

**Problem of the Day 7      CHEM 1252**

**Suggested Book Problems:** Chapter 11: 2, 4, 5, 12, 14, 16, 20, 26, 28, 34, 48, 54, 84

1. The following problem deals with two molecules, methyl amine,  $\text{CH}_3\text{NH}_2$ , and methane thiol,  $\text{CH}_3\text{SH}$ .

(a) Draw the Lewis Structures, determine the molecular geometry and the polarity of each molecule.

$\text{CH}_3\text{NH}_2$	molecular geometry
	polarity
	10

$\text{CH}_3\text{SH}$	molecular geometry
	polarity
	10

(b) List the intermolecular forces that each of the molecules experience.

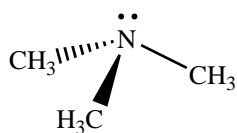
$\text{CH}_3\text{NH}_2$
3

$\text{CH}_3\text{SH}$
3

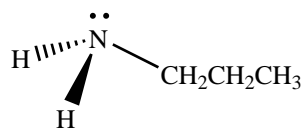
(c) The boiling point of methylamine,  $\text{CH}_3\text{NH}_2$ , is  $-6.3^\circ\text{C}$  and  $+6.8^\circ\text{C}$  for methane thiol,  $\text{CH}_3\text{SH}$ . Are these data consistent with the statement that hydrogen bonding is one of the strongest of intermolecular forces. You must justify your answer.

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2. Trimethylamine and propylamine have the same molecular formula, and their Lewis structures and boiling points, bp, are shown below.



Trimethylamine  
bp = 3 °C



Propylamine  
bp = 49 °C

(a) List the intermolecular forces each experience. Answers must be completely correct to receive credit.

Trimethylamine

6

Propylamine

6

(b) Even though both compounds have the same molecular formula, their boiling points are different. Rationalize this difference based on your answers in (a).

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3. Using the concepts of vapor pressure and the kinetic molecular theory of gases and liquids, describe how the process of boiling is **different** than the process of evaporation.

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