS

   b) SeO_2 or SO_2

   c) $CH_3CH_2CH_2NH_2$ or $H_2NCH_2CH_2NH_2$

   d) CH_3CH_3 or H_2CO

   e) CH_3OH or H_2CO

3) Rationalize the difference in boiling points for each of the following:

   a) n-pentane (36.2 °C) vs. 2,2-dimethylpropane (9.5 °C)

   b) HF (20 °C) vs. HCl (-85 °C)

   c) HCl (-85 °C) vs. LiCl (1360 °C)

   d) n-pentane (36.2 °C) vs. n-hexane (69 °C)