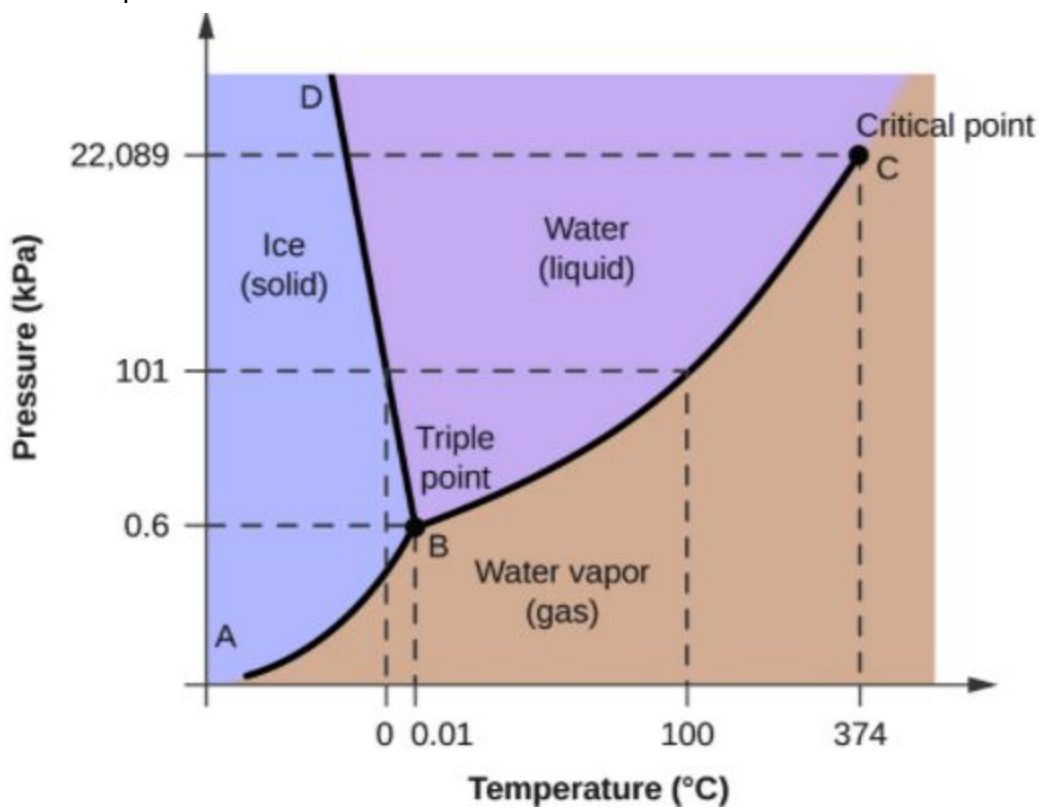**CHEM 1310 Reading Day**
Chapters 12 and 13: *Liquids and Solids* and *Solutions*

1. Arrange each of the following sets of compounds in order of increasing boiling temperature:
   a. HCl, H_2O, SiH_4
   b. F_2, Cl_2, Br_2
   c. CH_4, C_3H_8, C_2H_6

2. What phase changes will take place when water is subjected to varying pressure at a constant temperature of:

   a. 0.005 °C
   b. 40 °C
   c. -40 °C

3. Calculate the total amount of heat absorbed in kJ when a 2.00 mol of ice at -30.0°C is converted to steam at 140.0°C. The specific heats and enthalpies are:

$C_{p, ice} = 2.06$ J/g°C
$C_{p, water} = 4.18$ J/g°C
$C_{p, steam} = 1.87$ J/g°C
$\Delta H_{fus} = 6.01$ kJ/mol
$\Delta H_{vap} = 40.7$ kJ/mol

4. Metallic iron crystallizes in a type of cubic unit cell. The unit cell edge length is 287 pm. The density of iron is 7.87 g/cm³. How many iron atoms are there within one unit cell? What type of cubic unit cell is this?

5. In an experiment, 100 mL of water is placed in a polystyrene foam cup and the initial temperature of water is recorded. 5.05 g of potassium nitrate is added to the water while stirring until it is fully dissolved. The temperature of the solution falls and the minimum temperature achieved is recorded as the final temperature. The results of the experiment are shown below:

Volume of water	100 mL
Mass of $KNO_3(s)$	5.05 g
$T_{initial}$	25°C
T_{final}	21.7°C

Determine the value of the molar heat of solution of potassium nitrate in kJ/mol. Keep in mind that the density of water is 1.00 g/mL and the specific heat capacity of water is 4.18 J/g°C.