Intermolecular Forces

1. a. Even though both exhibit hydrogen bonding, C_2H_5OH has (in addition) a greater molar mass → greater dispersion forces.

b. The greater dispersion forces of CCl_4 must ~~outweigh~~ be more important the dipole-dipole (and dispersion forces) of $CHCl_3$.

c. Lower vapor pressure indicates greater intermolecular forces as well. $BaCl_2$ exhibits an ion-ion attraction which is stronger than the non-polar, CCl_4's dispersion forces.

2. a. high - CH_3OH , low - CH_4

b. high - CH_4 , low - GeH_4 $\quad V.P. \propto \frac{1}{IF}$

c. high - C_5H_{10} , low - C_2H_6

* d. high - H_2O (100°C) $\quad$ HF (19.7) $\quad$ low - NH_3 (-33) ⇒ * This one's tough, try to rationalize why!

Molar Mass = 76.1

(3.) a.) $CS_2(\ell, 30°C) \xrightarrow{q_1} CS_2(\ell, 46.3°C) \xrightarrow{q_2} CS_2(g, 46.3°C)$

$q_1 = mC\Delta T = 100\,g\left(\frac{2.32\,J}{g\,°C}\right)(46.3 - 30.0)$

$= 3,781.6\,J$

$q_2 = n\,\Delta H_{vap} = \frac{100\,g}{76.1}\left(\frac{28.4\,kJ}{mol}\right) = 37.3\,kJ$

$q_{TOT} = 3.8\,kJ + 37.3\,kJ = \boxed{41.1\,kJ}$

b.) $C_2H_5OH(\ell, 25°C) \xrightarrow{q_1} C_2H_5OH(\ell, 74°C)$

$q_1 = mC\Delta T = 2.50\,mole\left(\frac{46.08\,g}{mole}\right)\left(\frac{2.45\,J}{g\,°C}\right)(74 - 25)$

Molar Mass = 46.08

$= 13,830\,J = \boxed{13.8\,kJ}$