**Calculating Heat Energy (q = mCΔT)**

**YOYO:** Answer the questions below based on the diagram.

* Circle One: This is a (heating/cooling) curve.
* AB - KE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and PE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* BC - KE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and PE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* CD - KE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and PE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* DE - KE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and PE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* EF - KE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and PE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The boiling point of the compound is \_\_\_\_\_\_\_\_\_\_\_\_
* The melting point of the compound is \_\_\_\_\_\_\_\_\_\_\_\_
* The freezing point of this compound is \_\_\_\_\_\_\_\_\_\_\_\_
* True or False: There is no thing as “cold.” Cold is just the absence of heat. \_\_\_\_\_\_\_\_\_\_\_\_

Law of Conservation of Energy

* In any chemical or physical process, energy is neither created nor destroyed, it can be changed from one type of energy to another

Types of Energy

But first…some vocab

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Process: Energy is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in a chemical reaction **from** the system **to** the surrounding – the system becomes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Process: Energy is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in a chemical reaction **by** the system **from** the surrounding – system becomes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: the amount of heat it takes to raise the temperature of 1 gram of the substance
	+ Specific heat of water = 4.18 J/g•C (Table B)
		- 4.18 joules is needed to raise 1 gram of water 1 oC

The Equation

What do the symbols represent?

* q =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ + q = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ – q = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* m = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* C = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* ΔT = change in \_\_\_\_\_\_\_\_\_\_\_\_ (Tfinal – Tinitial)

Relating Back to the Heating/Cooling Curve

* The q = mCΔT is used ONLY when temperature is changing (when a substance either a solid, liquid, or gas) – (the slant part of the graph).
*  During phase changes (the flat line), there are 2 other equations we will discuss tomorrow

q = mCΔT

|  |  |
| --- | --- |
| 1. How many kilojoules of heat are absorbed when 1000 grams of water is heated from 18 oC to 85 oC

**CIRCLE ONE:**This is an ENDOTHERMIC/EXOTHERMIC process because the heat is ABSORBED/RELEASED | 1. The temperature of a 95.5 grams of copper increases from 25 oC to 48 oC when copper absorbs 849 J of heat. What is the specific heat of copper?

  **CIRCLE ONE:**This is an ENDOTHERMIC/EXOTHERMIC process because the heat is ABSORBED/RELEASED |
| 1. 300 grams [of ethanol](https://www.thoughtco.com/what-is-ethanol-1203782) at 10 °C is heated with 14640 Joules of energy. What is the final temperature of the ethanol? The specific heat of ethanol is 2.44 J/g·°C.

**CIRCLE ONE:**This is an ENDOTHERMIC/EXOTHERMIC process because the heat is ABSORBED/RELEASED | 1. How many joules of heat energy are released when 50.0 grams of water are cooled from 70 oC to 60 oC?

**CIRCLE ONE:**This is an ENDOTHERMIC/EXOTHERMIC process because the heat is ABSORBED/RELEASED |
| 1. How much heat is absorbed when 500. g of copper, C = 0.385 J/g•C, goes from 25.0oC to 35.0 oC?

**CIRCLE ONE:**This is an ENDOTHERMIC/EXOTHERMIC process because the heat is ABSORBED/RELEASED | 1. How much heat is released when 150. g of iron cools from 525oC to 100OC? (C = 0.44 J/g•C)

**CIRCLE ONE:**This is an ENDOTHERMIC/EXOTHERMIC process because the heat is ABSORBED/RELEASED |
| 1. A 50.0 g block of glass (C = 0.50 J/g•C) absorbs 333 joules of heat energy. How much does the temperature of the glass rise?

**CIRCLE ONE:**This is an ENDOTHERMIC/EXOTHERMIC process because the heat is ABSORBED/RELEASED | 1. 225 grams [of](https://www.thoughtco.com/what-is-ethanol-1203782) water at 45 °C is heated with 189940 Joules of energy. What is the final temperature of the water?

**CIRCLE ONE:**This is an ENDOTHERMIC/EXOTHERMIC process because the heat is ABSORBED/RELEASED |