Name: _____

Collisions Username: _____

Class: _____

Phase Change Quest

Complete this quest using the Challenge Levels 6, 8 - 15, and the Connected Levels.

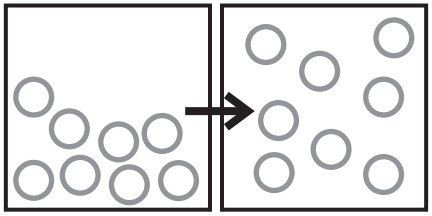
MISSION 1. GATHER YOUR INTEL

Use your Collisions gameplay experience to gather the following intel from specific Phase Change levels:

1. Label the particle used for this target.
2. Draw the particles in the initial phase and label the phase.
3. Draw the particles in the ending phase and label the phase.
4. List the temperature at phase change.

Sample Target

Particle: HCN



Initial Phase: liquid

Ending Phase: gas

26 °C at phase change

MISSION 2. EXPOSE THE DETAILS

Use your expertise to expose the following information for each target phase change.

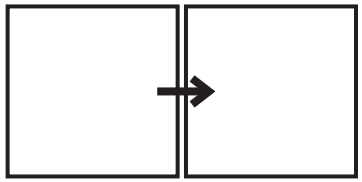
	Sample Target
Substance used	Hydrogen Cyanide
Phase Change(s) that occurred	Boiling
Exothermic or endothermic	Exothermic
$\Delta H>0$ or $\Delta H<0$	$\Delta H<0$
Does entropy increase or decrease?	Increases
Type of IMF	Dipole-Dipole
Were these IMFs broken or formed?	Broken
Formula mass of substance	27.026 g/mol
100. g = _____ moles?	3.7 moles
Calculate the energy needed to heat 100g of this particle by 10 degrees. Please indicate what state the particle is in.	2627 KJ (liquid)

Phase Change - Challenge Level 6

MISSION 1. GATHER YOUR INTEL

Target 1

Particle: _____



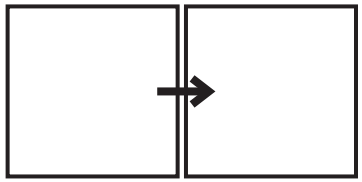
Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

Target 2

Particle: _____



Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

MISSION 2. EXPOSE THE DETAILS

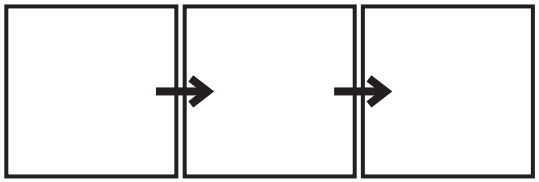
	Target 1	Target 2
Substance used		
Phase Change(s) that occurred		
Exothermic or endothermic		
$\Delta H>0$ or $\Delta H<0$		
Does entropy increase or decrease?		
Type of IMF		
Were these IMFs broken or formed?		
Formula mass of substance		
100. g = _____ moles?		
Calculate the energy needed to heat 100g of this particle by 10 degrees. Please indicate what state the particle is in.		

Phase Change - Challenge Level 8

MISSION 1. GATHER YOUR INTEL

Target 1

Particle: _____



Initial Phase: Phase 2: Ending Phase:

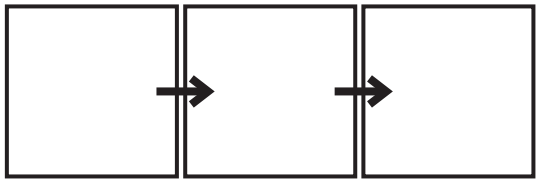
_____ _____ _____

_____°C at phase change

_____°C at phase change

Target 2

Particle: _____



Initial Phase: Phase 2: Ending Phase:

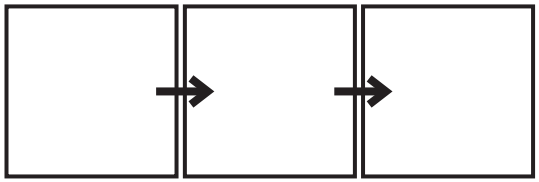
_____ _____ _____

_____°C at phase change

_____°C at phase change

Target 3

Particle: _____



Initial Phase: Phase 2: Ending Phase:

_____ _____ _____

_____°C at phase change

_____°C at phase change

MISSION 2. EXPOSE THE DETAILS

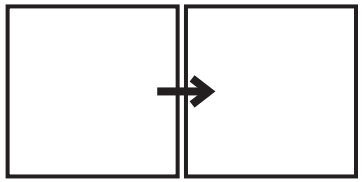
	Target 1	Target 2	Target 3
Substance used			
Phase Change(s) that occurred			
Exothermic or endothermic			
$\Delta H>0$ or $\Delta H<0$			
Does entropy increase or decrease?			
Type of IMF			
Were these IMFs broken or formed?			
Formula mass of substance			
100. g = _____ moles?			
Calculate the energy needed to heat 100g of this particle by 10 degrees. Please indicate what state the particle is in.			

Phase Change - Challenge Level 9

MISSION 1. GATHER YOUR INTEL

Target 1

Particle: _____



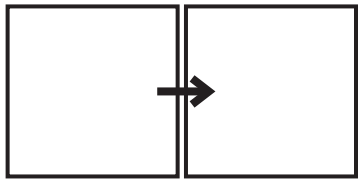
Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

Target 2

Particle: _____



Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

MISSION 2. EXPOSE THE DETAILS

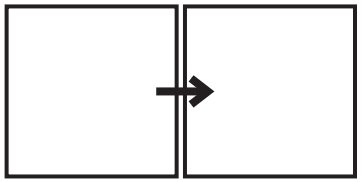
	Target 1	Target 2
Substance used		
Phase Change(s) that occurred		
Exothermic or endothermic		
$\Delta H>0$ or $\Delta H<0$		
Does entropy increase or decrease?		
Type of IMF		
Were these IMFs broken or formed?		
Formula mass of substance		
100. g = _____ moles?		
Calculate the energy needed to heat 100g of this particle by 10 degrees. Please indicate what state the particle is in.		

Phase Change - Challenge Level 10

MISSION 1. GATHER YOUR INTEL

Target 1

Particle: _____



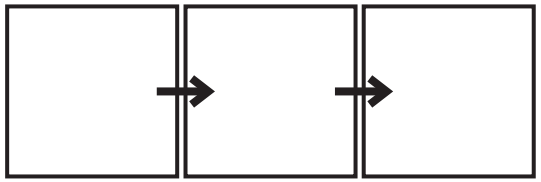
Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

Target 2

Particle: _____



Initial Phase: Phase 2: Ending Phase:

_____ _____ _____

_____°C
at phase change

_____°C
at phase change

MISSION 2. EXPOSE THE DETAILS

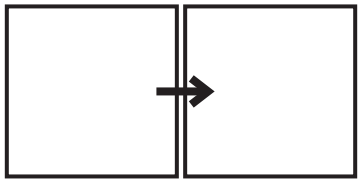
	Target 1	Target 2
Substance used		
Phase Change(s) that occurred		
Exothermic or endothermic		
$\Delta H>0$ or $\Delta H<0$		
Does entropy increase or decrease?		
Type of IMF		
Were these IMFs broken or formed?		
Formula mass of substance		
100. g = _____ moles?		
Calculate the energy needed to heat 100g of this particle by 10 degrees. Please indicate what state the particle is in.		

Phase Change - Challenge Level 11

MISSION 1. GATHER YOUR INTEL

Target 1

Particle: _____



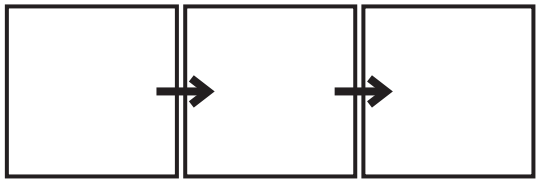
Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

Target 2

Particle: _____



Initial Phase: Phase 2: Ending Phase:

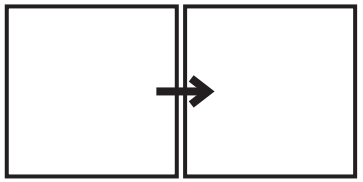
_____ _____ _____

_____°C
at phase change

_____°C
at phase change

Target 3

Particle: _____



Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

MISSION 2. EXPOSE THE DETAILS

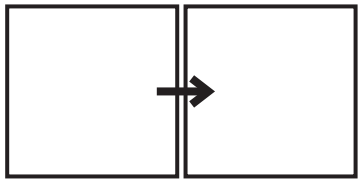
	Target 1	Target 2	Target 3
Substance used			
Phase Change(s) that occurred			
Exothermic or endothermic			
$\Delta H>0$ or $\Delta H<0$			
Does entropy increase or decrease?			
Type of IMF			
Were these IMFs broken or formed?			
Formula mass of substance			
100. g = _____ moles?			
Calculate the energy needed to heat 100g of this particle by 10 degrees. Please indicate what state the particle is in.			

Phase Change - Challenge Level 12

MISSION 1. GATHER YOUR INTEL

Target 1

Particle: _____



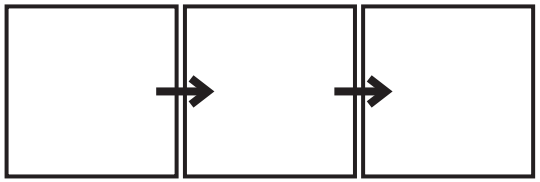
Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

Target 2

Particle: _____



Initial Phase: Phase 2: Ending Phase:

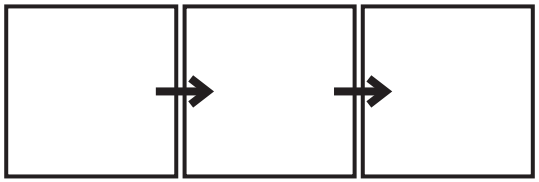
_____ _____ _____

_____°C
at phase change

_____°C
at phase change

Target 3

Particle: _____



Initial Phase: Phase 2: Ending Phase:

_____ _____ _____

_____°C
at phase change

_____°C
at phase change

MISSION 2. EXPOSE THE DETAILS

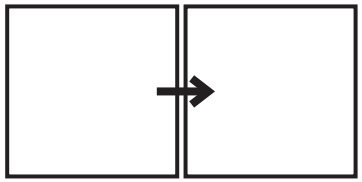
	Target 1	Target 2	Target 3
Substance used			
Phase Change(s) that occurred			
Exothermic or endothermic			
$\Delta H>0$ or $\Delta H<0$			
Does entropy increase or decrease?			
Type of IMF			
Were these IMFs broken or formed?			
Formula mass of substance			
100. g = _____ moles?			
Calculate the energy needed to heat 100g of this particle by 10 degrees. Please indicate what state the particle is in.			

Phase Change - Challenge Level 13

MISSION 1. GATHER YOUR INTEL

Target 1

Particle: _____



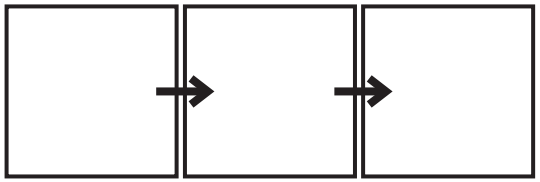
Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

Target 2

Particle: _____



Initial Phase: Phase 2: Ending Phase:

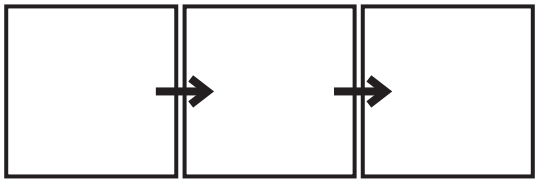
_____ _____ _____

_____°C
at phase change

_____°C
at phase change

Target 3

Particle: _____



Initial Phase: Phase 2: Ending Phase:

_____ _____ _____

_____°C
at phase change

_____°C
at phase change

MISSION 2. EXPOSE THE DETAILS

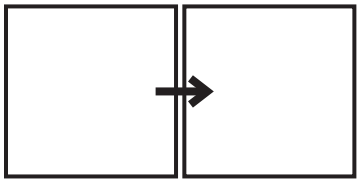
	Target 1	Target 2	Target 3
Substance used			
Phase Change(s) that occurred			
Exothermic or endothermic			
$\Delta H>0$ or $\Delta H<0$			
Does entropy increase or decrease?			
Type of IMF			
Were these IMFs broken or formed?			
Formula mass of substance			
100. g = _____ moles?			
Calculate the energy needed to heat 100g of this particle by 10 degrees. Please indicate what state the particle is in.			

Phase Change - Challenge Level 14

MISSION 1. GATHER YOUR INTEL

Target 1

Particle: _____



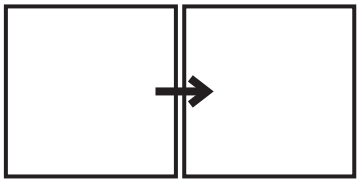
Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

Target 2

Particle: _____



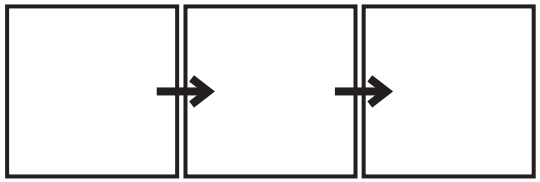
Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

Target 3

Particle: _____



Initial Phase: Phase 2: Ending Phase:

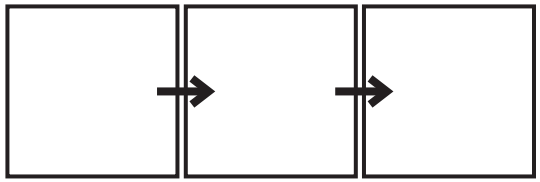
_____ _____ _____

_____°C
at phase change

_____°C
at phase change

Target 4

Particle: _____



Initial Phase: Phase 2: Ending Phase:

_____ _____ _____

_____°C
at phase change

_____°C
at phase change

MISSION 2. EXPOSE THE DETAILS

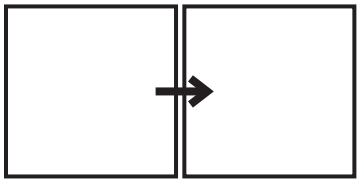
	Target 1	Target 2	Target 3	Target 4
Substance used				
Phase Change(s) that occurred				
Exothermic or endothermic				
$\Delta H>0$ or $\Delta H<0$				
Does entropy increase or decrease?				
Type of IMF				
Were these IMFs broken or formed?				
Formula mass of substance				
100. g = _____ moles?				
Calculate the energy needed to heat 100g of this particle by 10 degrees. Please indicate what state the particle is in.				

Phase Change - Challenge Level 15

MISSION 1. GATHER YOUR INTEL

Target 1

Particle: _____



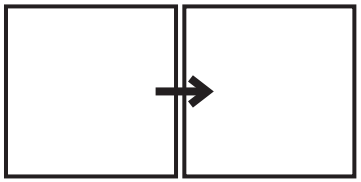
Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

Target 2

Particle: _____



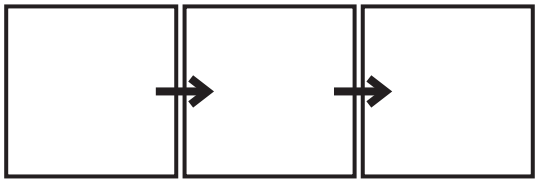
Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

Target 3

Particle: _____



Initial Phase: Phase 2: Ending Phase:

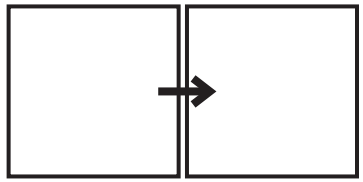
_____ _____ _____

_____°C
at phase change

_____°C
at phase change

Target 4

Particle: _____



Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

MISSION 2. EXPOSE THE DETAILS

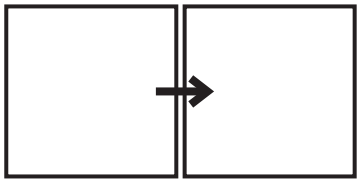
	Target 1	Target 2	Target 3	Target 4
Substance used				
Phase Change(s) that occurred				
Exothermic or endothermic				
$\Delta H>0$ or $\Delta H<0$				
Does entropy increase or decrease?				
Type of IMF				
Were these IMFs broken or formed?				
Formula mass of substance				
100. g = _____ moles?				
Calculate the energy needed to heat 100g of this particle by 10 degrees. Please indicate what state the particle is in.				

Phase Change - IMFs Connected Level 1

MISSION 1. GATHER YOUR INTEL

Target 1

Particle: _____



Initial Phase: Ending Phase:

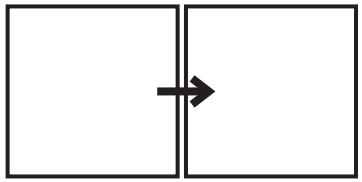
_____ _____

_____°C

at phase change

Target 2

Particle: _____



Initial Phase: Ending Phase:

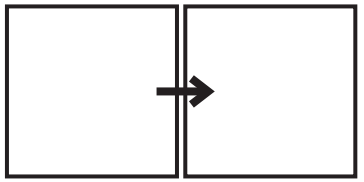
_____ _____

_____°C

at phase change

Target 3

Particle: _____



Initial Phase: Ending Phase:

_____ _____

_____°C

at phase change

MISSION 2. EXPOSE THE DETAILS

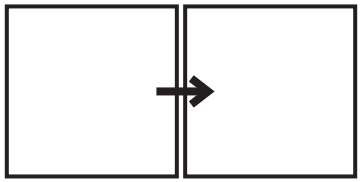
	Target 1	Target 2	Target 3
Substance used			
Phase Change(s) that occurred			
Exothermic or endothermic			
$\Delta H>0$ or $\Delta H<0$			
Does entropy increase or decrease?			
Type of IMF			
Were these IMFs broken or formed?			
Formula mass of substance			
100. g = _____ moles?			
Calculate the energy needed to heat 100g of this particle by 10 degrees. Please indicate what state the particle is in.			

Phase Change - IMFs Connected Level 2

MISSION 1. GATHER YOUR INTEL

Target 1

Particle: _____



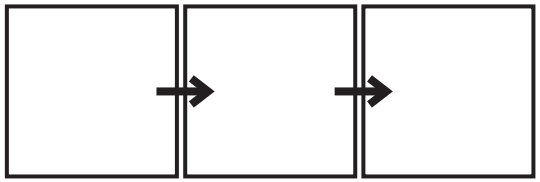
Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

Target 2

Particle: _____



Initial Phase: Phase 2: Ending Phase:

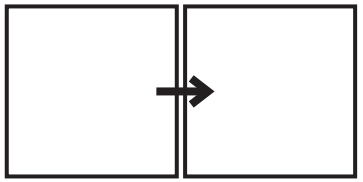
_____ _____ _____

_____°C
at phase change

_____°C
at phase change

Target 3

Particle: _____



Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

MISSION 2. EXPOSE THE DETAILS

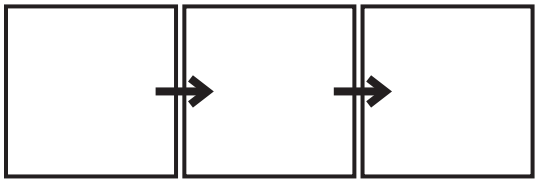
	Target 1	Target 2	Target 3
Substance used			
Phase Change(s) that occurred			
Exothermic or endothermic			
$\Delta H>0$ or $\Delta H<0$			
Does entropy increase or decrease?			
Type of IMF			
Were these IMFs broken or formed?			
Formula mass of substance			
100. g = _____ moles?			
Calculate the energy needed to heat 100g of this particle by 10 degrees. Please indicate what state the particle is in.			

Phase Change - IMFs Connected Level 3

MISSION 1. GATHER YOUR INTEL

Target 1

Particle: _____



Initial Phase: Phase 2: Ending Phase:

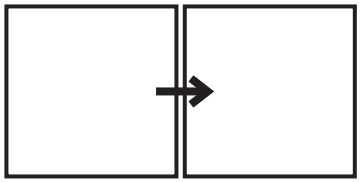
_____ _____ _____

_____°C at phase change

_____°C at phase change

Target 2

Particle: _____



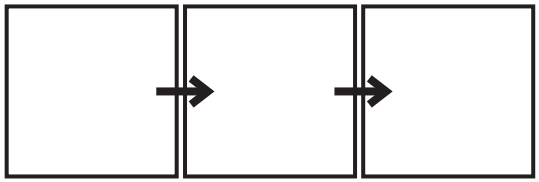
Initial Phase: Ending Phase:

_____ _____

_____°C at phase change

Target 3

Particle: _____



Initial Phase: Phase 2: Ending Phase:

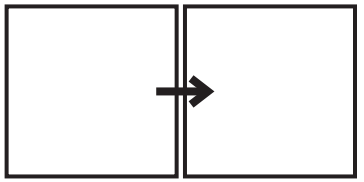
_____ _____ _____

_____°C at phase change

_____°C at phase change

Target 4

Particle: _____



Initial Phase: Ending Phase:

_____ _____

_____°C at phase change

MISSION 2. EXPOSE THE DETAILS

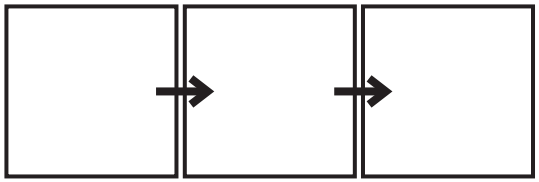
	Target 1	Target 2	Target 3	Target 4
Substance used				
Phase Change(s) that occurred				
Exothermic or endothermic				
$\Delta H>0$ or $\Delta H<0$				
Does entropy increase or decrease?				
Type of IMF				
Were these IMFs broken or formed?				
Formula mass of substance				
100. g = _____ moles?				
Calculate the energy needed to heat 100g of this particle by 10 degrees. Please indicate what state the particle is in.				

Phase Change - Ionic Bonding Connected Level 1

MISSION 1. GATHER YOUR INTEL

Target 1

Particle: _____



Initial Phase: Phase 2: Ending Phase:

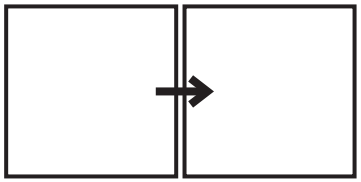
_____ _____ _____

_____°C at phase change

_____°C at phase change

Target 2

Particle: _____



Initial Phase: Ending Phase:

_____ _____

_____°C at phase change

MISSION 2. EXPOSE THE DETAILS

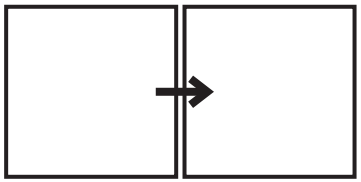
	Target 1	Target 2
Substance used		
Phase Change(s) that occurred		
Exothermic or endothermic		
$\Delta H>0$ or $\Delta H<0$		
Does entropy increase or decrease?		
Type of IMF		
Were these IMFs broken or formed?		
Formula mass of substance		
100. g = _____ moles?		
Calculate the energy needed to heat 100g of this particle by 10 degrees. Please indicate what state the particle is in.		

Phase Change - Ionic Bonding Connected Level 2

MISSION 1. GATHER YOUR INTEL

Target 1

Particle: _____



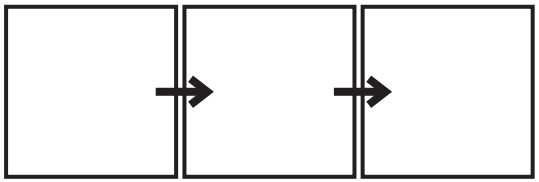
Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

Target 3

Particle: _____



Initial Phase: Phase 2: Ending Phase:

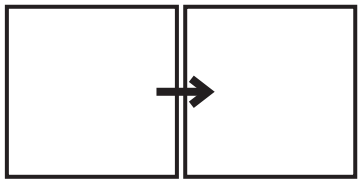
_____ _____ _____

_____°C at phase change

_____°C at phase change

Target 2

Particle: _____



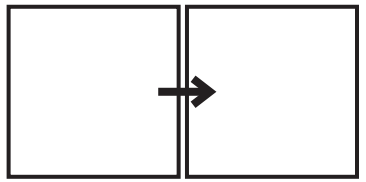
Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

Target 4

Particle: _____



Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

MISSION 2. EXPOSE THE DETAILS

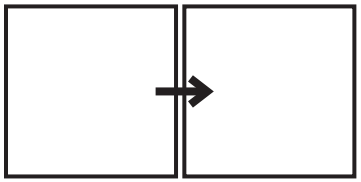
	Target 1	Target 2	Target 3	Target 4
Substance used				
Phase Change(s) that occurred				
Exothermic or endothermic				
$\Delta H>0$ or $\Delta H<0$				
Does entropy increase or decrease?				
Type of IMF				
Were these IMFs broken or formed?				
Formula mass of substance				
100. g = _____ moles?				
Calculate the energy needed to heat 100g of this particle by 10 degrees. Please indicate what state the particle is in.				

Phase Change - Ionic Bonding Connected Level 3

MISSION 1. GATHER YOUR INTEL

Target 1

Particle: _____



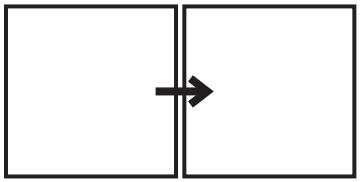
Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

Target 2

Particle: _____



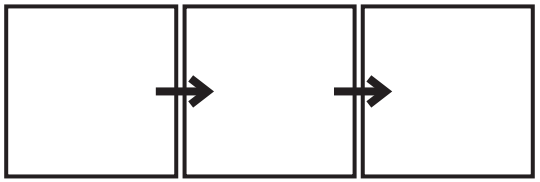
Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

Target 3

Particle: _____



Initial Phase: Phase 2: Ending Phase:

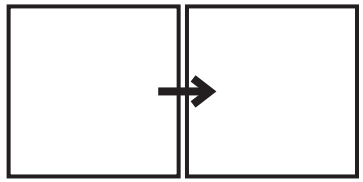
_____ _____ _____

_____°C at phase change

_____°C at phase change

Target 4

Particle: _____



Initial Phase: Ending Phase:

_____ _____

_____°C
at phase change

MISSION 2. EXPOSE THE DETAILS

	Target 1	Target 2	Target 3	Target 4
Substance used				
Phase Change(s) that occurred				
Exothermic or endothermic				
$\Delta H>0$ or $\Delta H<0$				
Does entropy increase or decrease?				
Type of IMF				
Were these IMFs broken or formed?				
Formula mass of substance				
100. g = _____ moles?				
Calculate the energy needed to heat 100g of this particle by 10 degrees. Please indicate what state the particle is in.				