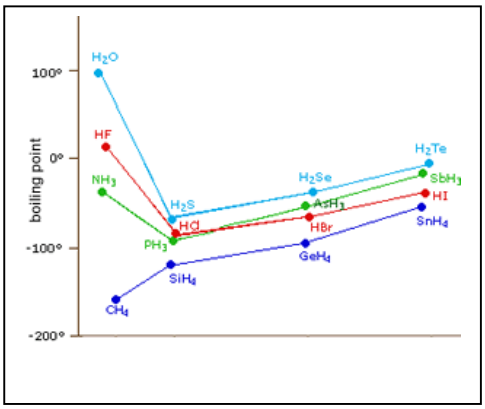
Friday worksheet 1 – properties of water

1. Consider the graph on the right.
   a. Explain why the first hydride of groups 5, 6 and 7 has a relatively higher boiling temperature than the rest of the hydrides in the group.

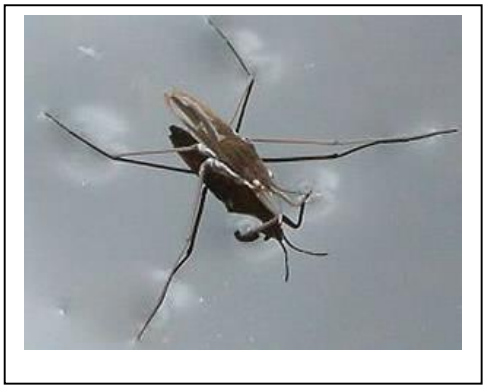


   b. Give an explanation of why CH_4 goes against the trend and has a lower boiling temperature than the first hydrides of every other group?

   c. Explain the trend in boiling temperature from H_2S to H_2Se to H_2Te.

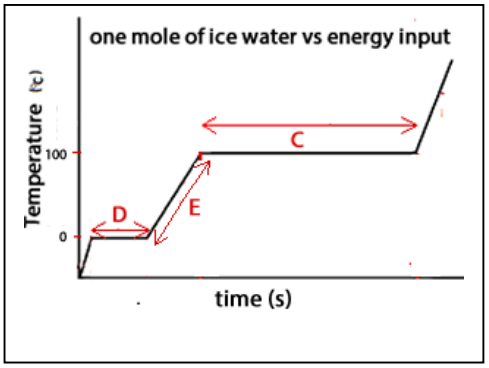
   d. Consider the molecules H_2O and HF.
      i. State the intermolecular forces found in liquid H_2O and HF.

      ii. HF has greater dipoles than H_2O, is a similar sized molecule to H_2O and yet it has a much lower boiling temperature, 19.7 °C, than water which boils at a staggering 100°C. Offer an explanation to justify the differences in boiling temperature between HF and H_2O.



      iii. The surface tension of water is very strong, strong enough to enable insects to land on the surface. Offer an explanation for this.

   e. Consider the temperature vs time graph of a sample of water as it is being heated.
      i. In terms of intermolecular bonds describe what is happening during section “D” and “C”.



      ii. Explain why regions “D” and “C” are flat?

      iii. Describe how the speed of the molecules differs during section “E” and “C”.