|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **#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** | | **[ ] increase or decrease** | | | |
| decrease temperature | | 2 SO2 (g) + O2 (g) <---------> 2 SO3 (g) + energy | | | | **R** | | [SO3] | | **INCR** | |
| increase temperature | | C (s) + CO2 (g) + energy<---------> 2 CO (g) | | | | **R** | | [C] | | **NO CHANGE** | |
| increase total pressure | | N2O4 (g) <---------> 2 NO2 (g) | | | | **L** | | [N2O4] | | **INCR** | |
| decrease total pressure | | CO (g) + H2O (g) <---------> CO2 (g) + H2 (g) | | | | **NO CHANGE** | | [H2] | | **NO CHANGE** | |
| decrease total pressure | | 2 NOBr (g) <---------> 2 NO (g) + Br2 (g) | | | | **R** | | [Br2] | | **INCR** | |
| add Fe(s) | | 3 Fe (s) + 4 H2O (g) <---------> Fe3O4 (s) + 4 H2 (g) | | | | **NO CHANGE** | | [H2] | | **NO CHANGE** | |
| add catalyst | | 2SO2 (g) + O2 (g) <---------> 2 SO3 (g) | | | | **NO CHANGE** | | [O2] | | **NO CHANGE** | |
| remove CO2 (g) | | CaCO3 (s) <---------> CaO (s) + CO2 (g) | | | | **R** | | [CaO] | | **NO CHANGE** | |
| increase [H2 (g)] | | N2 (g) + 3 H2 (g) <---------> 2 NH3 (g) | | | | **R** | | [N2] | | **DECR** | |
| **#5** | Consider the following equilibrium system: 3 H2 (g) + N2 (g) <--------> 2 NH3 (g) + Heat. | | | | | | | | | | |
| **The Stress** | | | **Right or Left** | **[H2]** | | **[N2]** | | | **[NH3]** | | |
| More N2 is added to the system | | | **R** | **DECR** | | skip | | | **INCR** | | |
| Some NH3 is removed from the system | | | **R** | **DECR** | | **DECR** | | | Skip | | |
| The temperature is increased | | | **L** | **INCR** | | **INCR** | | | **DECR** | | |
| The volume of the vessel is increased | | | **R** | **DECR** | | **DECR** | | | **INCR** | | |
| A catalyst was added | | | **NO CHANGE** | **NO CHANGE** | | **NO CHANGE** | | | **NO CHANGE** | | |
| **#6** | Consider the following equilibrium system: 3 Fe (s) + 4 H2O (g)  <------> Fe3O4 (s) + 4 H2 (g) | | | | | | | | | | |
| **The Stress** | | | **Right or Left** | **[Fe]** | **[H2O]** | | **[Fe3O4]** | | | | **[H2]** |
| The volume of the vessel is decreased | | | **NO CHANGE** | **NO CHANGE** | **NO CHANGE** | | **NO CHANGE** | | | | **NO CHANGE** |
| The pressure is decreased | | | **NO CHANGE** | **NO CHANGE** | **NO CHANGE** | | **NO CHANGE** | | | | **NO CHANGE** |
| More Fe is added to the system | | | **NO CHANGE** | skip | **NO CHANGE** | | **NO CHANGE** | | | | **NO CHANGE** |
| Some Fe3O4 is removed from the system | | | **NO CHANGE** | **NO CHANGE** | **NO CHANGE** | | skip | | | | **NO CHANGE** |
| A catalyst is added to the system | | | **NO CHANGE** | **NO CHANGE** | **NO CHANGE** | | **NO CHANGE** | | | | **NO CHANGE** |