Learning Check Q #20, 21.23 pg 438

20. endothermic — heat is on the left side of the equation

a) if the system is heated then the reaction will shift to the right side

b) the reactant [ ] will start to ↓ and product [ ] will ↑

21. A catalyst does not shift the equilibrium

23. exothermic — heat on the right side of the equation

a) if the system is heated then the reaction will shift to the left side

b) the reactant [ ] will ↑ and the product [ ] will ↓

Practice Problems Q # 21-27 pg 439

21. $2HI(g) \rightleftharpoons H_2(g) + I_2(g) + 52\,kJ$

If the temperature ↑ then the reaction will shift towards the reactants

For 22-25 V↑ P↓

22. $CO_2(g) + H_2(g) \rightleftharpoons CO(g) + H_2O(g)$

∴ there is the same # of particles on both sides of the equation there would be no shift.

23. $2NO_2(g) \rightleftharpoons N_2O_4$

V↑ the reaction shifts to the side with more particles

∴ it shifts to the reactant side.

24. $2CO_2(g) \rightleftharpoons 2CO(g) + O_2(g)$

V↑ the reaction shifts to the right (product) side since there is more particles

25. $CH_{4(g)} + 2H_2S_{(g)} \rightleftharpoons CS_{2(g)} + 4H_{2(g)}$

V↑ it will shift to the right side (product)

∵ there are more particles.