Name: Answer Key **Per:** _____

Unit 3 Hd 4

organize data

Using your chart, answer the following questions. **SHOW WORK like I did in class !!!!**

Specific Heat Problems:

1) Find the energy needed to make 439.3g of liquid copper to go from 1065 °C to 2000 °C.

$Q = ?$, $m = 439.3\,g$, $C_p = .503\,J/g\cdot°C$, $\Delta T = 935\,°C$

$Q = mass(\Delta T)(C_p)$

$(439.3\,g)(935\,°C)(.503\,J/g\cdot°C) = 206{,}605\,J$

$207{,}000\,J$

$2000\,°C - 1065\,°C = 935\,°C = \Delta T$

2) Find the mass of gold if 17,291 J is released as it goes down in temperature from 237°C to 4°C.

Q 17,291 J, $m = ?$, $C_p = .128\,J/g°C$, $\Delta T = 233\,°C$

$mass = \frac{Q}{(C_p)(\Delta T)} = \frac{17{,}291\,J}{(.128\,J/g°C)(233\,°C)}$

$237\,°C - 4\,°C = 233\,°C = \Delta T$

$580\,g$

3) What is the temperature change (ΔT) if 34.7g of solid aluminum is heated using 346.7J ?

$Q = 346.7\,J$, $m = 34.7\,g$, $C_p = .910\,J/g\,°C$, $\Delta T = ?$

$\Delta T = \frac{Q}{(m)(C_p)} = \frac{346.7\,J}{(34.7\,g)(.910\,\frac{J}{g°C})} = 11.0\,°C$

4) How much energy is needed to raise the temperature of 587g of water from 112°C to 173.4°C?

$Q = ?$, $m = 587\,g$, $C_p = 2.02\,J/g\cdot°C$, $\Delta T = 61.4\,°C$

$Q = (m)(C_p)(\Delta T)$

$= (587\,g)(2.02\,J/g\cdot°C)(61.4\,°C) = 72{,}804\,J$ or $72{,}800\,J$

$\Delta T = 61.4\,°C$

Heat of Fusion/ Vaporization Problems:

5) Find the energy needed to make 2250g of solid water melt.

$\Delta H_f = 334\,J/g$, $m = 2250\,g$, $Q = ?$

$Q = \Delta H_f (mass)$

$(334\,\frac{J}{g})(2250\,g) = 751{,}500\,J \Rightarrow 752{,}000\,J$

6) Find the energy in joules needed to raise melt 139g of Aluminum.

$\Delta H_f = 930\,J/g$, $m = 139\,g$, $Q = ?$

$Q = \Delta H_f (mass)$

$(930\,\frac{J}{g})(139\,g) = 129{,}270\,J \Rightarrow 129{,}000\,J$

7) How much energy is needed to vaporize of 587g of gold.

$\Delta H_v = 1580$, $Q = ?$

$Q = \Delta H_v (mass)$

$(1580\,\frac{J}{g})(587\,g) = 927{,}460\,J \Rightarrow 927{,}000\,J$

8) How much energy is released when 1234g of aluminum solidifies?

$Q = ?$, $\Delta H_f = 930\,\frac{J}{g}$, $m = 1234\,g$

$Q = \Delta H_f (mass)$

$= (930\,\frac{J}{g})(1234\,g) = 1{,}147{,}620\,J \Rightarrow 1{,}150{,}000\,J$

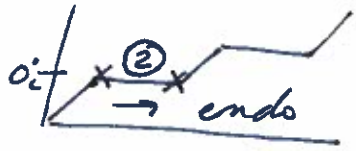
Problems using Specific Heat, Heat of Fusion/ Heat of Vaporization problems:
These problems are more challenging and Show all your work!!!!

One System Problems:

9) Find the energy needed to melt 165 grams of ice at 0 C°. ***Draw a graph!!***

(2) $Q = (\Delta H_f)(mass)$

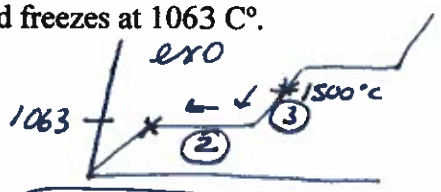
$\left(334 \frac{J}{g}\right)(165 g) = \boxed{55,110 J}$



10) Find the energy released when 115g of gold (Liquid) is cooled from 1500 C° and freezes at 1063 C°. ***Draw a graph!!***

(3) $(m)(C_p)(\Delta T) = Q$ $(115g)\left(.168 \frac{J}{g°c}\right)(437°c) =$ 8443 J

(2) $(\Delta H_f)(m) = Q$ $\left(64.5 \frac{J}{g}\right)(115g) =$ + 7418 J = **15,861 J**



11) Find the energy needed to change the temperature of salt from 100 C° to 1000 C°. ***Draw a graph!!***

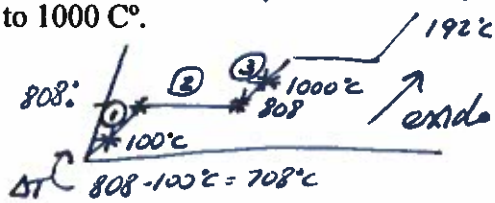
(1) $(155g)\left(2.51 \frac{J}{g·c}\right)(708°C) = 275447 J$ (155g of)

(2) $(155g)\left(486 \frac{J}{g}\right) = 75,330 J$

(3) $(155g)\left(3.77 \frac{J}{g°c}\right)(192°c) = 112,195 J$

462,972 J or **463,000 J**

$\Delta T = 1000°c - 808°c =$



Two System Problems:

12) How many grams of ice will melt if 564g of hot water at 70 C° is poured on it? (assume the water cools to 0 C°) ***Draw 2 graphs!!***

Cold

$m = \frac{165026 J}{334 \frac{J}{g}} = \boxed{494 g \text{ of ice melts}}$

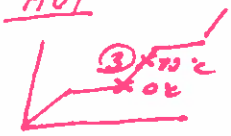
$(m)(C_p)(\Delta T) = Q$

$(564g)(4.18 J/g°c)(70°C) =$

$165026 J$

all hot goes to cold

Hot



13) 151 g piece of copper at 500 C° is lowered into water at 21 C°. If the final temp of both is 80 C°, what is the mass of the water heated? ***Draw 2 graphs!!***

Cold

$m = \frac{24,417 J}{\left(4.18 \frac{J}{g°c}\right)(59°c)} = \boxed{99.0 g}$

$(m)(C_p)(\Delta T) = Q$

$(151g)\left(.385 \frac{J}{g°c}\right)(420°c) = 24,417 J$

Hot

14) A 400g solid brass object at 160 C° is placed in 500g of water at 22.0 C°. The final temperature of both is 36.4 C°. Find the specific heat of the brass. ***Draw 2 graphs!!***

Cold

$Q = (500g)(14.4°c)\left(4.18 \frac{J}{g°c}\right)$

$Q = 30096 J$

all energy come from hot brass

Same on both sides

Show all your work!!!!

Hot

$C_p = \frac{30,096 J}{(400g)(124°c)}$

$C_p = .607 \frac{J}{g°c}$

ΔT
160°c
−36.4°c
123.6°c
124°c