**Heat Energy Notes and Problems**

**Q = mc∆T**

**Q = heat energy (HE) in Joules**

**m = mass in grams usually**

**c = specific heat capacity in Joules per gram oC (J/goC)**

**∆T = change in temperature in oC**

**∆T = Tf - Ti or ∆T = T2 - T1 Hint: When solving for Ti or Tf always solve for ∆T first!**

**specific heat capacity**

* is a characteristic property i.e. it can be used to identify a substance
* by def'n is the amount of heat energy required to change the temperature of 1 g of a substance by 1 oC

e.g. The specific heat capacity of water is 4.19 J / goC

If you had 1 g of water at 20.0 oC and wanted to raise its temperature to 24.0 oC what would you have to do? Explain using math and then English!

|  |
| --- |
|  |
|  |

**1.** How much heat energy would be required to take 20.0 mL of water at 25.0 oC up to 100.0 oC?

**2.** If 35.7 kJ of heat energy are added to 45.0 g of water how much would its temperature change by?

**3.** What is the specific heat capacity of 50.0 g of substance Zed if 1.5 x 103  J

of heat energy cause its temperature to rise by 36.0 oC?

**4.** The table below gives information about the antifreeze in a car’s cooling system.

|  |
| --- |
| Mass: 5 000.00 g  Initial temperature: 5.0°C  Specific heat capacity: 2.2 J/(g•°C) |

When the car is running, this mass of antifreeze absorbs 935 000 J.

What will be the final temperature of the antifreeze?

**5.** In the summertime, you find that tap water at 18.0°C is too warm to drink. You put 500.0 mL of this water in the refrigerator. After a period of time, the temperature of the water is 4.0°C. While it was cooling, the water lost a certain quantity of heat energy.

What quantity of heat energy was lost?

**6.** When a 3500-g block of lead was heated, its temperature increased from 20°C to 200°C. The specific heat capacity of lead is 0.13 J/(g•°C).

How much heat energy was absorbed by this block of lead?

|  |  |  |  |
| --- | --- | --- | --- |
| A) | 81.9 J | C) | 81 900 J |
| B) | 9 100 J | D) | 91 000 J |