

## SCH4U 4-1F: Chemical Equilibrium

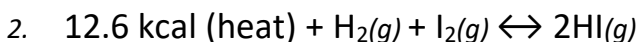
### ANSWER KEY

#### Applying Le Chatelier's Principle in Chemical Equilibrium

Use Le Chatelier's Principle to **determine** in which direction equilibrium will shift in each scenario. Complete the following charts by writing left, right, or none for the equilibrium shift, and decreases, increases, or remains the same for the concentrations of reactants and products. **Justify** your reasoning.



Stress	Equilibrium Shift	Reasoning
Add $\text{N}_2$	→ (right)	To consume excess $\text{N}_2$
Remove $\text{H}_2$	← (left)	To accommodate limited $\text{H}_2$ by creating more $\text{H}_2$
Increase Temperature	← (left)	Exothermic reaction: will shift to absorb the heat
Increase Pressure	→ (right)	Shift to the side that has less moles. 4 moles of reactants used to make 2 moles of products



Stress	Equilibrium Shift	Reasoning
Remove $\text{H}_2$	← (left)	To accommodate limited $\text{H}_2$ by creating more $\text{H}_2$
Adding a Catalyst	No shift	Catalysts do not affect equilibrium
Increase Temperature	→ (right)	Endothermic, reaction shifts to absorb heat
Decrease Pressure	No Shift	Both sides have an equal number of moles



Stress	Equilibrium Shift	Reasoning
Decrease Temperature	← (left)	Endothermic reaction, reaction shifts to create heat
Add $\text{CO}_2$	→ (right)	Shifts to use up the extra $\text{CO}_2$
Remove CO	→ (right)	To accommodate limited CO by creating more CO
Increase Pressure	← (left)	Gasses of a ratio of 1:2, so increase pressure, we shift towards the lower pressure to accommodate