

Name _____ Period _____

Phase Change Worksheet

Heat Capacities for common materials:

Substance	Specific Heat	Substance	Specific Heat
H ₂ O (s)	2.06 J/g °C	Aluminum (s)	0.900 J/g °C
H ₂ O (g)	2.02 J/g °C	Benzene (l)	1.74 J/g °C
H ₂ O (l)	4.18 J/g °C	Ethanol (l)	2.42 J/g °C

Phase Change Data

Substance	Heats of Fusion (H _f):	Heats of Vaporization (H _v):	Boiling Points	Melting Points
H ₂ O	333.5 J/g	2258 J/g	373.2 K	273.2 K
Benzene	135.5 J/g	394 J/g	353.2 K	278.6 K
Ethanol	99.8 J/g	944 J/g	351.5 K	158.7 K
Acetone	98.5 J/g	500.9 J/g	329.4 K	179 K

Some useful data:

Benzene = C₆H₆ Ethanol = C₂H₅OH Acetone = CH₃COCH₃

Answer the following questions dealing with phase changes. Be very careful of units.

- 1) In an exothermic reaction is heat absorbed or released?
- 2) In an endothermic reaction is heat absorbed or released?
- 3) When you boil water does the temperature of the water change while it is boiling?
- 4) When you drop an ice cube in a cup of hot water the ice cube melts. Where does the heat come from to melt the ice cube?
- 5) When you melt an ice cube in hot water, the hot water gets cold. Where does the heat from the hot water go?
- 6) What is latent heat?
- 7) What is meant by the Heat of Fusion?

- 8) What is meant by the Heat of Vaporization?
- 9) How much heat is required to melt 25.0 g of ice at 0°C?
- 10) How much heat is required to melt 25.0 g of Benzene at 278.6 K?
- 11) How much heat is required to boil away 25.0 g of Ethanol at 351.5 K?
- 12) How much heat is required to boil away 25.0 g of Acetone at 329.4 K?
- 13) You have a sample of H₂O with a mass of 23.0 g at a temperature of -46.0 °C. How many kilojoules of heat energy are necessary to:
- A) heat the ice to 0°C?
 - B) melt the ice?
 - C) heat the water from 0°C to 100°C?
 - D) boil the water?
 - E) heat the steam from 100°C to 109°C?
- 14) How much heat is required to raise 250.0 g of ice at a temperature -15.0°C to 105.0°C?
- 15) How much heat is required to change 25.0 g of liquid Ethanol that is at a temperature of 158.7 K to a gas at 351.5 K?