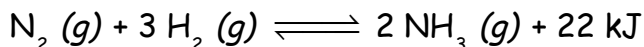


If a system at equilibrium is subjected to a \_\_\_\_\_, the equilibrium is displaced in the direction that relieves the \_\_\_\_\_.

- A stress is defined as any change which could affect the \_\_\_\_\_ of either or both the forward and/or reverse reaction.
- When, because of an applied stress, the forward reaction is faster than the reverse reaction, the system is said to shift to the (right, left). As a result, the [products] will (increase, decrease) and the [reactants] will (increase, decrease).
- When, because of an applied stress, the reverse reaction is faster than the forward reaction, the system is said to shift to the (right, left). As a result, the [products] will (increase, decrease) and the [reactants] will (increase, decrease).

*In simpler terms: If anything is added to a system at \_\_\_\_\_, the system will try to consume whatever was \_\_\_\_\_. If anything is removed from a system at equilibrium, the system will try to replace whatever was \_\_\_\_\_. So, the reaction is favored away from what is (added, removed) and toward what is (added, removed).*

1. In the following reaction, will the  $[H_2]$  increase or decrease when equilibrium is reestablished after these stresses are applied?



$NH_3(g)$ is added	_____	$N_2(g)$ is removed	_____
pressure is increased	_____	temperature is increased	_____

2. Note reaction:  $2 NO(g) + H_2(g) \rightleftharpoons N_2O(g) + H_2O(g) + 36 \text{ kJ}$

In which direction, left or right, will the equilibrium shift if the following changes are made?

NO is added	_____	the system is cooled	_____
$H_2$ is removed	_____	pressure is increased	_____
$N_2O$ is added	_____	$H_2$ is removed	_____

3. In this reaction:  $\text{CO}_2 (g) + \text{H}_2 (g) + \text{heat} \rightleftharpoons \text{CO} (g) + \text{H}_2\text{O} (g)$

a. Is heat absorbed or released by the forward reaction?

\_\_\_\_\_

b. In which direction will the equilibrium shift if these changes are made?

CO is added	_____	temperature is increased	_____
CO <sub>2</sub> is added	_____	system is cooled	_____
H <sub>2</sub> is removed	_____	pressure is increased	_____
catalyst is added	_____		

4. In this reaction:  $2 \text{NO} (g) + \text{H}_2 (g) \rightleftharpoons \text{N}_2\text{O} (g) + \text{H}_2\text{O} (g) + \text{heat}$

What will happen to the [H<sub>2</sub>O] when equilibrium is reestablished after these stresses are applied?

temperature is increased	_____
a catalyst is added	_____
pressure is decreased	_____
NO is added	_____
N <sub>2</sub> O is removed	_____

5. How would an increase in pressure affect the [H<sub>2</sub>] in the following reactions?

