T3

#9-2
Chemistry
Specific Heat Demonstrations

$Q = m * c * (Tf - Ti)$
$c_{copper} = 0.36 g/molC$
$c_{Aluminum} = 0.9 g/molC$

Specific Heat Practice Calculations

1. A 100g copper block is heated form 25° to 50°C. How much energy is required?

$q = m \cdot \Delta T \cdot C$
$100 \cdot (25) \cdot 0.36 = 900 J$

2. Using the energy from #1 a second 100g aluminum block is heated. If the block started at 25°C what will be the final temperature?

$900 J = 100 \cdot 0.9 \cdot (Tf - 298)$ $\Delta T = 10°$
$Tf = 308$ or $35°C$

3. Comparing questions #1 and #2 why do the blocks end up at different temperatures?

specific heat

Block Demonstration

4. A block with the mass of 50g and is 100°C is dropped in to 150g of water 21°C.
If the water/block warmed to 23°C
What is the specific heat of the block?
What is the identity of the block?

B	W
50	150
100	21
23	23
?	4.18

$q = 150 \cdot 2 \cdot 4.18$
$= 1254 J$

5. Demonstration calculations

class

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

$1254 = 50 \cdot 77 \cdot C$

$C = 0.32$

todo #5 → watch video QR code

QR Code on front

See Class Video starts 14:25

Dissolving NaOH Demonstration

Unlike just dropping a piece of metal in water we are now running a chemical reaction. How much energy take in/give off will depend on how much NaOH we dissolve.

Known –water	Unknown - NaOH
Mass =	Mass =
Ti =	Ti = X
Tf =	Tf = X
c =	c = X
q =	q = X

6. If we dissolve twice as much NaOH we will get twice the amount of energy. This type of relationship is called Linear or proportional

7. Write out the dissolving equation NaOH. $NaOH \rightarrow Na^+ + OH^-$

~~8~~. Record the experiment data in the table above.

9. Based upon initial data, is the reaction system (gaining/losing energy)? Surroundings/system getting hot

10. What substance is doing the collecting of energy? water/NaOH Mixture

*11. How much energy did the water collect?

q =

*12. Since we did not actually dissolve one mole of NaOH, what would be the energy if we did dissolve 1 mole? 1 mol = 40g use $\frac{4.4\ g}{9129\ J} = \frac{40\ g}{?\ J}$ proportion use #11 answer

? = 82.9KJ

Remember, enthalpy is the amount of energy (q/mol_{rxn}) as the reaction cycles 1 time through the process.

$NaOH \rightarrow Na^+ + OH^{-1}$

1mol

13. What is the enthalpy (ΔH) for the process?

from #11 video answer 82.9 KJ/Rxn

14. What would be the ΔH for the following reaction? $2NaOH \rightarrow 2Na^+ + 2OH^{-1}$

2x 82.9 = 165.9 KJ/Rxn

Dissolving ammonium nitrate.

Based upon the data provided in class determine the enthalpy change.

Known –water	Unknown - NaOH
Mass =	Mass =
Ti =	Ti = X
Tf =	Tf = X
c =	c = X
q =	q = X

Not in video

see class or future video