

A completed equilibrium note

Original teaching example, not a student result. Paper exercise using ideal gases; not a lab procedure. Source-checked with OpenStax Chemistry 2e, sections 13.2 and 13.3.

QUESTION / CONDITION	ANSWER / REASON / CHECK
Starting system	$\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$, initially at equilibrium in a closed container. Forward and reverse rates are equal, not necessarily the concentrations.
Change and fixed condition	Compress to half the original volume at fixed temperature. Before readjustment, the partial pressure of each reacting gas doubles.
Prediction and reason	Net reaction goes right, toward NH_3 . Gas coefficients total 4 on the left and 2 on the right. Compression favors fewer gas particles.
Independent Q check	$Q_p = p(\text{NH}_3)^2 / [p(\text{N}_2) \times p(\text{H}_2)^3]$. Use pressures relative to the same standard pressure. Initially $Q_p = K_p$. After compression: $Q' = (2^2/2^4)K_p = K_p/4$. $Q' < K_p$, so net reaction goes right.
Limit / wrong shortcut	A shift does not mean complete conversion; final amounts are not calculated. K_p stays fixed. "Higher total pressure always shifts right" is wrong: inert gas at fixed V and T leaves reacting partial pressures unchanged.
Changed case + answer	Instead double volume at fixed T. Each reacting partial pressure halves: $Q' = [(1/2)^2/(1/2)^4]K_p = 4K_p$. Net reaction goes left.

Summary: record the changed variable and fixed conditions beside the equation. Cover the answer column and explain the changed case before checking.

Source / verification: OpenStax Chemistry 2e 13.2 (Q and K), 13.3 (equilibrium shifts). Facts checked September 14, 2026. Wording, layout, and exercise are original; no textbook figure is reproduced.

OpenStax 13.2: Equilibrium Constants

OpenStax 13.3: Shifting Equilibria

Your two-column chemistry note

Print and write by hand. This is not a fillable PDF. For typing, use the companion TXT from the article. Fill one concept, then cover the right column and answer from the left.

Topic: _____

Course source / section / page / checked date: _____

QUESTION / CONDITION	ANSWER / REASON / CHECK
Core idea / question	
Equation / symbols / units	
What changes? What stays fixed?	
Worked example / givens	
Changed case / answer	
Error / correction / retry	

One-sentence summary: _____

Check the answer against your source. Label the exact error and one new question to try. The article contains the completed example and four explained changed-condition questions.