Phase Change Questions

1. How much energy in joules is used to convert 250 grams of ice (at -30 °C) to a gas with a temperature of 150 °C ?

2. How much heat energy is absorbed when 47.0 grams of ice melts?

3. How much heat energy is released when 62.8 moles of H_2O at 135 °C is cooled to -23 °C?

4. How many kJ are required to heat 45.0 g of H_2O at 25.0 °C and then boil it all away?

5. How many kJ need to be removed from a 120.0 g sample of water, initially at 25.0 °C, in order to freeze it at 0 °C?

6. Lead has a melting point of 327.5 °C, its specific heat is 0.128 J/g ·°C, and its molar enthalpy of fusion is 4.80 kJ/mol. How much heat, in kilojoules, will be required to heat a 500.0 g sample of lead from 23.0 °C to its melting point and then melt it?

7. The specific heat capacity of silver is 0.235 J/g-K. Its melting point is 962.0 °C, and its enthalpy of fusion is 11.3 kJ/mol. What quantity of energy, in Joules, is required to change 9.10 g of silver from a solid at 25.0 °C to a liquid at 962 °C?

8. Draw a phase change diagram for aluminum. MP = 660 °C BP = 2517 °C

9. How much heat is needed to raise a 200 g piece of aluminum from 20 °C to 650 °C? Specific heat for aluminum is 0.90 J/g ·°C.

10. How much energy is needed to raise the temperature of 20.4 grams of water from 47 °C to 152 °C?

11. How much energy is needed to completely melt 250 grams of ice which starts at -7 °C?

$C_{(ice)}$ = 2.06 J/g°C, $C_{(liquid)}$ = 4.184 J/g°C, $C_{(steam)}$ = 1.89 J/g°C,

$\Delta H_{(fus)}$ for H_2O is 334.J/g or 6.02 KJ/mol $\Delta H_{(vap)}$ for H_2O is 2261 J/g or 40.7 kJ / mol