The ULTIMATE Equilibrium Problem...

Consider the following equation: $\mathbf{NH_4HS\ (s) \leftrightarrows NH_3\ (g) + H_2S\ (g)}$

1. Some solid NH_4HS is placed in an evacuated vessel at 25°C. After Eq. is attained, the total pressure in the system is 0.659 atm. Some solid NH_4HS remains in the vessel at Eq. CALCULATE K_p.

2. Some extra NH_3 (g) is injected into the vessel. When Eq. is reestablished, the partial pressure of NH_3 (g) in the vessel is 2x the partial pressure of H_2S (g). Calculate the P_{NH3} and P_{H2S}.

3. In a *different* experiment, NH_3 and H_2S are introduced into an evacuated 1.00 L vessel at 25°C. The initial pressure of each gas is 0.500 atm. Calculate the partial pressure of NH_3 (g) and H_2S (g) as well as the moles of solid of NH_4HS all present at Eq.

4. Knowing the K_p from above, calculate K'_p for the following reaction: $2\ NH_3\ (g) + 2\ H_2S\ (g) \quad 2\ NH_4HS\ (s)$

5. If K_p at 45°C is 0.00108, is this reaction ENDO- or EXO- ???

6. Considering the original reaction: NH_4HS (s) NH_3 (g) + H_2S (g)

- Which way would the reaction shift in each case?
- What would happen to the moles of H_2S?
- What would happen to K?

EXPLAIN your answers....use Energy diagrams and symbols as much as possible!

a. Add more NH_4HS.

b. Increase the P by decreasing the volume.

c. Add a catalyst.

d. While maintaining the same volume, add some Argon.

e. While maintaining the same pressure, add some Argon.

f. Decrease the temperature.

g. Add some HCl.