

# Thermodynamics



*"I blame entropy."*

**Name** \_\_\_\_\_

**Test Date** \_\_\_\_\_

## Thermodynamics Vocabulary

Terms	Definition
Energy	
Potential Energy	
Kinetic Energy	
Law of conservation of energy	
Chemical potential energy	
Thermochemistry	
Heat	
Calorie	
Joule	
Temperature	
Thermal Energy	

*Heat Conversion Factors*



Try It: Practice Problems

1) A fruit and oatmeal bar contains 142 Calories. Convert this energy to calories.

2) If an endothermic process absorbs 256 J, how many kilocalories are absorbed?

3) The breakfast I ate this morning contains 230 nutritional Calories. How much energy in joules will this breakfast supply?

*Heat Vs Temperature*

Thermal Energy:

Definition:

Units:

Heat

Definition:

Units:

Temperature:

Definition:

Units:

**ENTHALPY**

Definition:

Symbol:

## Endothermic vs Exothermic

*Endothermic:*

Definition:

Sign of  $\Delta H$ :

*Exothermic:*

Definition:

Sign of  $\Delta H$ :

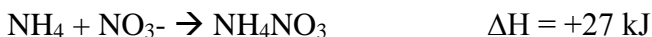


Label the following reactions as exothermic or endothermic:



Rewrite the equations above including the  $\Delta H$  value as a reactant or product.

Try these!



## *Changes of State*

Heat of vaporization:

Heat of fusion:

*Formulas:*

$$q =$$

$$m =$$

$$\Delta H_f =$$

$$\Delta H_f =$$

\*\*\**During a phase change, temperature \_\_\_\_\_  
\_\_\_\_\_ because kinetic energy \_\_\_\_\_ and  
potential energy \_\_\_\_\_.*\*\*\*

Try It:            Practice Problems

- 1) Calculate the heat required to melt 25.7 g of solid water at its melting point.
  
  
  
  
  
  
  
  
  
  
- 2) How much heat is evolved when 275 g of water vapor condenses to a liquid at its boiling point?

## **Specific Heat:**

Definition:

Formula (label the parts as well):

Try it!

Which has a higher specific heat? Why?

- Water or sand
  
- Metal pan or oven mitts

Try it:

- 1) How much heat is lost when 4110 g of aluminum cools from  $660^{\circ}\text{C}$  to  $25.0^{\circ}\text{C}$ ?

q	
m	
$C_p$	
$T_f$	
$T_i$	

Work:

Answer: \_\_\_\_\_

- 2) How much heat is required to increase the temperature of 124 g of water from  $17.5^{\circ}\text{C}$  to  $45.8^{\circ}\text{C}$ ?

q	
m	
$C_p$	
$T_f$	
$T_i$	

Work:

Answer: \_\_\_\_\_

## Calorimeter/Calorimetry

Definition:

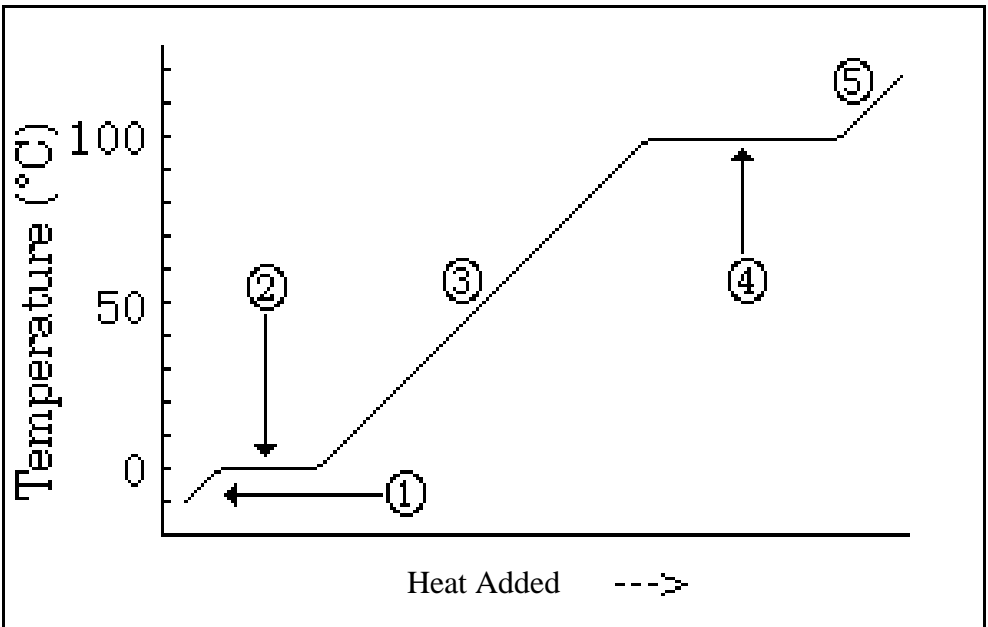
Formula:

Try it:

A 20.0 g piece of metal at a temperature of  $90.0^{\circ}\text{C}$  is dropped into an insulated container holding 125 g of water at  $20.0^{\circ}\text{C}$ . If the final temperature is  $23.0^{\circ}\text{C}$ , what is the specific heat of the metal?

## Heating/Cooling Curve

Label the heating curve below!!!!



Which numbers on the heating curve show a change in kinetic energy?

Which numbers show a change in potential energy?

Review:

Exothermic or endothermic?

- a) Condensation
- b) Melting
- c) Freezing
- d) Boiling
- e) Sublimation (s  $\rightarrow$  g)
- f)  $\Delta H = -13.6\text{J}$
- g)  $A + B + 159.8\text{ J} \rightarrow C + D$

## Entropy

Definition:

Variable and unit:

Law of Disorder:

From each group, select the part with the highest entropy:

- a) Increasing temperature      or      decreasing temperature
- b) Reactants or Products       $2\text{NH}_3(\text{g}) \rightarrow 3\text{H}_2(\text{g}) + \text{N}_2(\text{g})$
- c) ice      or      water      or      steam



What are the states of matter from lowest entropy to highest entropy?

When S is \_\_\_\_\_ that means entropy is \_\_\_\_\_.

When S is \_\_\_\_\_ that means entropy is \_\_\_\_\_.

*Predict the change in entropy:*

