Chemistry CP

Name: _____

Energy in Changes of State: Level 1

Use the following constants in your problems:
C_p(ice) = 2.077 J /g ^oC
C_p(water) = 4.180 J /g ^oC
C_p(water vapor) = 2.042 J /g ^oC
ΔH_{fus} = 6.00 kJ/mol= 333 J/g
ΔH_{vap} = 40.6 kJ/mol = 2254 J/g

How many joules are needed in each of the following problems? Use the heat of fusion or the heat of vaporization.

1. to melt 115 g of ice
2. to melt 8.0 kg of ice
3. to vaporize 10.0 g of water
4. to vaporize 50.0 g of water

How much heat energy in Joules is absorbed or removed in each of the following problems? Use the heat of fusion or the heat of vaporization.

5. To freeze 10.0 g of water
6. To freeze 250 g of water
7. To condense 40.0 g of steam
8. To condense 5.0 kg of steam

How much heat energy in joules is absorbed or removed in each of the following?

9. Warming 20.0 g of water at 15^oC to 70^oC (one step)
10. Melting 50.0 g of ice at 0^oC, and warming the liquid to 65^oC (two steps)
11. Condensing 100 g of steam at 100^oC to liquid, and cooling the liquid to 0^oC (two steps)
12. Melting 80.0g of ice at 0^oC, warming the liquid to 100^oC, and vaporizing it at 100^oC (three steps)

How much heat energy in joules is absorbed or removed in each of the following?

13. Condensing 125 g of steam at 100^oC, and cooling the liquid to 15^oC (two steps)
14. Melting a 5.0 kg block of ice at 0^oC, and warming the liquid to 15^oC (two steps)
15. Condensing 250 g of steam at 100^oC, cooling the liquid, and freezing it at 0^oC (three steps)
16. Warming 150 mL of water (density = 1.0 g/mL) from 10^oC to 100^oC, and vaporizing it at 100^oC (two steps)