

Name \_\_\_\_\_

Period \_\_\_\_\_

### Worksheet #4: Heat Curve Practice

Helpful information:

- Heat of vaporization of water: 2260 J/g
- Heat of fusion of water: 334 J/g

Specific heat of water: 4.18 J/g°C  
Specific heat of ice 2.0 J/g°C, steam 2.1 J/g°C



1. How much energy (joules) must be absorbed by 20.0 g of water to increase its temperature from 283.0 °C to 303.0 °C?



$$m C \Delta T = q$$

$$(20g)(2.1 J/g^{\circ}C)(303.0 - 283.0^{\circ}C)$$

840 J

2. Calculate how much energy (joules) is needed to change a 25.0 g sample of ice at 0.0 °C to liquid water at 32.8 °C.



$$q = m \Delta H_f$$

$$= (25g)(334 J/g)$$

$$= 8350 J$$

$$+ q = m C \Delta T$$

$$= (25g)(4.18 J/g^{\circ}C)(32.8^{\circ}C)$$

$$= 3427.6 J$$

11777 J

3. How much energy (joules) is required to convert 21.6 g of water at 16.4 °C to steam at 121.2 °C?



$$m C \Delta T$$

$$(21.6g)(4.18 J/g^{\circ}C)(100 - 16.4)$$

$$7,548 J$$

$$m \Delta H$$

$$(21.6g)(2260 J/g)$$

$$48,816 J$$

$$m C \Delta T$$

$$(21.6g)(2.1 J/g^{\circ}C)(121.2 - 100)$$

$$961.0$$

57,325.6 J

4. How much energy (in calories) is needed to change 76 g of steam at 100.0 °C to liquid water at 12.8 °C?



$$m \Delta H$$

$$(76g)(2260 J/g)$$

$$171,760$$

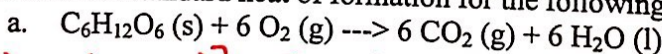
$$m C \Delta T$$

$$(76)(4.18 J/g^{\circ}C)(12.8 - 100)$$

$$27,762 J$$

-199,462 J

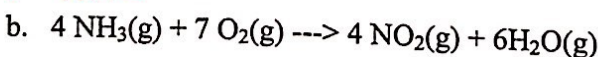
5. Calculate the standard heat of formation for the following equations.  $\Delta H^{\circ}_f$  values are given in kJ/mol.



$$[6(-393.5) + 6(-285.8)] - [6(0) + (-1275)]$$

$$-2,361 + -1714.8$$

-2,801 kJ/mol



$$[6(-285.8) + 4(33.1)] - [4(-45.9) + 7(0)]$$

$$[-1714.8 + 132.4] - [-183.6 + 0]$$

$$-1582.4 + 183.6$$

1,398.8

1399 kJ/mol

$C_6H_{12}O_6(s)$	-1275.0
$O_2(g)$	0.00
$CO_2(g)$	-393.5
$H_2O(l)$	-285.8
$NH_3(g)$	-45.90
$NO_2(g)$	+33.1
$H_2O(g)$	-241.83