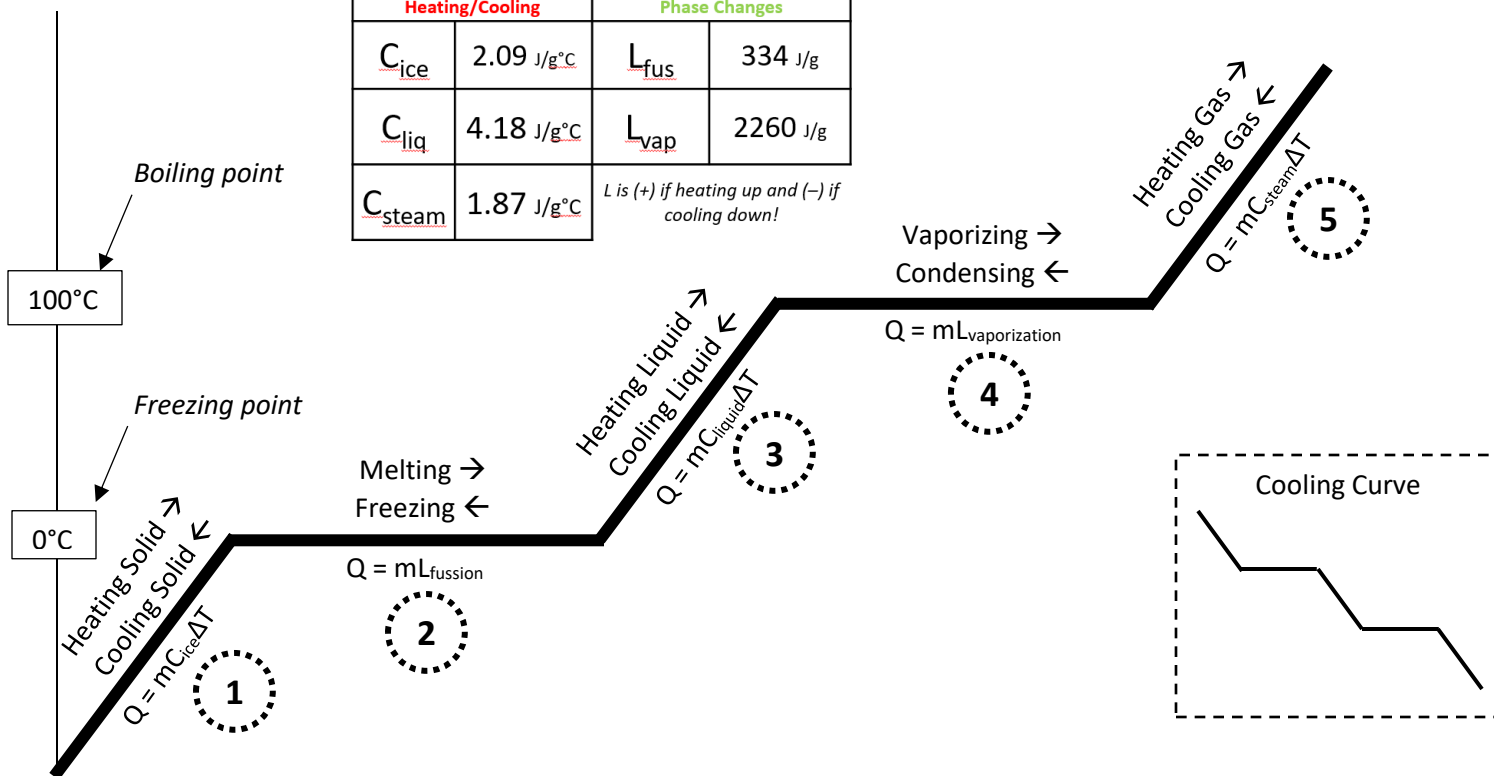


Heating and Cooling Curves

This is an example of water – can be done with any substance but the temperature values and C and L values will be different. Also please note that the slope and length of lines are not drawn to scale. It is traditional to just draw the heating curve. A cooling curve would just be the opposite direction!

| Heating/Cooling | | Phase Changes | |
|-----------------|------------|--|----------|
| C_{ice} | 2.09 J/g°C | L_{fus} | 334 J/g |
| C_{liq} | 4.18 J/g°C | L_{vap} | 2260 J/g |
| C_{steam} | 1.87 J/g°C | <i>L is (+) if heating up and (-) if cooling down!</i> | |



$$Q = mC\Delta T$$

| Variable | Meaning | Common Units |
|------------|--------------------------|------------------------------|
| Q | Energy being transferred | Joules, kJ, calorie, Calorie |
| m | Mass of sample | grams, kilograms |
| C | Specific Heat | J/g°C, kJ/g°C |
| ΔT | Change in Temperature | °C |

Common Specific Heat Values

| Substance | J/g°C | cal/g°C |
|-------------|-------|---------|
| Aluminum | 0.90 | 0.23 |
| Copper | 0.39 | 0.093 |
| Ethanol | 2.44 | 0.58 |
| Glass | 0.50 | 0.12 |
| Gold | 0.13 | 0.031 |
| Graphite | 0.71 | 0.17 |
| Ice | 2.09 | 0.50 |
| Iron | 0.45 | 0.11 |
| Lead | 0.13 | 0.031 |
| Mercury | 0.14 | 0.033 |
| Silver | 0.24 | 0.057 |
| Steam | 1.87 | 0.45 |
| Water (liq) | 4.18 | 1.00 |
| Wood | 1.8 | 0.42 |

Note:

- Temperature is in CELSIUS not Kelvins for this topic!
- Q can be positive or negative, energy absorbed or energy released
- 1 kJ = 1000 J
- 1 calorie = 4.18 J
- 1 Calorie = 1 kcal = 1000 calories
- Specific Heat values can vary a little bit from source to source. That is ok. Depends on the exact type that was measured. Feel free to add other specific heats you come across to this list!