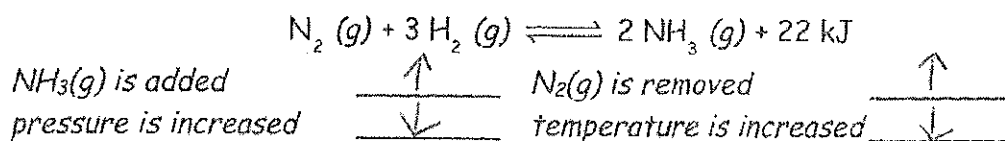


If a system at equilibrium is subjected to a stress, the equilibrium is displaced in the direction that relieves the stress.

- A stress is defined as any change which could affect the rate 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).

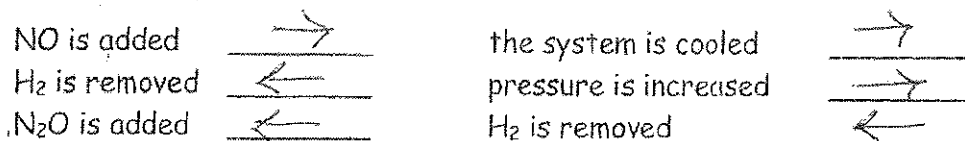
In simpler terms: If anything is added to a system at \rightleftharpoons , the system will try to consume whatever was added. If anything is removed from a system at equilibrium, the system will try to replace whatever was removed. So, the reaction is favored away from what is (added, removed) and toward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

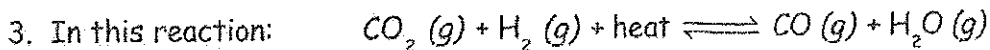
1. In the following reaction, will the $[H_2]$ increase or decrease when equilibrium is reestablished after these stresses are applied?



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

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





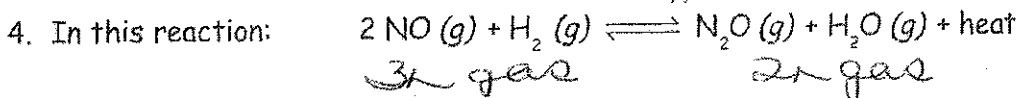
a. Is heat absorbed or released by the forward reaction?

absorbed

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

CO is added	\leftarrow	temperature is increased	\rightarrow
CO ₂ is added	\rightarrow	system is cooled	\leftarrow
H ₂ is removed	\leftarrow	pressure is increased	X
catalyst is added	X	<u>no shift = no effect</u>	<u>nothing</u>

same # n gas each side



3 n gas

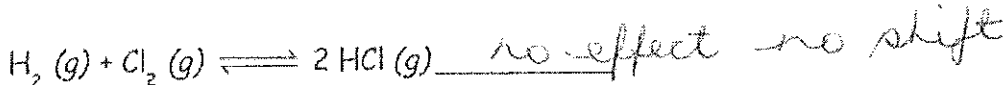
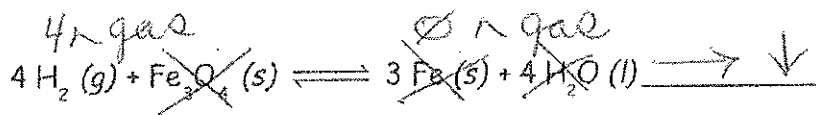
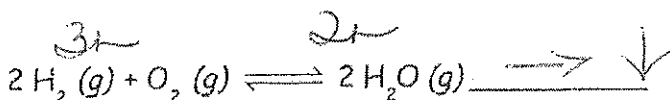
2 n gas

side no shift

What will happen to the [H₂O] when equilibrium is reestablished after these stresses are applied?

temperature is increased	\leftarrow	\downarrow	<u>no shift</u>
a catalyst is added	X	X	
pressure is decreased	\leftarrow	\downarrow	
NO is added	\rightarrow	\uparrow	
N ₂ O is removed	\rightarrow	\uparrow	

5. How would an increase in pressure affect the [H₂] in the following reactions?



2 n gas 2 n gas