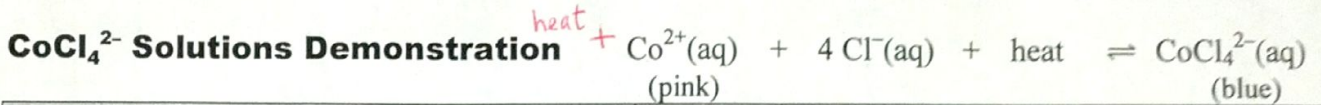


18 • Equilibrium

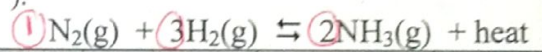
LE CHATELIER'S PRINCIPLE

When a stress is added to a system at equilibrium, the system will shift to reduce that stress.



	Stress	Change	Co ²⁺	Cl ⁻	Heat	Shift	CoCl ₄ ²⁻
1. Add HCl	too much Cl ⁻	pink → blue	↓	↑ more		↷	↑
2. Add AgNO ₃	removes Cl ⁻	blue → pink	↑	↓ less		↶	↓
3. Add heat	heat ↑	pink → blue	↓	↓		↷	↑
4. Remove heat	heat ↓	blue → pink	↑	↑		↶	↓

Complete the following chart by writing by indicating the shift for the equilibrium (↷ or ↶) and whether the other values increase (↑), decrease (↓) or remain unchanged (-).



	Stress	[N ₂]	[H ₂]	Shift	[NH ₃]
1. Add N ₂	too much N ₂	↑	↓	↷	↑
2. Add H ₂		↓	↑	↷	↑
3. Add NH ₃		↑	↑	↶	↑
4. Remove N ₂		↓	↑	↶	↓
5. Remove H ₂		↑	↓	↶	↓
6. Remove NH ₃		↓	↓	↷	↓
7. Increase Temperature		↑	↑	↶	↓
8. Decrease Temperature		↓	↓	↷	↑
9. Increase Pressure (decrease volume)		↓	↓	↷	↑
10. Decrease Pressure (increase volume)		↑	↑	↶	↓

11. Add a catalyst

— — — No Shift —