NAME
CHEMISTRY
Energy Content by Collection
Calorimetry

Known –water	Unknown - Metal
Mass =	Mass =
Ti =	Ti =
Tf =	Tf =
c =	c =
q =	q =

1. What is thermal heat? Under what conditions is heat transferred from one object to another?

   ↳ Energy you can't feel, different temp

2. Two metal balls, aluminum and copper, one placed in each hand. Which metal ball will reach your body temperature first and why?

   Al = 0.91 Cu = 0.39 ↑ lower spec. ht. heat

3. How much heat, in joules, is needed to warm 250g of water (about 1 cup) from 22°C(about room temperature) to near its boiling point, 98°C?

   250g · (98-22) · 4.18 = 79420 J

4. The specific heat of toluene, C_7H_8, is 1.13J/gK. How many joules of heat are needed to raise the temperature of 40.0g or toluene from 10.4°C to 28.0°C.

   40 · 1.13 · 17.6 = 795 J

5. How much heat in Kilojoules must be removed from 175g of water to lower its temperature (22°C) to its freezing point.

   175 · 78 · 4.18 = 57057 J = 57.0 kJ

6. A 100 gram block at 100°C is dropped into 150g of water at 25°C. The water and block come to equilibrium at 28°C.
   - What is the energy the water gained?
   - What is energy of the block lost?
   - What is the specific heat of the block?

	Block	Water
M	100	150
ΔT	100	25 → 3
ΔTs	28	28
C	?	4.18
q	1881	1881

   C = 0.24

7. 44g of NaOH is dropped into 1 Liter of water. The temperature raises 13°C.
   - How many moles of NaOH are dissolved in the water?
   - What is the total energy given off by the NaOH?
   - What is the energy (kJ) per mole?

   44g · 1/40 = 1.1 mol

   q = m · ΔT · C

   1000 · 13 · 4.18 = 54340 J

   53.3 kJ/1.1 mol = 49.4 kJ/mol

8. 50 grams of 100°water is dropped into 50g of 50° water. What is the final temperature?

   75°

   m · (Tf - Ti) · C = q = m · (Tf - Ti) · C

   solve for combined Tf

9. 50 grams of 100° Aluminum is dropped into 50g of 50°C water. What is the final temperature?

   m · (Tf - Ti) · C = m · (Tf - Ti) · C

   50 · (Tf - 373) · 0.9 = 50 · (Tf - 323) · 4.18

   solve for Tf