Specific Heat Calculations Worksheet
Chemistry
2 points

Name: _____

Date: _____ Hour: _____

*****YOU MUST **SHOW YOUR WORK** TO RECEIVE CREDIT!!!!***

Here is a chart of specific heat capacities for your use:

Material	Specific Heat Capacity (J/g·°C)
aluminum (Al)	0.9025
concrete	0.84
ethyl alcohol (CH_3CH_2OH)	2.4194
gold (Au)	0.12905
helium (He)	5.1931
hydrogen (H_2)	14.304
iron (Fe)	0.4494

Material	Specific Heat Capacity (J/g·°C)
lead (Pb)	0.1276
mercury (Hg)	0.13950
rhodium (Rh)	0.2427
solid steel	0.4494
titanium (Ti)	0.5526
vanadium (V)	0.4886
water (H_2O)	4.184

1) In order to make tea, 322 000 J of energy were added to 1000.0 g of water. What was the temperature change of the water? [77.0 °C]

q = _____

c = _____

m = _____

ΔT = _____

2) A 32.07 gram sample of vanadium was heated to 75.00 °C (its initial temperature). It was then dumped into a calorimeter. The initial temperature of the calorimeter's water was 22.50 °C. After the metal was allowed to release all its heat to the calorimeter's water, 26.30 °C was the final temperature. What mass of distilled water was in the calorimeter? [48.0 g]

SYSTEM ( )

q = _____

c = _____

m = _____

T_{final} = _____

$T_{initial}$ = _____

ΔT = _____

SURROUNDINGS ( )

q = _____

c = _____

m = _____

T_{final} = _____

$T_{initial}$ = _____

ΔT = _____

3) What is specific heat capacity? _____

_____

4) What are the units of specific heat? _____

5) What is the symbol for specific heat? _____

6) Look at the specific heat capacity chart on the first page of this worksheet.

Which chemical has the highest specific heat capacity? _____

Which chemical has the lowest specific heat capacity? _____

How do the specific heat capacities of metals compare with those of liquids? _____

_____

7) A 49.2 g sample of solid steel was heated from 24.1 °C to 67.3 °C. What was the energy change? (must show work for credit) [955 J]

q = _____

c = _____

m = _____

ΔT = _____

8) A piece of unknown metal with mass 17.19 g is heated to an initial temperature of 92.50 °C and dropped into 25.00 g of water (with an initial temperature of 24.50 °C) in a calorimeter. The final temperature of the system is 30.05°C. What is the specific heat of the metal?

SYSTEM ( )		SURROUNDINGS ( )	
q =	_____	q =	_____
c =	_____	c =	_____
m =	_____	m =	_____
T_{final} =	_____	T_{final} =	_____
$T_{initial}$ =	_____	$T_{initial}$ =	_____
ΔT =	_____	ΔT =	_____

9) How much heat is required to raise the temperature of 7.89 g of ethyl alcohol from 25.0 °C to 72.7 °C? (must show work for credit) [911 J]

q = _____

c = _____

m = _____

ΔT = _____

10) How much heat is released when 432 g of aluminum cool from 71.0 °C to 18.0 °C?

q = _____

c = _____

m = _____

ΔT = _____

11) How many joules of heat are needed to increase the temperature of 250.0 g of mercury by 26.0 °C?

q = _____

c = _____

m = _____

ΔT = _____

12) What mass of lead is needed to absorb 54 000 J of energy if its temperature is to increase by only 2.5 °C? [170 000 g]

q = _____

c = _____

m = _____

ΔT = _____

13) A piece of rhodium with a mass of 24.50 g and an initial temperature of 96.00 °C was dropped into a calorimeter containing 30.08 g of distilled water. The final temperature of the metal and water in the calorimeter was 30.07 °C. What was the initial temperature of the water?

SYSTEM ( )		SURROUNDINGS ( )	
q =	_____	q =	_____
c =	_____	c =	_____
m =	_____	m =	_____
T_{final} =	_____	T_{final} =	_____
$T_{initial}$ =	_____	$T_{initial}$ =	_____
ΔT =	_____	ΔT =	_____

14) (a) A 25.0 g sample of titanium is heated from 25.25 °C to 75.25 °C. Determine the amount of energy this requires.

q = _____

c = _____

m = _____

ΔT = _____

(b) Was energy absorbed or lost during this process? Explain your answer. _____

_____

_____