Equilibrium: LeChatlier's Principle Name: _____

Describe which direction the equilibrium will shift under the conditions listed.

heat **CH_4 (g) + H_2O (g) ⇄ CO (g) + $3H_2$ (g) $\Delta H = +72$ kJ**

1) Increase the concentration of the reactants shifts right
2) Increase the pressure shifts left
3) Add carbon monoxide shifts left
4) Decrease the concentration of the products shifts right
5) Decrease temperature shifts left
6) Add more water shifts right
7) Decrease the amount of hydrogen gas shifts right

$2\ SO_{2\,(g)} + O_{2\,(g)}$ ⇄ $2\ SO_{3\,(g)}$ heat **$\Delta H = -27$ kJ**

8) O_2 is added to the reaction shifts right
9) The concentration of SO_3 is increased shifts left
10) The temperature is increased shifts left
11) The pressure is increased shifts right
12) SO_2 is removed shifts left
13) The concentration of SO_3 is decreased shifts right

Theory *Indicate if true or false. If false, then correct it.*

14) At equilibrium, the concentration of reactants and products are equal. FALSE – the concentration of reactants and products remain constant at equilibrium
15) When a reaction reaches equilibrium, it stops. FALSE – even though it visually looks like nothing changes, the rate of the forward reaction equals the rate of the reverse reaction
16) A reversible reaction is one that can proceed in the forward and the reverse directions. TRUE
17) A reversible reaction in a closed container can never reach equilibrium. FALSE – in a closed container, a reversible reaction will always reach equilibrium
18) If ΔH is positive, then the reaction is endothermic. TRUE

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2) Increase the pressure
3) Add carbon monoxide
4) Decrease the concentration of the products
5) Decrease temperature
6) Add more water
7) Decrease the amount of hydrogen gas

$2\ SO_{2\,(g)} + O_{2\,(g)}$ ⇄ $2\ SO_{3\,(g)}$ $\Delta H = -27$ kJ

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