**Name: Period: Seat#:**

**Worksheet #2**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **#1** | **N2O4 (g)  <--------> 2NO2(g) ΔH = + 92 KJ** | | | | | | | | | | | |
| **The Stress** | | **Shift Right or Left** | | **∆ [N2O4]** | | | **∆ [NO2]** | | | **∆ Temperature** | | |
| [N2O4] is increased | |  | |  | | |  | | |  | | |
| [NO2] is increased | |  | |  | | |  | | |  | | |
| Temp is increased | |  | |  | | |  | | |  | | |
| [N2O4] is decreased | |  | |  | | |  | | |  | | |
| [NO2] is decreased | |  | |  | | |  | | |  | | |
| Temp is decreased | |  | |  | | |  | | |  | | |
| **#2** | **4HCl (g)  + O2 (g) <--------> 2H2O(g) + 2Cl2 (g) + 98 KJ** | | | | | | | | | | | |
| **The Stress** | | **Shift Right or Left** | **∆ [HCl]** | | **∆ [O2]** | | | **∆ [H2O]** | | | | **∆ Temperature** |
| [HCl] is increased | |  |  | |  | | |  | | | |  |
| [H2O] is increased | |  |  | |  | | |  | | | |  |
| [O2] is increased | |  |  | |  | | |  | | | |  |
| Temp is increased | |  |  | |  | | |  | | | |  |
| **#3** | **CaCO3 (s) + 170 KJ <----------> CaO (s) + CO2 (g)**  Reminder: Adding or removing solids or liquids does not shift the equilibrium. | | | | | | | | | | | |
| **The Stress** | | **Shift Right or Left** | **∆ [CaCO3]** | | | **∆ Temperature** | | | **∆ [CaO]** | | **∆ [CO2]** | |
| CaCO3 is added | |  |  | | |  | | |  | |  | |
| CaO is added | |  |  | | |  | | |  | |  | |
| CO2 is added | |  |  | | |  | | |  | |  | |
| Temp is decreased | |  |  | | |  | | |  | |  | |
| A catalyst is added | |  |  | | |  | | |  | |  | |
| [CO2] is decreased | |  |  | | |  | | |  | |  | |
| Temp is increased | |  |  | | |  | | |  | |  | |
| CaO is removed | |  |  | | |  | | |  | |  | |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **#4** | **State the direction in which each of the following equilibrium systems would be shifted upon the application of the following stress. Then state if the concentration of the listed substance will increase or decrease.** | | | | | | | | |
| **The Stress** | | **Reaction** | | | **Shift Right or Left** | | | **[ X ] increase or decrease?** | |
| decrease temperature | | 2 SO2 (g) + O2 (g) <---------> 2 SO3 (g) + energy | | |  | | | [SO3] | |
| increase temperature | | C (s) + CO2 (g) + energy<---------> 2 CO (g) | | |  | | | [C] | |
| increase total pressure | | N2O4 (g) <---------> 2 NO2 (g) | | |  | | | [N2O4] | |
| decrease total pressure | | CO (g) + H2O (g) <---------> CO2 (g) + H2 (g) | | |  | | | [H2] | |
| decrease total pressure | | 2 NOBr (g) <---------> 2 NO (g) + Br2 (g) | | |  | | | [Br2] | |
| add Fe(s) | | 3 Fe (s) + 4 H2O (g) <---------> Fe3O4 (s) + 4 H2 (g) | | |  | | | [Fe] | |
| add catalyst | | 2SO2 (g) + O2 (g) <---------> 2 SO3 (g) | | |  | | | [O2] | |
| remove CO2 (g) | | CaCO3 (s) <---------> CaO (s) + CO2 (g) | | |  | | | [CO2] | |
| increase [H2 (g)] | | N2 (g) + 3 H2 (g) <---------> 2 NH3 (g) | | |  | | | [H2] | |
| **#5** | Consider the following equilibrium system: 3 H2 (g) + N2 (g) <--------> 2 NH3 (g) + Heat. | | | | | | | | |
| **The Stress** | | | **Shift Right or Left** | **∆ [H2]** | | **∆[N2]** | **∆ [NH3]** | | **∆ Heat** |
| More N2 is added to the system | | |  |  | |  |  | |  |
| Some NH3 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 H2O (g)  <------> Fe3O4 (s) + 4 H2 (g) | | | | | | | | |
| **The Stress** | | | **Shift Right or Left** | **∆ [Fe]** | | **∆ [H2O]** | **∆ [Fe3O4]** | | **∆ [H2]** |
| The volume of the vessel is decreased | | |  |  | |  |  | |  |
| The pressure is decreased | | |  |  | |  |  | |  |
| More Fe is added to the system | | |  |  | |  |  | |  |
| Some Fe3O4 is removed from the system | | |  |  | |  |  | |  |
| A catalyst is added to the system | | |  |  | |  |  | |  |