|  |  |
| --- | --- |
| **#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** |