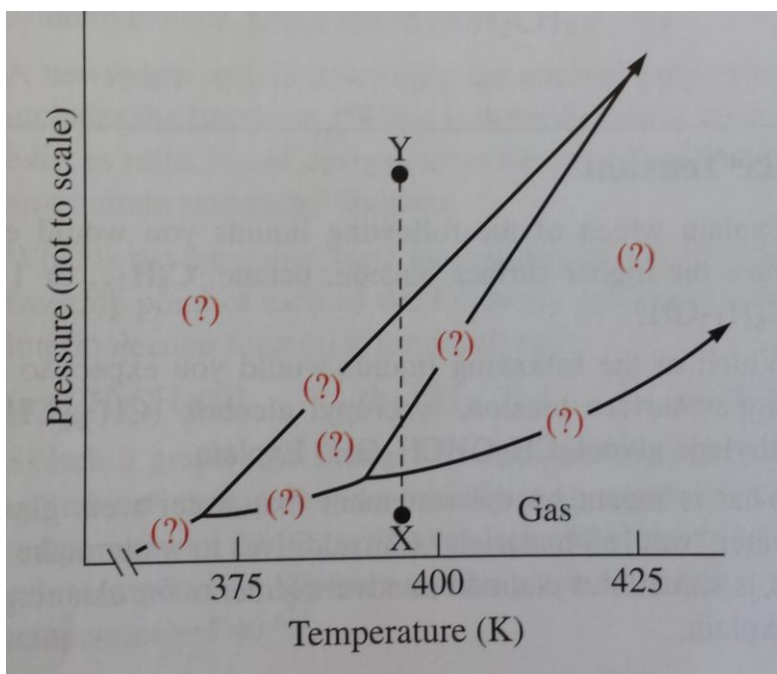


Show all the work for the calculations and give the answers in the correct significant figures.

1. How much heat, in KJ, is required to vaporize 3.539 Kg of octane, C_8H_{18} ? ($\Delta H_{vap} C_8H_{18} = 41.5$ KJ/mol) (Ans: 1280KJ)

(Strategy: convert kg to g and then to mol and find the heat of vap.)

2. The figure below is a portion of a phase diagram for sulfur. The stable form of solid sulfur at room temperature is rhombic sulfur S_α ; at the normal melting point, it is monoclinic sulfur, S_β ;
- Indicate the phases present in the portion of the graph marked (?);
 - Identify the triple point and indicate the phases at the equilibriums of each one;
 - Describe the phase changes that occur as the pressure of a sample is raised at constant temperature from point X to point Y.



For the following questions – indicate which intermolecular force is responsible for your choice.

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

(**Strategy:** a) identify if the compound is ionic or covalent – ionic are higher in IM forces; b) if compound is covalent then determine if molecule has H-bonding (that will always have higher IM forces); c) if covalent and no H-bonding, see if molecule has dipole moment (use shape of molecule and electronegativity to determine this) ; d) if all molecules are covalent and similar looking then see which one is heavier (mol. wt) that is the one with higher IM forces.)

3. What intermolecular force will be found in the following compounds? Also indicate if the compound will be solid (s), liquid (l) or gas (g).

CO ₂		KCl	
NH ₃		CH ₃ CH ₂ CH ₂ CH ₂ CH ₃	
C ₆ H ₅ COOH		H ₂ O	

4. Circle the compound with a higher:

Melting or boiling point	Compounds	Intermolecular force
Boiling point	CH ₃ CH ₂ CH ₂ CH ₂ OH or CH ₃ CH ₂ CH ₂ CH ₃	
Boiling point	Phosphorous pentabromide or carbon tetrafluoride	
Melting point	Sulfur hexafluoride or carbon tetraiodide	
Boiling point	CH ₃ CH ₂ CH ₂ CH ₂ CH ₃ or CH ₃ CH ₂ OCH ₂ CH ₃	

5. Which of the following solvents would you choose to dissolve the compounds given in the table below?

H₂O: water

CH₃CH₂CH₂CH₂CH₃: pentane

CH₃CH₂OH: ethanol

Substance	Solvent	Intermolecular force
CH ₄		
C ₆ H ₅ COOH		
CaCO ₃		

6. Arrange the following in increasing melting point.
NaOH, CH₃OH, C₆H₅OH, CH₃CH₃