Measuring the Quantity of Heat

Activity 1
Question Group 1
Question 1
In an exothermic process, a quantity of heat (**Q**) is released by a system, causing a change in temperature (**ΔT**) of the surroundings. The surroundings consist of a mass (**m**) of water. The release of ...

a. ... 4.18 J of heat causes 1.00 g of H_2O to have a ΔT of _____ °C.
b. ... 41.8 J of heat causes 5.00 g of H_2O to have a ΔT of _____ °C.
c. ... 418 J of heat causes _____ g of H_2O to have a ΔT of 2.50°C.
d. ... _____ J of heat causes 50.0 g of H_2O to have a ΔT of 8.00°C.
e. ... 2400 J of heat causes 78.5 g of H_2O to have a ΔT of _____ °C.

Question 2
In an exothermic process, a quantity of heat (**Q**) is released by a system, causing a change in temperature (**ΔT**) of the surroundings. The surroundings consist of a mass (**m**) of water. The release of ...

a. ... 4.18 J of heat causes 1.00 g of H_2O to have a ΔT of _____ °C.
b. ... 41.8 J of heat causes 2.00 g of H_2O to have a ΔT of _____ °C.
c. ... 418 J of heat causes _____ g of H_2O to have a ΔT of 4.00°C.
d. ... _____ J of heat causes 100.0 g of H_2O to have a ΔT of 8.00°C.
e. ... 2800 J of heat causes 61.5 g of H_2O to have a ΔT of _____ °C.

Question 3
In an exothermic process, a quantity of heat (**Q**) is released by a system, causing a change in temperature (**ΔT**) of the surroundings. The surroundings consist of a mass (**m**) of water. The release of ...

a. ... 4.18 J of heat causes 1.00 g of H_2O to have a ΔT of _____ °C.
b. ... 41.8 J of heat causes 4.00 g of H_2O to have a ΔT of _____ °C.
c. ... 418 J of heat causes _____ g of H_2O to have a ΔT of 2.00°C.
d. ... _____ J of heat causes 25.0 g of H_2O to have a ΔT of 8.00°C.
e. ... 3200 J of heat causes 82.4 g of H_2O to have a ΔT of _____ °C.

Question 4

In an exothermic process, a quantity of heat (**Q**) is released by a system, causing a change in temperature (**ΔT**) of the surroundings. The surroundings consist of a mass (**m**) of water. The release of ...

a. ... 4.18 J of heat causes 1.00 g of H_2O to have a ΔT of _____ °C.
b. ... 41.8 J of heat causes 2.50 g of H_2O to have a ΔT of _____ °C.
c. ... 418 J of heat causes _____ g of H_2O to have a ΔT of 5.00°C.
d. ... _____ J of heat causes 20.0 g of H_2O to have a ΔT of 8.00°C.
e. ... 4600 J of heat causes 56.9 g of H_2O to have a ΔT of _____ °C.

Activity 2
Question Group 2
Question 5
An exothermic reaction causes **Q** J of heat to release to the surrounding **m** g of water at a temperature of $\mathbf{T_i}$ °C, causing it to increase its temperature by **ΔT** °C to a final temperature of $\mathbf{T_f}$ °C.

	Q (J)	m (g)	T_i (°C)	T_f (°C)	ΔT (°C)
a.		100.0	24.3		16.5
b.		100.0	16.2	41.5	
c.	9250	100.0	15.8		
d.	12500	50.0	9.2		
e.	13200		7.5	48.8	

Question 6
An exothermic reaction causes **Q** J of heat to release to the surrounding **m** g of water at a temperature of $\mathbf{T_i}$ °C, causing it to increase its temperature by **ΔT** °C to a final temperature of $\mathbf{T_f}$ °C.

	Q (J)	m (g)	T_i (°C)	T_f (°C)	ΔT (°C)
a.		50.0	21.4		26.4
b.		50.0	11.3	58.6	
c.	10500	100.0	7.9		
d.	13500	100.0	5.6		
e.	11800		10.2	46.6	

Question 7

An exothermic reaction causes **Q** J of heat to release to the surrounding **m** g of water at a temperature of $\mathbf{T_i}$ °C, causing it to increase its temperature by **ΔT** °C to a final temperature of $\mathbf{T_f}$ °C.

	Q (J)	m (g)	T_i (°C)	T_f (°C)	ΔT (°C)
a.		50.0	19.6		22.8
b.		100.0	18.2	39.1	
c.	11400	50.0	5.4		
d.	10600	80.0	12.9		
e.	15500		4.9	56.7	

Question 8

An exothermic reaction causes **Q** J of heat to release to the surrounding **m** g of water at a temperature of $\mathbf{T_i}$ °C, causing it to increase its temperature by **ΔT** °C to a final temperature of $\mathbf{T_f}$ °C.

	Q (J)	m (g)	T_i (°C)	T_f (°C)	ΔT (°C)
a.		100.0	18.2		14.0
b.		50.0	12.5	49.4	
c.	8820	80.0	12.8		
d.	10900	80.0	7.4		
e.	14600		10.1	56.3	

Question 9

An exothermic reaction causes **Q** J of heat to release to the surrounding **m** g of water at a temperature of $\mathbf{T_i}$ °C, causing it to increase its temperature by **ΔT** °C to a final temperature of $\mathbf{T_f}$ °C.

	Q (J)	m (g)	T_i (°C)	T_f (°C)	ΔT (°C)
a.		50.0	21.5		28.2
b.		100.0	14.6	39.1	
c.	10100	75.0	9.8		
d.	12500	50.0	7.6		
e.	13600		8.8	52.5	

Question 10

An exothermic reaction causes **Q** J of heat to release to the surrounding **m** g of water at a temperature of $\mathbf{T_i}$ °C, causing it to increase its temperature by **ΔT** °C to a final temperature of $\mathbf{T_f}$ °C.

	Q (J)	m (g)	T_i (°C)	T_f (°C)	ΔT (°C)
a.		100.0	22.4		19.1
b.		50.0	10.4	52.5	
c.	10800	50.0	15.8		
d.	11200	100.0	7.6		
e.	15400		4.4	58.8	

Activity 3

Question 11

In an effort to determine the heat of reaction **(ΔH_{rxn})**, **X** grams of a reactant (molar mass = 40.00 g/mol) react, generating <B>**Q**</B> kJ of heat. This causes **m** g of H_2O O in a calorimeter to increase its temperature by **ΔT** °C.

	mass reactant (g)	moles reactant	m of H_2O (g)	ΔT (°C)	Q (kJ)	ΔH_{rxn} (kJ/mol)
a.	20.00		100.0	64.0		
b.	10.00		50.0	58.6		
c.	4.00		50.0			51.2
d.			80.0		10.0	50.0
e.		0.400		23.6	18.8	

Question 12

In an effort to determine the heat of reaction **(ΔH_{rxn})**, **X** grams of a reactant (molar mass = 40.00 g/mol) react, generating <B>**Q**</B> kJ of heat. This causes **m** g of H_2O O in a calorimeter to increase its temperature by **ΔT** °C.

	mass reactant (g)	moles reactant	m of H_2O (g)	ΔT (°C)	Q (kJ)	ΔH_{rxn} (kJ/mol)
a.	20.00		50.0	82.0		
b.	10.00		100.0	21.2		
c.	4.00		50.0			35.4
d.			75.0		12.1	34.6
e.		0.400		45.4	14.1	

Question 13

In an effort to determine the heat of reaction **(ΔH_{rxn})**, **X** grams of a reactant (molar mass = 80.00 g/mol) react, generating <B>**Q**</B> kJ of heat. This causes **m** g of H_2O O in a calorimeter to increase its temperature by **ΔT** °C.

	mass reactant (g)	moles reactant	m of H_2O (g)	ΔT (°C)	Q (kJ)	ΔH_{rxn} (kJ/mol)
a.	40.00		100.0	29.9		
b.	20.00		50.0	32.1		
c.	16.00		50.0			25.4
d.			80.0		12.2	24.8
e.		0.400		25.9	10.6	

Question 14

In an effort to determine the heat of reaction **(ΔH_{rxn})**, **X** grams of a reactant (molar mass = 80.00 g/mol) react, generating <B>**Q**</B> kJ of heat. This causes **m** g of H_2O O in a calorimeter to increase its temperature by **ΔT** °C.

	mass reactant (g)	moles reactant	m of H_2O (g)	ΔT (°C)	Q (kJ)	ΔH_{rxn} (kJ/mol)
a.	20.00		50.0	36.2		
b.	40.00		100.0	35.9		
c.	8.00		50.0			29.7
d.			80.0		14.8	30.5
e.		0.750		56.4	22.1	

Question 15

In an effort to determine the heat of reaction **(ΔH_{rxn})**, **X** grams of a reactant (molar mass = 120.00 g/mol) react, generating <B>**Q**</B> kJ of heat. This causes **m** g of H_2O O in a calorimeter to increase its temperature by **ΔT** °C.

	mass reactant (g)	moles reactant	m of H_2O (g)	ΔT (°C)	Q (kJ)	ΔH_{rxn} (kJ/mol)
a.	60.00		200.0	23.9		
b.	30.00		100.0	24.2		
c.	12.00		50.0			39.9
d.			80.0		10.1	40.6
e.		0.300		32.7	12.1	

Question 16

In an effort to determine the heat of reaction **(ΔH_{rxn})**, **X** grams of a reactant (molar mass = 120.00 g/mol) react, generating <B>**Q**</B> kJ of heat. This causes **m** g of H_2O O in a calorimeter to increase its temperature by **ΔT** °C.

	mass reactant (g)	moles reactant	m of H_2O (g)	ΔT (°C)	Q (kJ)	ΔH_{rxn} (kJ/mol)
a.	30.00		50.0	26.3		
b.	60.00		100.0	25.4		
c.	24.00		50.0			22.3
d.			80.0		10.8	21.8
e.		0.650		30.9	14.2	