States of Matter and IM Forces/Practice **Name:** Key

1) How much heat, in KJ is required to convert 79.8 g water from liquid at 11.3 °C to vapor at 25.0 °C? (ΔH_{vap} H_2O = 44.0 KJ/mol) (Ans: 199KJ)

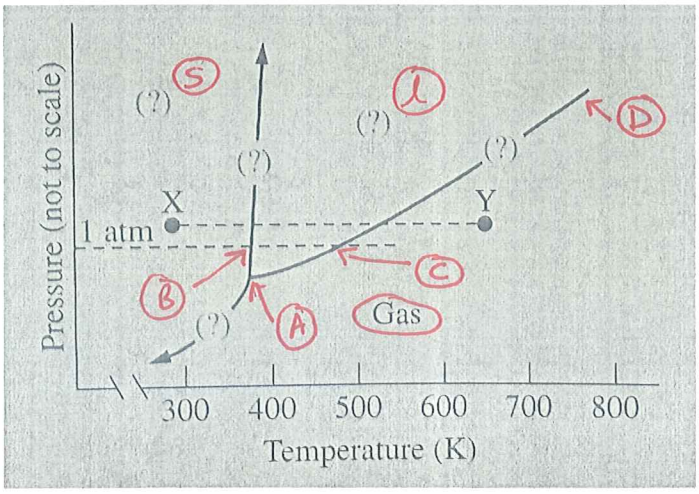
$\Delta H = \Delta H_1 + \Delta H_2$

$11.3° \rightarrow 25.0°C$ $\Delta H_1 = ms\Delta T = 79.8\,g \times 4.18\,J/g°C \times (25 - 11.3) \times \frac{1\,kJ}{1000\,J} = 4.57\,kJ$

liq $\rightarrow$ vap $\Delta H_2 = 79.8\,g \times \frac{1\,mol}{18\,g} \times \frac{44\,kJ}{mol} = 195\,kJ$

$(195 + 4.57)\,kJ = 199\,kJ$

2) The figure below is a phase diagram for iodine. A) indicate the phases present in the portions of the diagrams marked (?); b) use the letters A, B, C and D to represent the triple point, the normal melting point, the normal boiling point, and the critical point, respectively; c) describe the phase changes that occur as the temperature of aa sample is raised, at constant pressure, from point X to point Y.



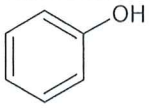
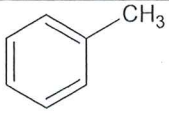
X ⟶ Y

s ⟶ l ⟶ g

Use the following intermolecular forces to answer the following questions.

A) London forces
B) dipole-dipole interactions
C) Hydrogen bonding
D) ion-dipole interactions
E) Ionic forces

3) Which of the above forces do you expect in the following molecules?

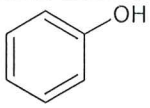
	A, C		A
CH_3CH_2F	B	$CaCO_3$	E
$CH_3CH_2OCH_2CH_3$	B	CH_3OH	C

4) Circle the compound in the following pairs that has a higher boiling point? Which intermolecular force is responsible for the higher value?

CO_2 or OCS B	SeO_2 or SO_2 A	CH_3CH_3 or H_2CO B
CH_3CH_2OH or CH_3OCH_3 C	NaCl or H_2O E	Ne or Kr A

5) For the compounds in the table chose the solvent it will be soluble in the solvents given below. Give the major intermolecular force responsible for the solubility.

Methanol: CH_3OH Water: H_2O Hexane: $CH_3CH_2\ CH_2CH_2CH_2CH_3$

Substance	Solvent	Intermolecular force
CO_2	hexane	A
	methanol	C
$CH_3CH_2OCH_2CH_3$	hexane	A

6) Arrange the following in increasing melting point.
H_2O, NH_3, CH_4, LiOH

$LiOH > H_2O > NH_3 > CH_4$

highest.