| #4 | State the direction in which each of the following equilibrium systems would be shifted upon the application of the following stress listed beside the equation. | | |
|---|---|---|---|
| **The Stress** | **Reaction** | **Right or Left** | **[ X ] increase or decrease** |
| decrease temperature | $2\ SO_{2\,(g)} + O_{2\,(g)} \text{ <---------> } 2\ SO_{3\,(g)}$ + energy | | $[SO_3]$ |
| increase temperature | $C_{\,(s)} + CO_{2\,(g)}$ + energy <---------> $2\ CO_{\,(g)}$ | | [C] |
| increase total pressure | $N_2O_{4\,(g)} \text{ <---------> } 2\ NO_{2\,(g)}$ | | $[N_2O_4]$ |
| decrease total pressure | $CO_{\,(g)} + H_2O_{\,(g)} \text{ <---------> } CO_{2\,(g)} + H_{2\,(g)}$ | | $[H_2]$ |
| decrease total pressure | $2\ NOBr_{\,(g)} \text{ <---------> } 2\ NO_{\,(g)} + Br_{2\,(g)}$ | | $[Br_2]$ |
| add $Fe_{(s)}$ | $3\ Fe_{\,(s)} + 4\ H_2O_{\,(g)} \text{ <---------> } Fe_3O_{4\,(s)} + 4\ H_{2\,(g)}$ | | [Fe] |
| add catalyst | $2SO_{2\,(g)} + O_{2\,(g)} \text{ <---------> } 2\ SO_{3\,(g)}$ | | $[O_2]$ |
| remove $CO_{2\,(g)}$ | $CaCO_{3\,(s)} \text{ <---------> } CaO_{\,(s)} + CO_{2\,(g)}$ | | $[CO_2]$ |
| increase $[H_{2\,(g)}]$ | $N_{2\,(g)} + 3\ H_{2\,(g)} \text{ <---------> } 2\ NH_{3\,(g)}$ | | $[H_2]$ |

| #5 | Consider the following equilibrium system: $3\ H_{2\,(g)} + N_{2\,(g)} \text{ <--------> } 2\ NH_{3\,(g)}$ + Heat. | | | |
|---|---|---|---|---|
| **The Stress** | **Right or Left** | **$[H_2]$** | **$[N_2]$** | **$[NH_3]$** |
| More $N_2$ is added to the system | | | | |
| Some $NH_3$ is removed from the system | | | | |
| The temperature is increased | | | | |
| The volume of the vessel is increased | | | | |
| A catalyst was added | | | | |

| #6 | Consider the following equilibrium system: $3\ Fe_{\,(s)} + 4\ H_2O_{\,(g)} \text{ <------> } Fe_3O_{4\,(s)} + 4\ H_{2\,(g)}$ | | | | |
|---|---|---|---|---|---|
| **The Stress** | **Right or Left** | **[Fe]** | **$[H_2O]$** | **$[Fe_3O_4]$** | **$[H_2]$** |
| The volume of the vessel is decreased | | | | | |
| The pressure is decreased | | | | | |
| More Fe is added to the system | | | | | |
| Some $Fe_3O_4$ is removed from the system | | | | | |
| A catalyst is added to the system | | | | | |