Answer on Question #53445 – Chemistry – Inorganic Chemistry

Question:

what is meaning of volatility?
explain the order of volatility of hydrides of group 16 elements and also give reason.

Answer:

Volatility is a characteristic of substance which reflects its tendency to vaporize. The volatility is determined by the strength of intermolecular interaction. The strong interaction leads to the lower volatility which is represented by low vapor pressure and low boiling point.

Volatility for hydrides of group 16 has no clear tendency: H_2O (b.p. 100 C^o), H_2S (b.p. -60 C^o), H_2Se (b.p. -41 C^o), H_2Te (b.p. -4 C^o).

Water has the lowest volatility, because it the most polar molecule in this group. Because oxygen having the highest electronegativity in the group polarizes O-H bond strongly that results in stronger dipole-dipole interaction between molecules.

Boiling point as well as volatility increases from S to Te, which is conditioned by the increase of intermolecular interaction. Despite the polarity of the compound are almost similar and decreases from S to Te, such order indicates that the intermolecular forces increase. As known this trend corresponds to the order of increasing atomic radius for elements from the same group. Thus, it can be explained by the fact that the bigger atom having several completed electronic levels is able to provide bigger number of hydrogen bonds and other dipole-dipole interactions. Thus, these forces keep molecules together more strongly for H_2Te than for H_2Se and H_2S.