

Problem Set #11

(note: 1 mL of water = 1 gram of water)

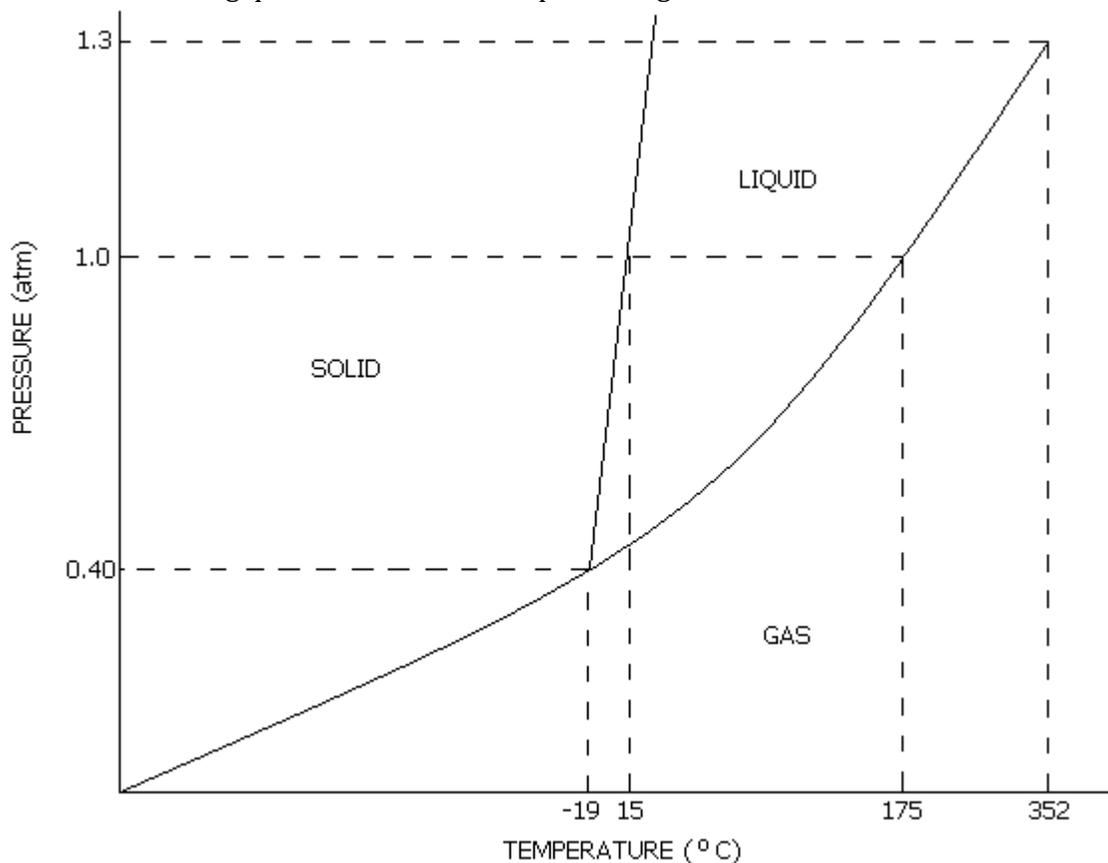
1. How much heat is absorbed when 28.3 grams of H₂O (s) at 0°C is converted to liquid at 0°C?
2. How much heat is needed to change 240.0 grams of H₂O from ice at -20°C to steam at 115°C?
3. A 40.60 gram sample of a metal is boiled in water and placed in 75.0 mL of water in a calorimeter at 40.0°C. The water temperature of 55.2°C. What is the specific heat of the metal?
4. The temperature of a piece of unknown metal with a mass of 18.0 grams increases from 25.0°C to 40.0°C when the metal absorbs 141.2 J of heat. What is the specific heat of the unknown metal? Compare your answer to the values listed on the Reference Tables. What is the identity of the unknown metal?
5. Calculate the heat capacity of a piece of wood if 1500.0 grams of the wood absorbs 6.75×10^4 Joules of heat, and its temperature changes from 32°C to 57°C.
6. 100.0 mL of 4.0°C water is heated until its temperature is 37°C. If the specific heat of water is 4.18 J/g°C, calculate the amount of heat energy needed to cause this rise in temperature.
7. 25.0 grams of mercury is heated from 25°C to 155°C, and absorbs 455 Joules of heat in the process. Calculate the specific heat of mercury.
8. When 15.0 grams of steam drops in temperature from 275.0°C to 250.0°C, how much heat energy is released?
9. How much heat (in Joules) is released when 85.0 grams of lead cools from 200.0°C to 10.0°C? (Use the value for the specific heat of lead given on the Reference Tables.)

(See other side for the rest of Problem Set #11.)

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Answer the following questions based on the phase diagram below.



10. What is the critical temperature of this substance?
11. What are the pressure and temperature at the triple point?
12. What is the normal melting point of this substance?
13. What state(s) of matter are present at:
 - (A) 175°C and 1.0 atm
 - (B) 100°C and 1.05 atm
 - (C) -19°C and 0.40 atm
 - (D) 355°C and 1.5 atm
 - (E) 15°C and 1.0 atm
 - (F) -45°C and 0.50 atm
 - (G) 75°C and 0.25 atm