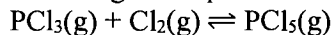


Key

17 • Le Chatelier's Principle

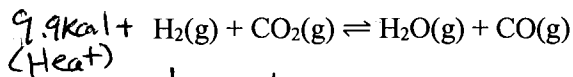
1. Consider the equilibrium $\text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g}) \rightleftharpoons \text{PCl}_5(\text{g})$.

How would the following changes affect the partial pressures of each gas at equilibrium?



- | | | | |
|---|---|---|---|
| a) addition of PCl_3 | ↓ | ↓ | ↑ |
| b) removal of Cl_2 | ↑ | ↑ | ↓ |
| c) removal of PCl_5 | ↓ | ↓ | ↑ |
| d) decrease in the volume of the container ($\uparrow P$) | ↓ | ↓ | ↑ |
| e) addition of He without change in volume | — | — | — |

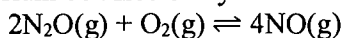
2. Indicate how each of the following changes affects the amount of each gas in the system below, for which $\Delta H_{\text{reaction}} = +9.9 \text{ kcal}$.



- | | | | | |
|--|---|---|---|---|
| a) addition of CO_2 | ↓ | ↓ | ↑ | ↑ |
| b) addition of H_2O | ↑ | ↑ | ↓ | ↓ |
| c) addition of a catalyst | — | — | — | — |
| d) increase in temperature | ↓ | ↓ | ↑ | ↑ |
| e) decrease in the volume of the container | — | — | — | — |

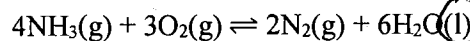
3. Consider the equilibrium: $2\text{N}_2\text{O}(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 4\text{NO}(\text{g})$

How will the amount of chemicals at equilibrium be affected by



- | | | | |
|--|---|---|---|
| a) adding N_2O | ↓ | ↓ | ↑ |
| b) removing O_2 | ↑ | ↑ | ↓ |
| c) increasing the volume of the container ($\downarrow P$) | ↓ | ↓ | ↑ |
| d) adding a catalyst | — | — | — |

4. For the reaction,
 How will the concentration of each chemical be affected by



- | | | | | |
|--|---|---|---|---|
| a) adding O_2 to the system | ↓ | ↓ | ↑ | ↑ |
| b) adding N_2 to the system | ↑ | ↑ | ↓ | ↓ |
| c) removing H_2O from the system | — | — | — | — |
| d) decreasing the volume of the container ($\uparrow P$) | ↓ | ↓ | ↑ | ↑ |

minimal impact as the surface area won't change much

liquids + solid behave differently
 Not impacted by pressure change