



Name: \_\_\_\_\_

Collisions Username: \_\_\_\_\_

Class: \_\_\_\_\_

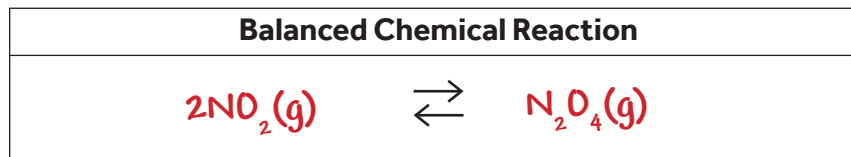
## Equilibrium Quest

Complete this quest using the Challenge Levels 5-21.

### MISSION 1. GATHER YOUR INTEL

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

1. Record the reaction.
2. List the disturbance that successfully completed each target.



#### Target 1

SHIFT  
RIGHT + [NO<sub>2</sub>]

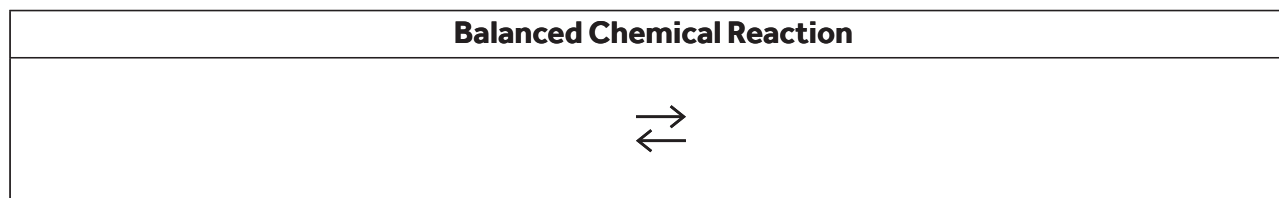
### MISSION 2. EXPOSE THE DETAILS

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

Reaction		
What is the $K_c$ expression?	$\frac{[\text{N}_2\text{O}_4]}{[\text{NO}_2]^2}$	
At Eq, is the reaction more reactant or product heavy?	<b>product</b>	
$K_c > 1$ or $K_c < 1$	$K_c > 1$	
Target 1		
What is another way to reach this target?	<b>- [N<sub>2</sub>O<sub>4</sub>]</b>	
Determine if these <b>increase, decrease, or remain the same</b> after the disturbance.	Concentration of reactants	<b>decrease</b>
	Concentration of products	<b>increase</b>
	Temperature	<b>increase</b>
	Pressure	<b>decrease</b>

# Equilibrium - Challenge Level 5

## MISSION 1. GATHER YOUR INTEL



**Target 1**

SHIFT  
RIGHT \_\_\_\_\_

**Target 2**

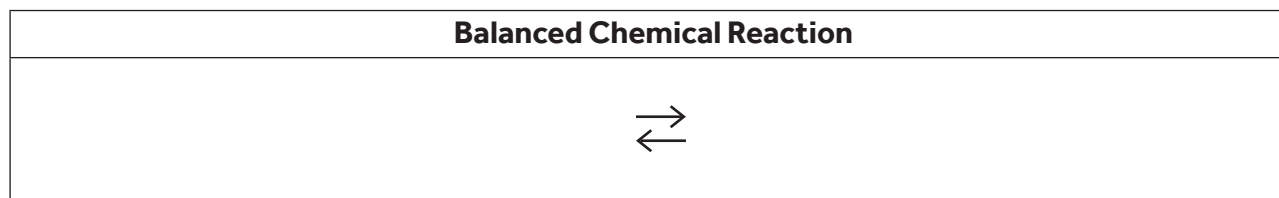
SHIFT  
LEFT \_\_\_\_\_

## MISSION 2. EXPOSE THE DETAILS

Reaction			
	What is the $K_c$ expression?		
	At Eq, is the reaction more reactant or product heavy?		
	$K_c > 1$ or $K_c < 1$		
		Target 1	Target 2
	What is another way to reach this target?		
Determine if these <b>increase, decrease, or remain the same</b> after the disturbance.	Concentration of reactants		
	Concentration of products		
	Temperature		
	Pressure		

# Equilibrium - Challenge Level 6

## MISSION 1. GATHER YOUR INTEL



**Target 1**

SHIFT  
RIGHT \_\_\_\_\_

**Target 2**

SHIFT  
LEFT \_\_\_\_\_

**Target 3**

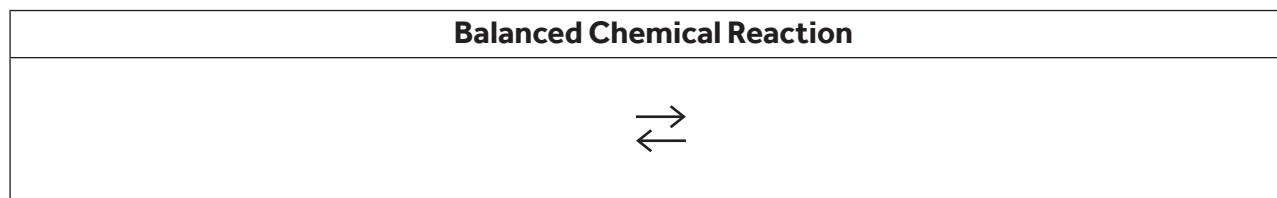
SHIFT  
LEFT \_\_\_\_\_

## MISSION 2. EXPOSE THE DETAILS

Reaction				
What is the $K_c$ expression?				
At Eq, is the reaction more reactant or product heavy?				
$K_c > 1$ or $K_c < 1$				
		Target 1	Target 2	Target 3
What is another way to reach this target?				
Determine if these <b>increase, decrease, or remain the same</b> after the disturbance.	Concentration of reactants			
	Concentration of products			
	Temperature			
	Pressure			

# Equilibrium - Challenge Level 7

## MISSION 1. GATHER YOUR INTEL



**Target 1**

SHIFT  
RIGHT \_\_\_\_\_

**Target 2**

SHIFT  
LEFT \_\_\_\_\_

**Target 3**

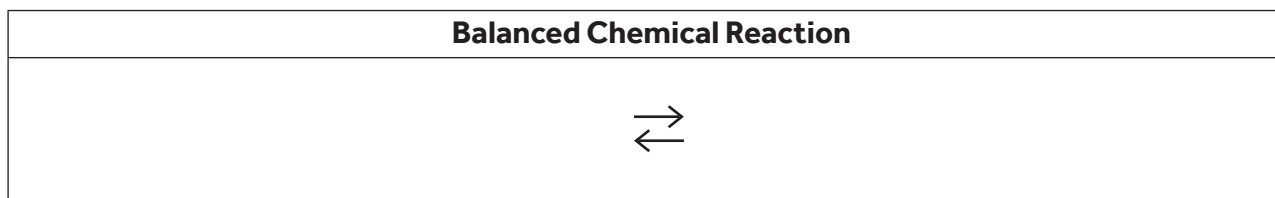
SHIFT  
LEFT \_\_\_\_\_

## MISSION 2. EXPOSE THE DETAILS

Reaction				
What is the $K_c$ expression?				
At Eq, is the reaction more reactant or product heavy?				
$K_c > 1$ or $K_c < 1$				
		Target 1	Target 2	Target 3
What is another way to reach this target?				
Determine if these <b>increase, decrease, or remain the same</b> after the disturbance.	Concentration of reactants			
	Concentration of products			
	Temperature			
	Pressure			

# Equilibrium - Challenge Level 8

## MISSION 1. GATHER YOUR INTEL



**Target 1**

**Target 2**

SHIFT  
RIGHT \_\_\_\_\_

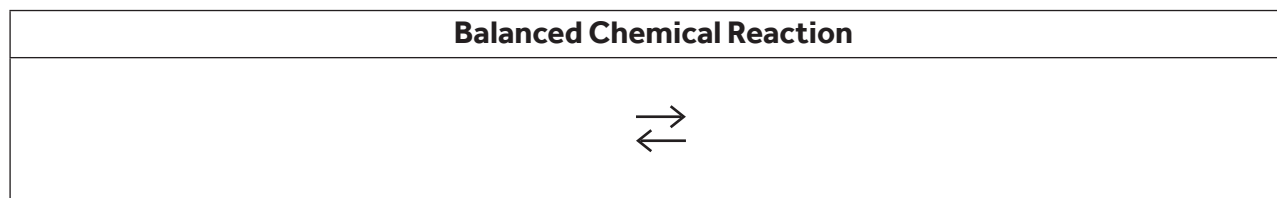
SHIFT  
LEFT \_\_\_\_\_

## MISSION 2. EXPOSE THE DETAILS

Reaction			
	What is the $K_c$ expression?		
	At Eq, is the reaction more reactant or product heavy?		
	$K_c > 1$ or $K_c < 1$		
		Target 1	Target 2
	What is another way to reach this target?		
Determine if these <b>increase, decrease, or remain the same</b> after the disturbance.	Concentration of reactants		
	Concentration of products		
	Temperature		
	Pressure		

# Equilibrium - Challenge Level 9

## MISSION 1. GATHER YOUR INTEL



**Target 1**

SHIFT  
RIGHT \_\_\_\_\_

**Target 2**

SHIFT  
LEFT \_\_\_\_\_

**Target 3**

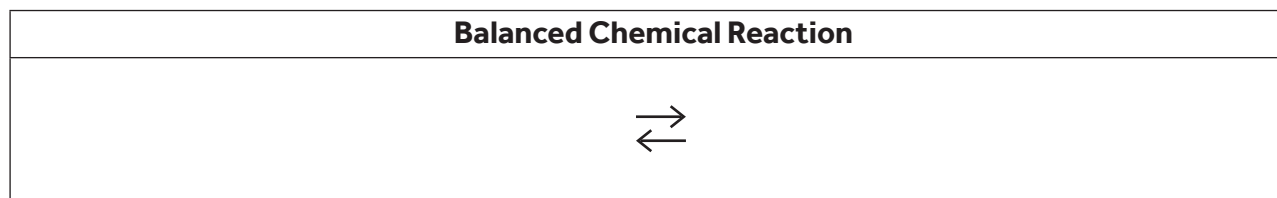
SHIFT  
LEFT \_\_\_\_\_

## MISSION 2. EXPOSE THE DETAILS

Reaction				
What is the $K_c$ expression?				
At Eq, is the reaction more reactant or product heavy?				
$K_c > 1$ or $K_c < 1$				
		Target 1	Target 2	Target 3
What is another way to reach this target?				
Determine if these <b>increase, decrease, or remain the same</b> after the disturbance.	Concentration of reactants			
	Concentration of products			
	Temperature			
	Pressure			

# Equilibrium - Challenge Level 10

## MISSION 1. GATHER YOUR INTEL



**Target 1**

SHIFT  
LEFT \_\_\_\_\_

**Target 2**

SHIFT  
LEFT \_\_\_\_\_

**Target 3**

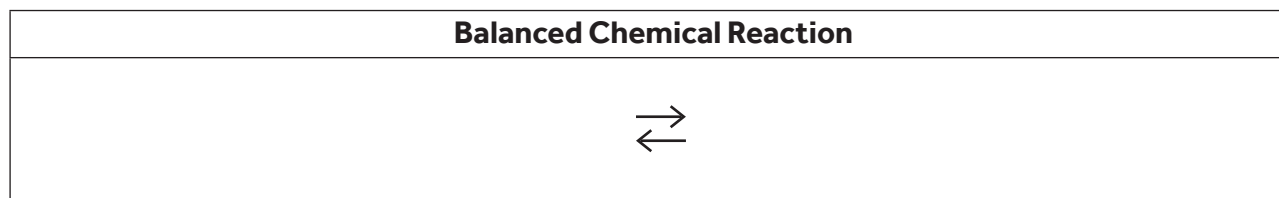
SHIFT  
LEFT \_\_\_\_\_

## MISSION 2. EXPOSE THE DETAILS

Reaction			
What is the $K_c$ expression?			
At Eq, is the reaction more reactant or product heavy?			
$K_c > 1$ or $K_c < 1$			
	Target 1	Target 2	Target 3
What is another way to reach this target?			
Determine if these <b>increase, decrease, or remain the same</b> after the disturbance.	Concentration of reactants		
	Concentration of products		
	Temperature		
	Pressure		

# Equilibrium - Challenge Level 11

## MISSION 1. GATHER YOUR INTEL



**Target 1**

SHIFT  
RIGHT \_\_\_\_\_

**Target 2**

SHIFT  
LEFT \_\_\_\_\_

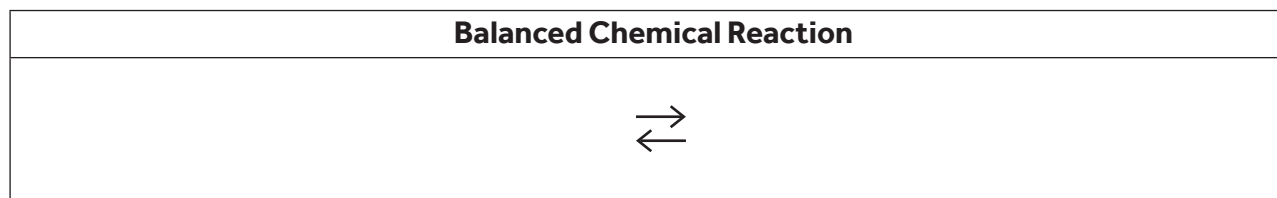
## MISSION 2. EXPOSE THE DETAILS

Reaction		
What is the $K_c$ expression?		
At Eq, is the reaction more reactant or product heavy?		
$K_c > 1$ or $K_c < 1$		
Target 1		
Target 2		
What is another way to reach this target?		
Determine if these <b>increase, decrease, or remain the same</b> after the disturbance.	Concentration of reactants	
	Concentration of products	
	Temperature	
	Pressure	



# Equilibrium - Challenge Level 12

## MISSION 1. GATHER YOUR INTEL



**Target 1**

SHIFT  
RIGHT \_\_\_\_\_

**Target 2**

SHIFT  
LEFT \_\_\_\_\_

**Target 3**

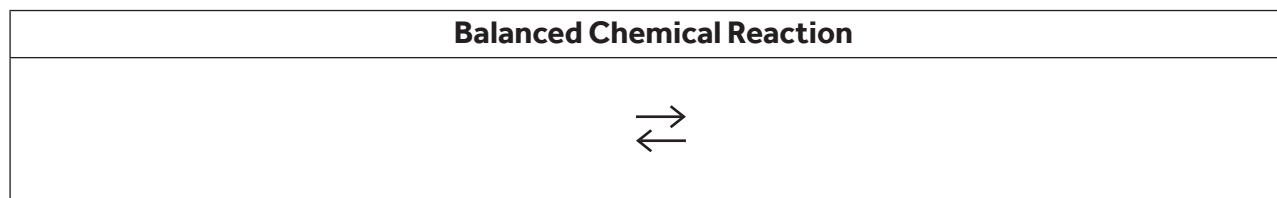
SHIFT  
LEFT \_\_\_\_\_

## MISSION 2. EXPOSE THE DETAILS

Reaction			
What is the $K_c$ expression?			
At Eq, is the reaction more reactant or product heavy?			
$K_c > 1$ or $K_c < 1$			
	Target 1	Target 2	Target 3
What is another way to reach this target?			
Determine if these <b>increase, decrease, or remain the same</b> after the disturbance.	Concentration of reactants		
	Concentration of products		
	Temperature		
	Pressure		

# Equilibrium - Challenge Level 13

## MISSION 1. GATHER YOUR INTEL



**Target 1**

DECREASE  
H<sub>2</sub> at Eq \_\_\_\_\_

**Target 2**

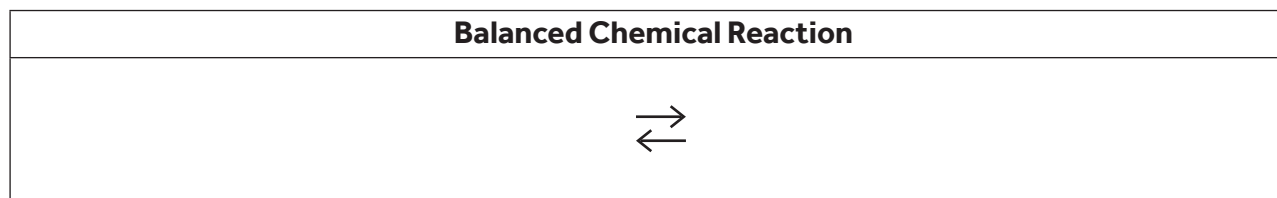
DECREASE  
HCl at Eq \_\_\_\_\_

## MISSION 2. EXPOSE THE DETAILS

Reaction	
What is the $K_c$ expression?	
At Eq, is the reaction more reactant or product heavy?	
$K_c > 1$ or $K_c < 1$	
Target 1	
Target 2	
What is another way to reach this target?	
Determine if these <b>increase, decrease, or remain the same</b> after the disturbance.	
Concentration of reactants	
Concentration of products	
Temperature	
Pressure	

# Equilibrium - Challenge Level 14

## MISSION 1. GATHER YOUR INTEL



### Target 1

INCREASE  
 $\text{H}_3\text{O}^+$  at Eq \_\_\_\_\_

### Target 2

DECREASE  
 HBr at Eq \_\_\_\_\_

### Target 3

DECREASE  
 $\text{Br}^-$  at Eq \_\_\_\_\_

## MISSION 2. EXPOSE THE DETAILS

Reaction				
What is the $K_c$ expression?				
At Eq, is the reaction more reactant or product heavy?				
$K_c > 1$ or $K_c < 1$				
		Target 1	Target 2	Target 3
What is another way to reach this target?				
Determine if these <b>increase, decrease, or remain the same</b> after the disturbance.	Concentration of reactants			
	Concentration of products			
	Temperature			
	Pressure			

# Equilibrium - Challenge Level 15

## MISSION 1. GATHER YOUR INTEL

<b>Balanced Chemical Reaction</b>
$\rightleftharpoons$

**Target 1**

DECREASE  
PRESSURE at Eq \_\_\_\_\_

**Target 2**

DECREASE  
PRESSURE at Eq \_\_\_\_\_

**Target 3**

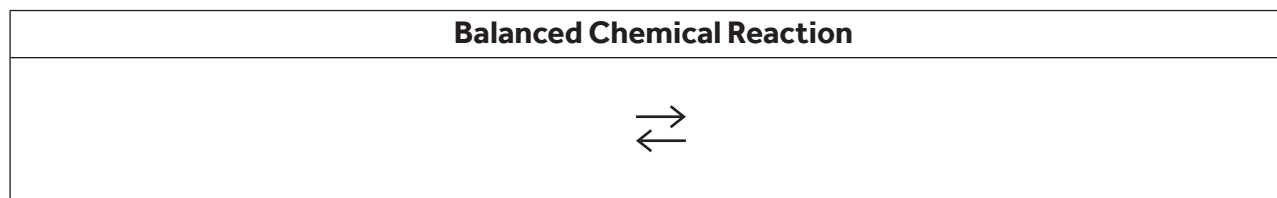
DECREASE  
PRESSURE at Eq \_\_\_\_\_

## MISSION 2. EXPOSE THE DETAILS

Reaction			
What is the $K_c$ expression?			
At Eq, is the reaction more reactant or product heavy?			
$K_c > 1$ or $K_c < 1$			
Target 1                      Target 2                      Target 3			
What is another way to reach this target?			
Determine if these <b>increase, decrease, or remain the same</b> after the disturbance.	Concentration of reactants		
	Concentration of products		
	Temperature		
	Pressure		

# Equilibrium - Challenge Level 16

## MISSION 1. GATHER YOUR INTEL



**Target 1**

INCREASE  
Pressure at Eq \_\_\_\_\_

**Target 2**

INCREASE  
H<sub>2</sub> at Eq \_\_\_\_\_

**Target 3**

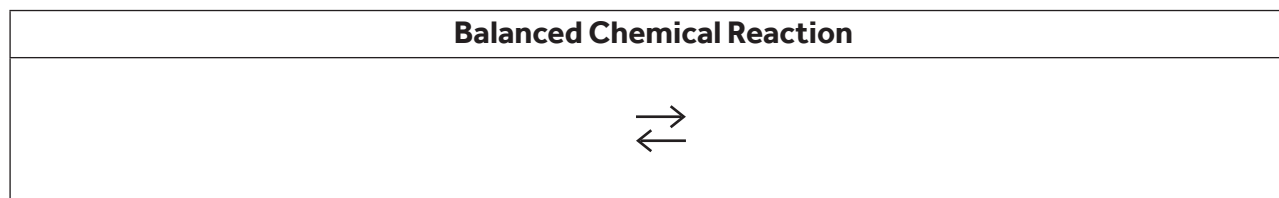
INCREASE  
CH<sub>4</sub> at Eq \_\_\_\_\_

## MISSION 2. EXPOSE THE DETAILS

Reaction			
What is the $K_c$ expression?			
At Eq, is the reaction more reactant or product heavy?			
$K_c > 1$ or $K_c < 1$			
	Target 1	Target 2	Target 3
What is another way to reach this target?			
Determine if these <b>increase, decrease, or remain the same</b> after the disturbance.	Concentration of reactants		
	Concentration of products		
	Temperature		
	Pressure		

# Equilibrium - Challenge Level 17

## MISSION 1. GATHER YOUR INTEL



### Target 1

INCREASE  
N<sub>2</sub> at Eq \_\_\_\_\_

### Target 2

INCREASE  
NH<sub>3</sub> at Eq \_\_\_\_\_

### Target 3

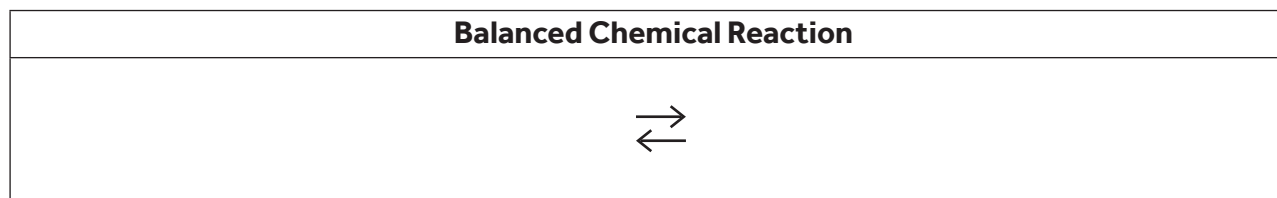
DECREASE  
H<sub>2</sub> at Eq \_\_\_\_\_

## MISSION 2. EXPOSE THE DETAILS

Reaction			
What is the $K_c$ expression?			
At Eq, is the reaction more reactant or product heavy?			
$K_c > 1$ or $K_c < 1$			
	Target 1	Target 2	Target 3
What is another way to reach this target?			
Determine if these <b>increase, decrease, or remain the same</b> after the disturbance.	Concentration of reactants		
	Concentration of products		
	Temperature		
	Pressure		

# Equilibrium - Challenge Level 18

## MISSION 1. GATHER YOUR INTEL



### Target 1

INCREASE  
PRESSURE at Eq \_\_\_\_\_

### Target 2

DECREASE  
CO at Eq \_\_\_\_\_

### Target 3

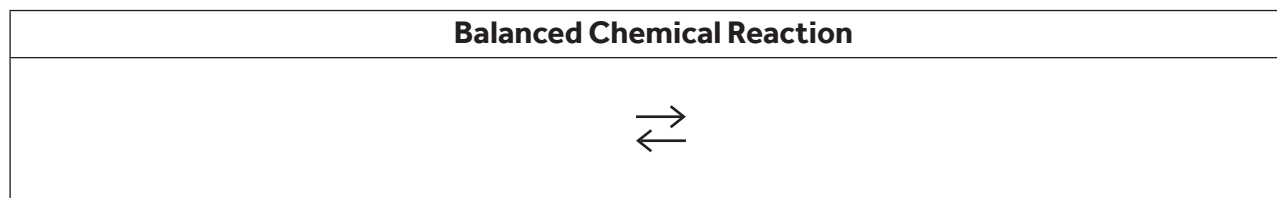
DECREASE  
CO<sub>2</sub> at Eq \_\_\_\_\_

## MISSION 2. EXPOSE THE DETAILS

Reaction			
What is the $K_c$ expression?			
At Eq, is the reaction more reactant or product heavy?			
$K_c > 1$ or $K_c < 1$			
	Target 1	Target 2	Target 3
What is another way to reach this target?			
Determine if these <b>increase, decrease, or remain the same</b> after the disturbance.	Concentration of reactants		
	Concentration of products		
	Temperature		
	Pressure		

# Equilibrium - Challenge Level 19

## MISSION 1. GATHER YOUR INTEL



**Target 1**

INCREASE  
PRESSURE at Eq \_\_\_\_\_

**Target 2**

DECREASE  
SO<sub>3</sub> at Eq \_\_\_\_\_

**Target 3**

DECREASE  
SO<sub>2</sub> at Eq \_\_\_\_\_

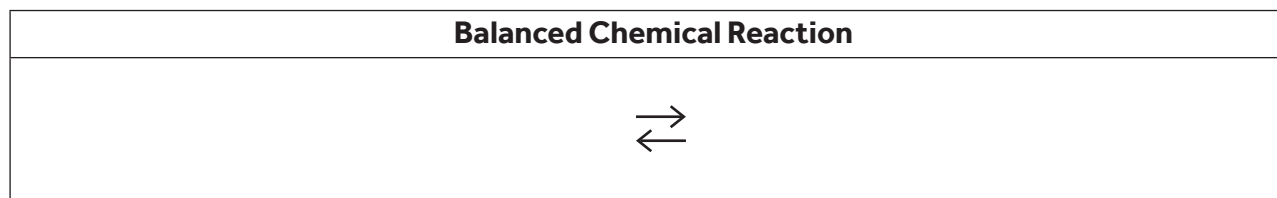
## MISSION 2. EXPOSE THE DETAILS

Reaction				
What is the $K_c$ expression?				
At Eq, is the reaction more reactant or product heavy?				
$K_c > 1$ or $K_c < 1$				
Target 1                      Target 2                      Target 3				
What is another way to reach this target?				
Determine if these <b>increase, decrease, or remain the same</b> after the disturbance.	Concentration of reactants			
	Concentration of products			
	Temperature			
	Pressure			



# Equilibrium - Challenge Level 20

## MISSION 1. GATHER YOUR INTEL



### Target 1

INCREASE  
PRESSURE at Eq \_\_\_\_\_

### Target 2

DECREASE  
O<sub>2</sub> at Eq \_\_\_\_\_

### Target 3

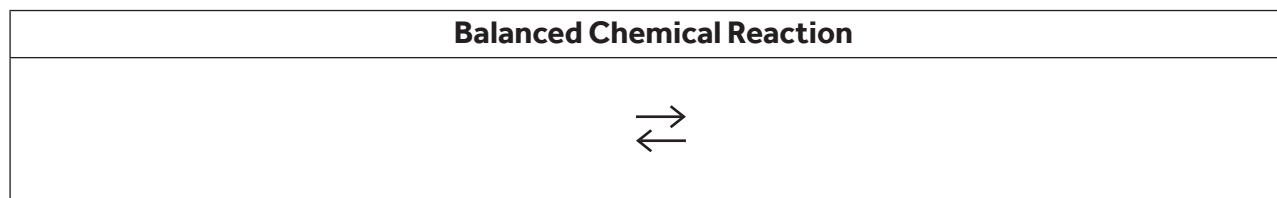
DECREASE  
NO<sub>2</sub> at Eq \_\_\_\_\_

## MISSION 2. EXPOSE THE DETAILS

Reaction			
What is the $K_c$ expression?			
At Eq, is the reaction more reactant or product heavy?			
$K_c > 1$ or $K_c < 1$			
	Target 1	Target 2	Target 3
What is another way to reach this target?			
Determine if these <b>increase, decrease, or remain the same</b> after the disturbance.	Concentration of reactants		
	Concentration of products		
	Temperature		
	Pressure		

# Equilibrium - Challenge Level 21

## MISSION 1. GATHER YOUR INTEL



### Target 1

INCREASE  
CO at Eq \_\_\_\_\_

### Target 2

INCREASE  
H<sub>2</sub>O at Eq \_\_\_\_\_

### Target 3

DECREASE  
CO<sub>2</sub> at Eq \_\_\_\_\_

## MISSION 2. EXPOSE THE DETAILS

Reaction			
What is the $K_c$ expression?			
At Eq, is the reaction more reactant or product heavy?			
$K_c > 1$ or $K_c < 1$			
	Target 1	Target 2	Target 3
What is another way to reach this target?			
Determine if these <b>increase, decrease, or remain the same</b> after the disturbance.	Concentration of reactants		
	Concentration of products		
	Temperature		
	Pressure		