

#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	$2 \text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2 \text{SO}_3(\text{g}) + \text{energy}$	R	[SO <sub>3</sub> ]	INCR	
increase temperature	$\text{C}(\text{s}) + \text{CO}_2(\text{g}) + \text{energy} \rightleftharpoons 2 \text{CO}(\text{g})$	R	[C]	NO CHANGE	
increase total pressure	$\text{N}_2\text{O}_4(\text{g}) \rightleftharpoons 2 \text{NO}_2(\text{g})$	L	[N <sub>2</sub> O <sub>4</sub> ]	INCR	
decrease total pressure	$\text{CO}(\text{g}) + \text{H}_2\text{O}(\text{g}) \rightleftharpoons \text{CO}_2(\text{g}) + \text{H}_2(\text{g})$	NO CHANGE	[H <sub>2</sub> ]	NO CHANGE	
decrease total pressure	$2 \text{NOBr}(\text{g}) \rightleftharpoons 2 \text{NO}(\text{g}) + \text{Br}_2(\text{g})$	R	[Br <sub>2</sub> ]	INCR	
add Fe <sub>(s)</sub>	$3 \text{Fe}(\text{s}) + 4 \text{H}_2\text{O}(\text{g}) \rightleftharpoons \text{Fe}_3\text{O}_4(\text{s}) + 4 \text{H}_2(\text{g})$	NO CHANGE	[H <sub>2</sub> ]	NO CHANGE	
add catalyst	$2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2 \text{SO}_3(\text{g})$	NO CHANGE	[O <sub>2</sub> ]	NO CHANGE	
remove CO <sub>2</sub> (g)	$\text{CaCO}_3(\text{s}) \rightleftharpoons \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$	R	[CaO]	NO CHANGE	
increase [H <sub>2</sub> (g)]	$\text{N}_2(\text{g}) + 3 \text{H}_2(\text{g}) \rightleftharpoons 2 \text{NH}_3(\text{g})$	R	[N <sub>2</sub> ]	DECR	
#5	Consider the following equilibrium system: $3 \text{H}_2(\text{g}) + \text{N}_2(\text{g}) \rightleftharpoons 2 \text{NH}_3(\text{g}) + \text{Heat}$ .				
The Stress	Right or Left	[H <sub>2</sub> ]	[N <sub>2</sub> ]	[NH <sub>3</sub> ]	
More N <sub>2</sub> is added to the system	R	DECR	skip	INCR	
Some NH <sub>3</sub> 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: $3 \text{Fe}(\text{s}) + 4 \text{H}_2\text{O}(\text{g}) \rightleftharpoons \text{Fe}_3\text{O}_4(\text{s}) + 4 \text{H}_2(\text{g})$				
The Stress	Right or Left	[Fe]	[H <sub>2</sub> O]	[Fe <sub>3</sub> O <sub>4</sub> ]	[H <sub>2</sub> ]
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 Fe <sub>3</sub> O <sub>4</sub> 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