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N-35
Specific Heat

How much heat can something absorb?

Specific Heat

The amount of energy it takes to raise the temperature of 1 gram of something by 1 °C

Units:

$$\frac{J}{g\ °C}$$

Specific Heat

$$Q = mC\Delta T$$

C = specific heat

Q = energy lost or gained

m = mass

ΔT = "delta" T or change in temp

$$Q = m \times C \times (T_{final} - T_{starting})$$

Positive or Negative?

Gaining Heat	Endothermic	Q = +	ΔT = +
Losing Heat	Exothermic	Q = -	ΔT = -
m and C are always positive			

Specific Heat

$$Q = mC\Delta T$$

How much heat is needed to raise the temperature of 10 grams of a substance from 40 °C to 60 °C if the specific heat is 3.8 J/ g °C ?

$$Q = (10g)(3.8\frac{J}{g°C})(60°C - 40°C)$$

$$Q = 760\,J$$

Specific Heat

$$Q = mC\Delta T$$

A 2 gram sample of a metal was heated from 260 K to 300 K. It absorbed 52 J of energy. What's the specific heat?

$$52\,J = (2g)(C)(27°C\ - -13°C)$$

Careful about double negatives this chapter!

$$52\,J = (2g)(C)(27°C + 13°C)$$

$$C = 0.65\ \frac{J}{g°C}$$

Specific Heat

$$Q = mC\Delta T$$

A 50 gram piece of hot metal is put into cold water. The metal transfers 5000 J of energy to the cold water. The specific heat of the metal is 6 J/g °C. What is the change in temperature of the metal?

$$-5000J = (50g)(6\frac{J}{g°C})(\Delta T)$$

Releasing heat makes Q negative!!!

$$\Delta T = -16.67°\text{C}$$

Temperature DECREASED by 16.67°C

Specific Heat

$$Q = mC\Delta T$$

A 25 gram piece of cold metal is put into hot water. The metal absorbs 154 J of energy from the hot water. The specific heat of the metal is 0.35 J/g °C. What is the initial temperature of the metal if the metal started at 25°?

$$154J = (25g)(0.35\frac{J}{g°C})(25°C - T_i)$$

Remember!
$\Delta T = T_f - T_i$

$$\frac{154\,J}{(25g)(0.35\frac{J}{g°C})} = (25°C - T_i)$$

$$T_i = 25°C - \left(\frac{154\,J}{(25g)(0.35\frac{J}{g°C})}\right)$$

$$\boxed{T_i = 7.4°C}$$

Careful with algebra! Don't be too lazy to actually show steps so you don't make silly mistakes! MOST commonly missed type of question for silly algebra mistakes!