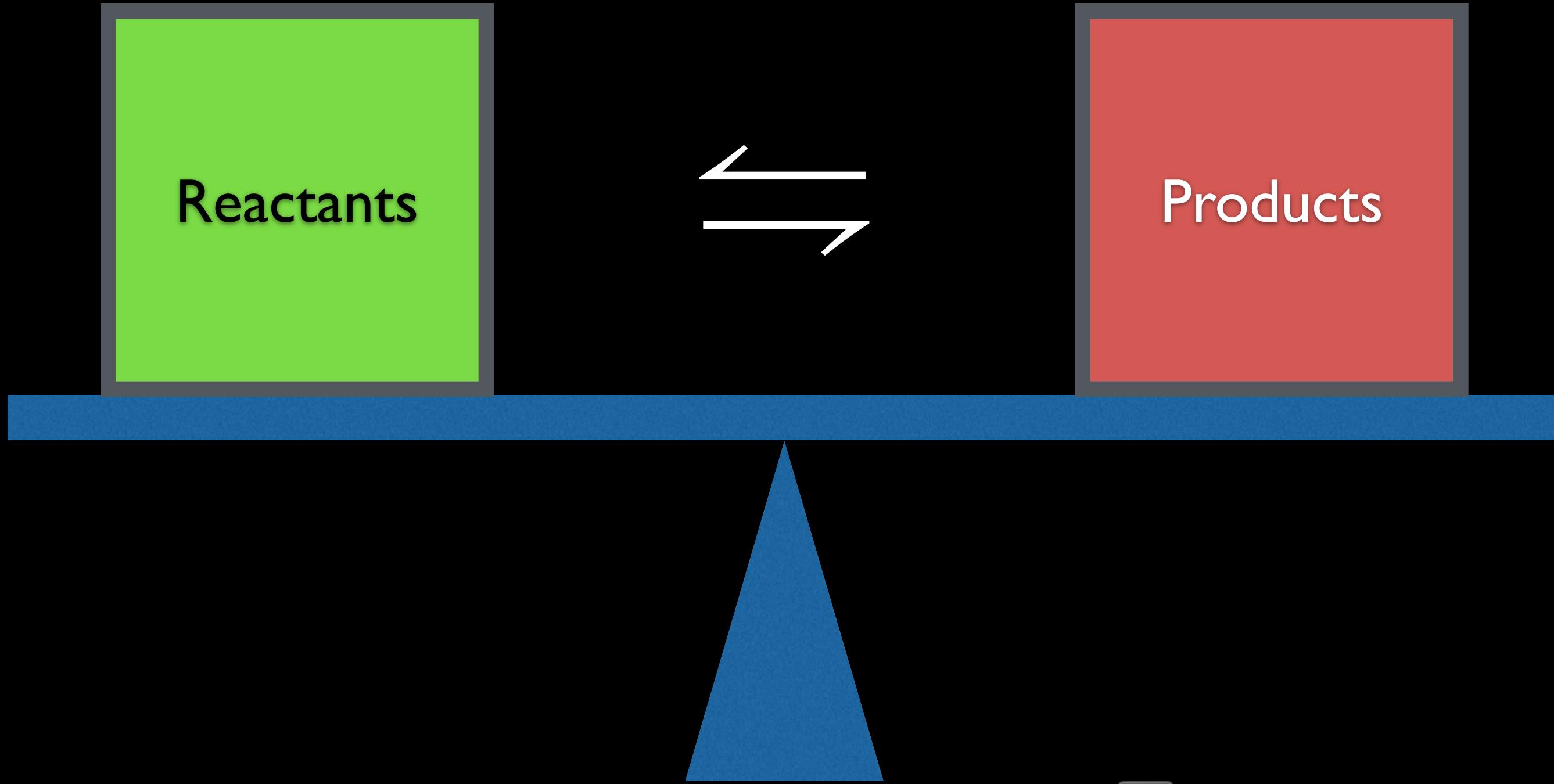
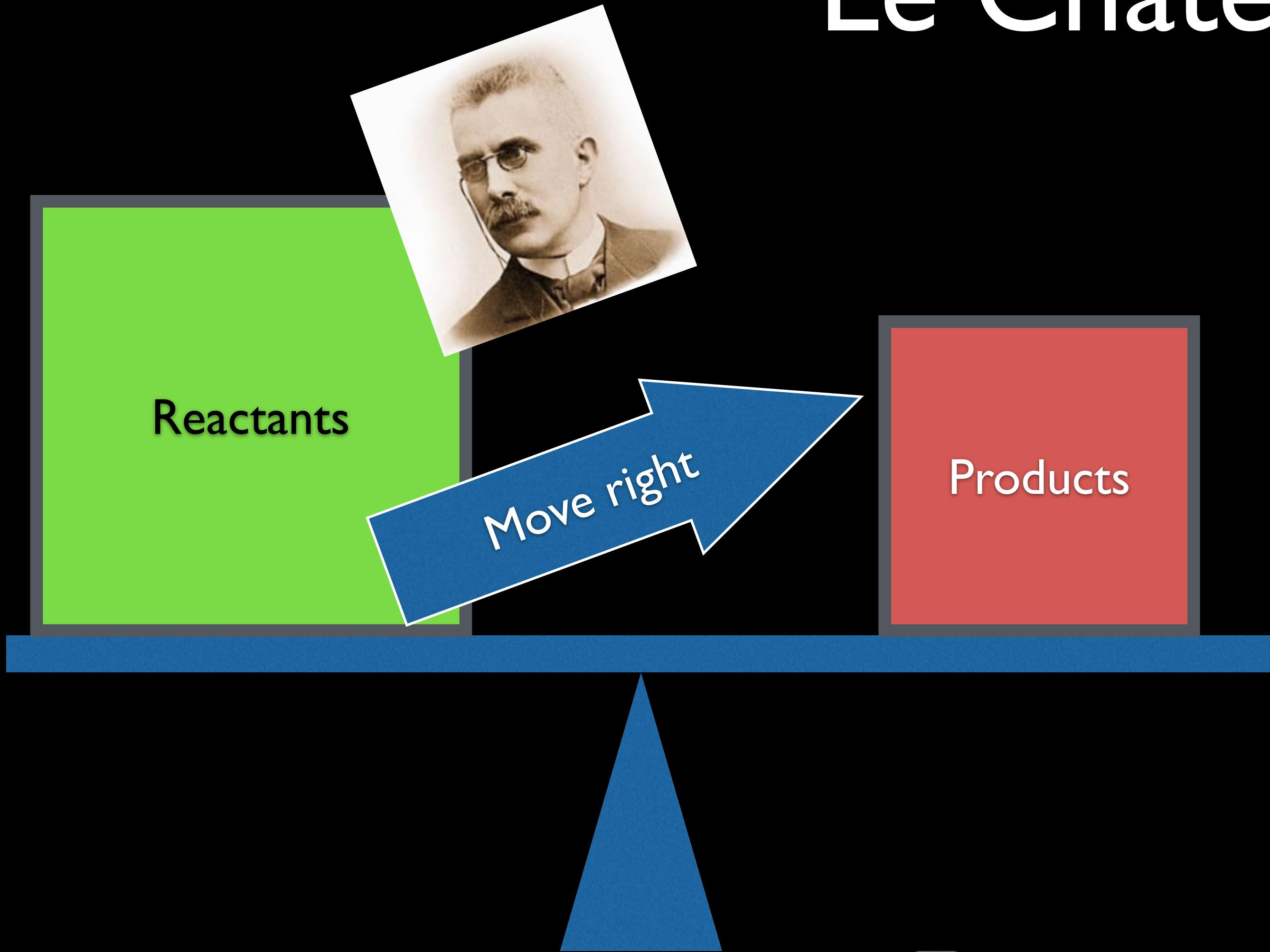


Le Châtelier's Principle

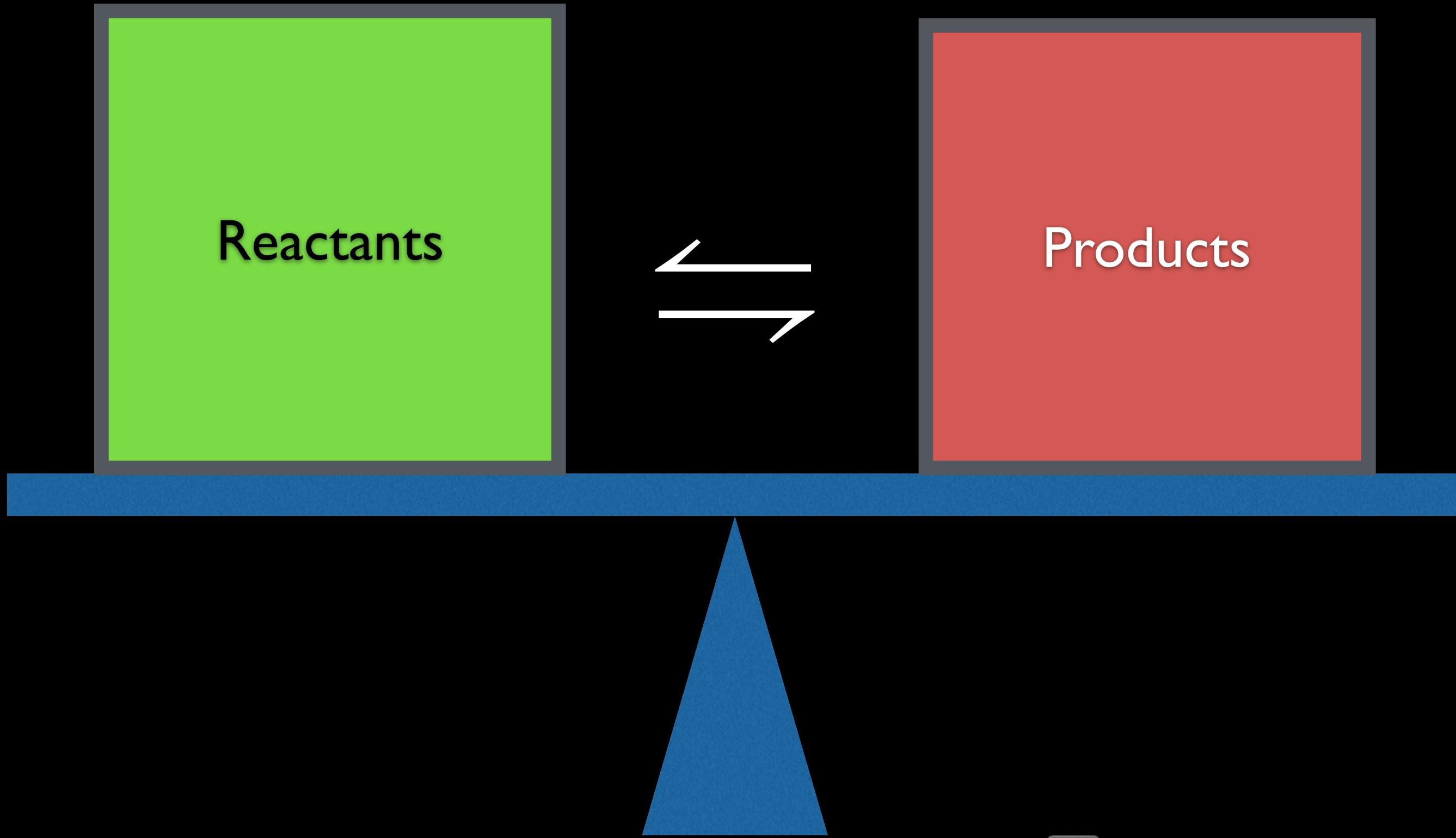


Le Châtelier's Principle



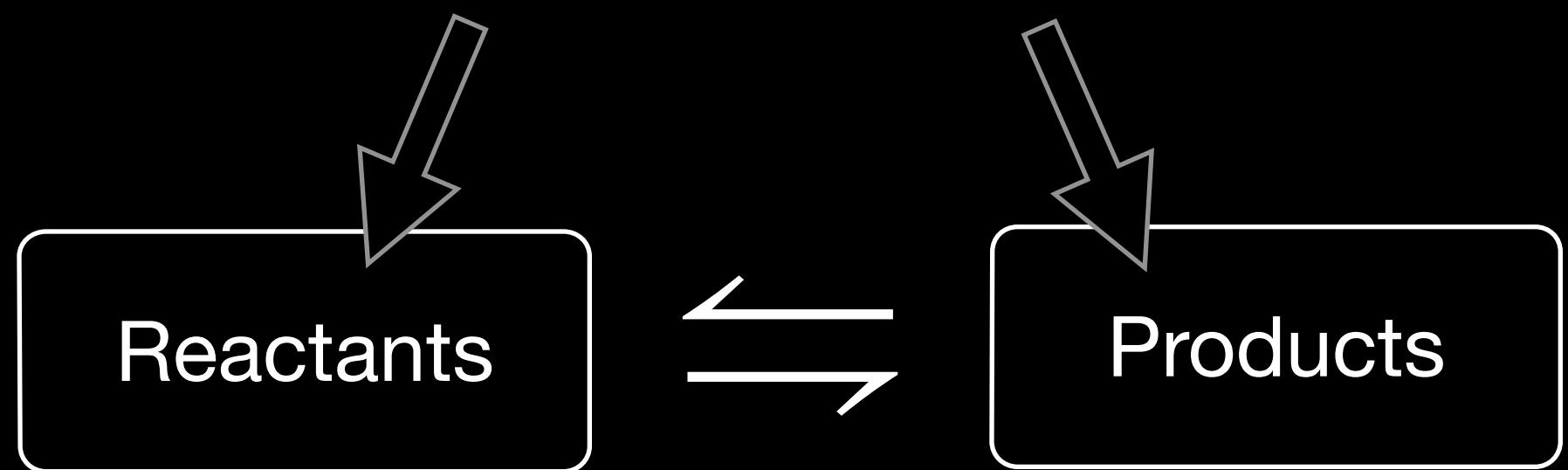
Chemistry Essentials - 066

Le Châtelier's Principle



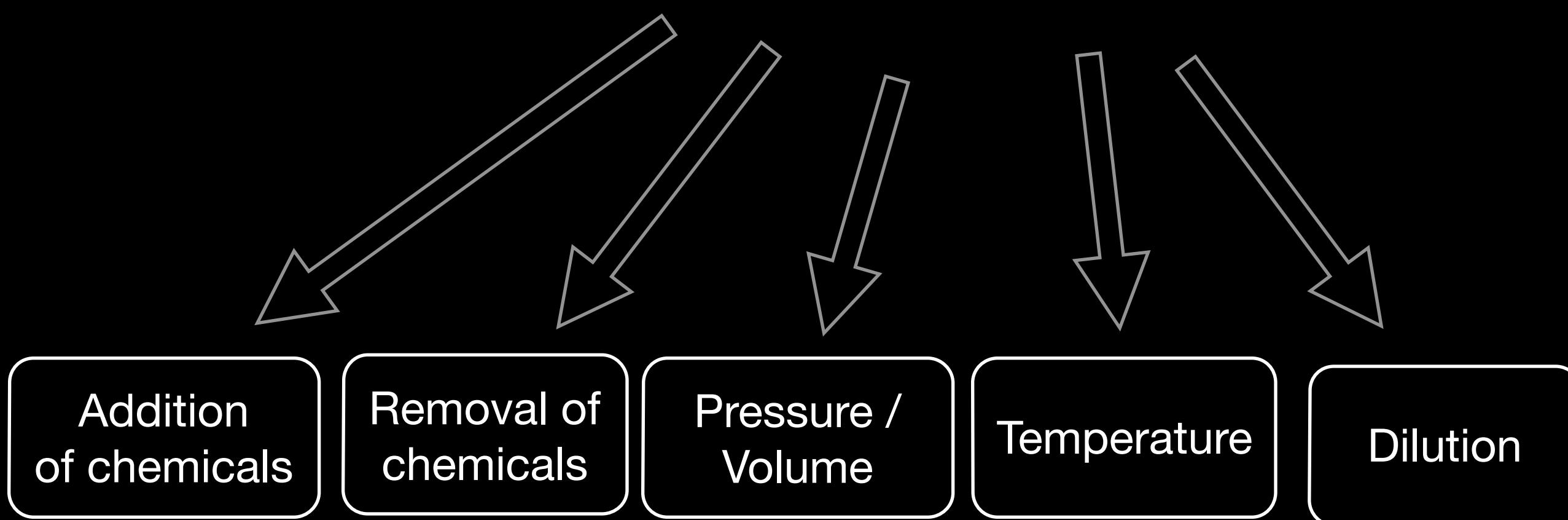
Chemistry Essentials - 066

Le Châtelier's Principle



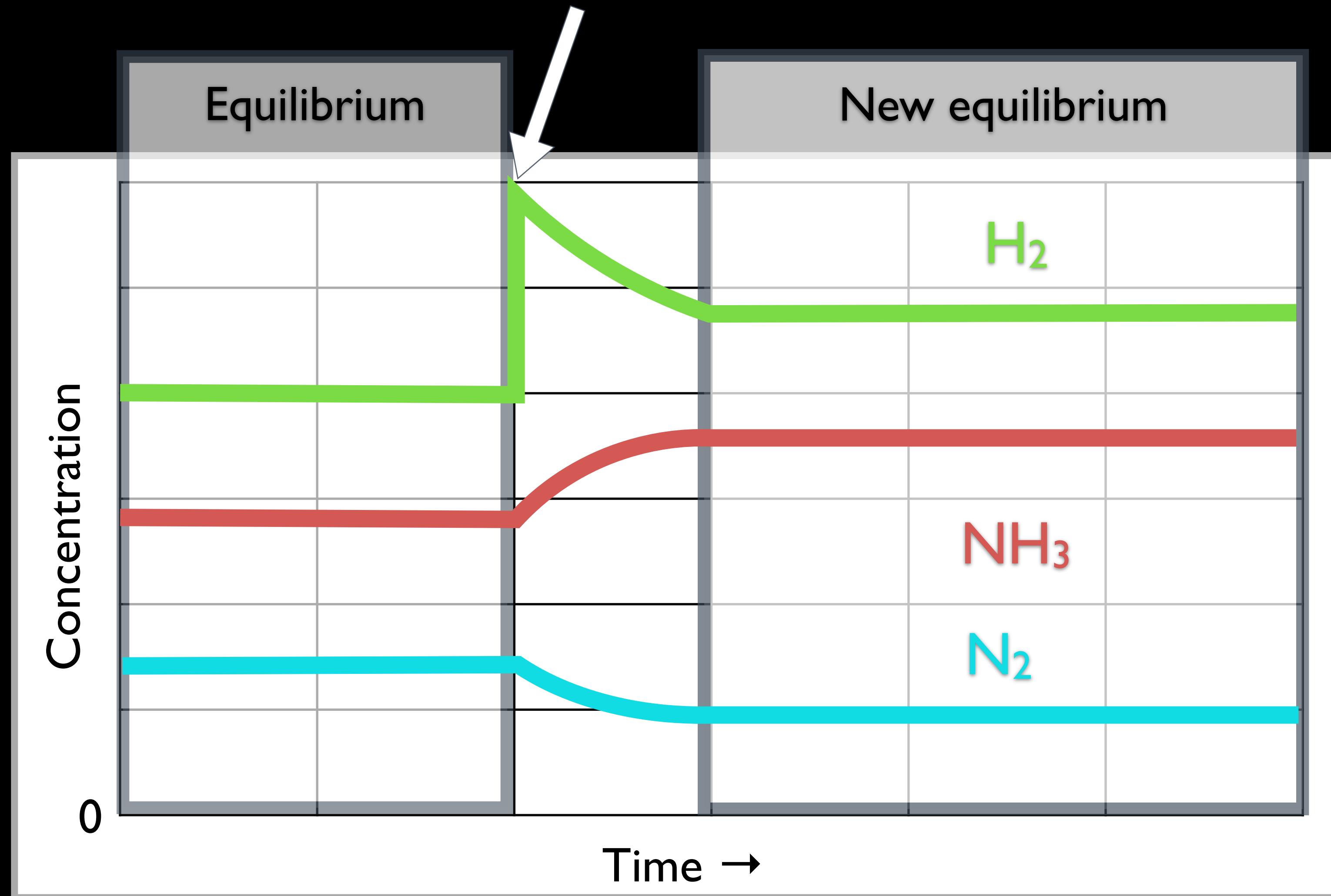
Equilibrium

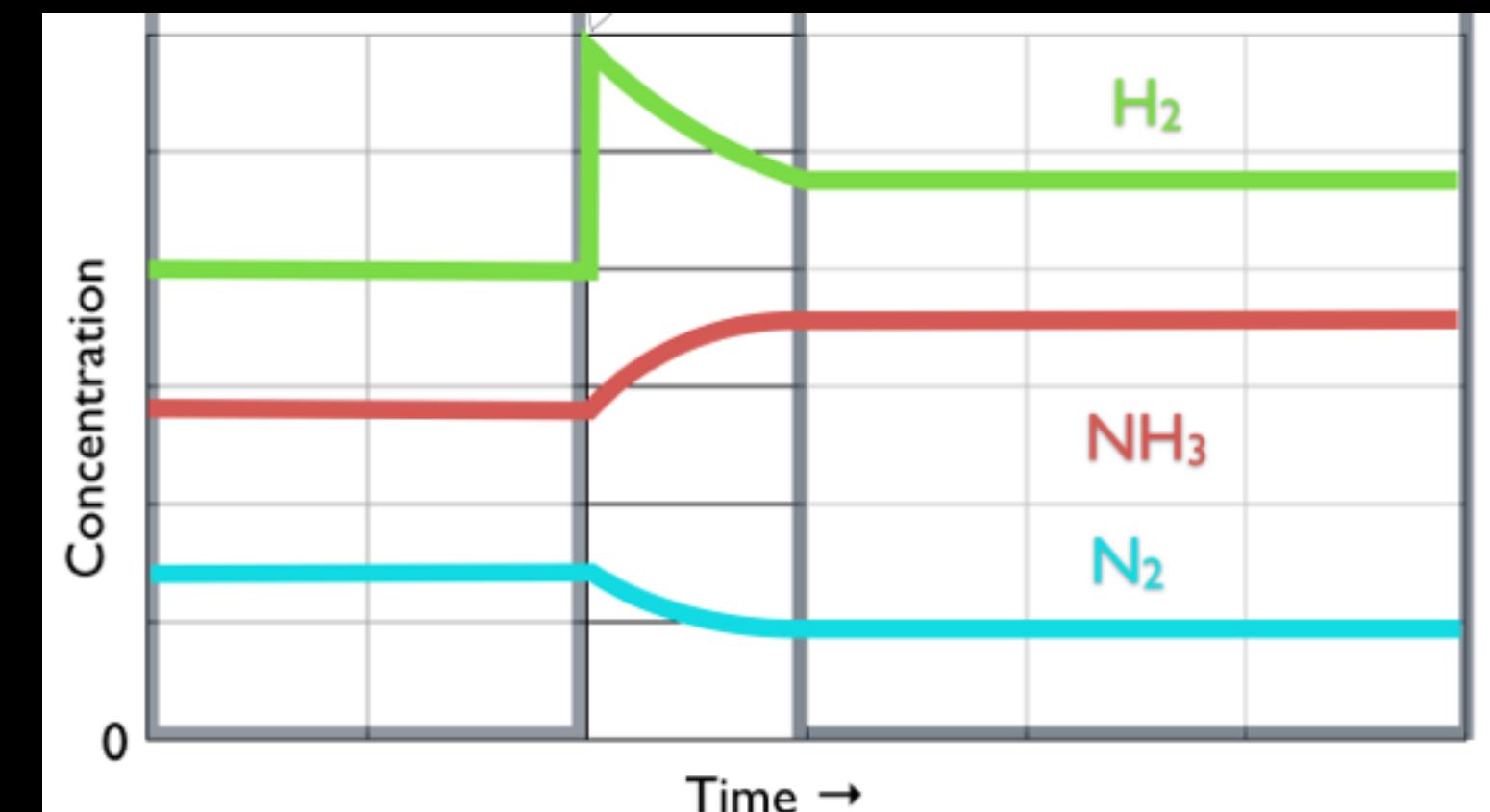
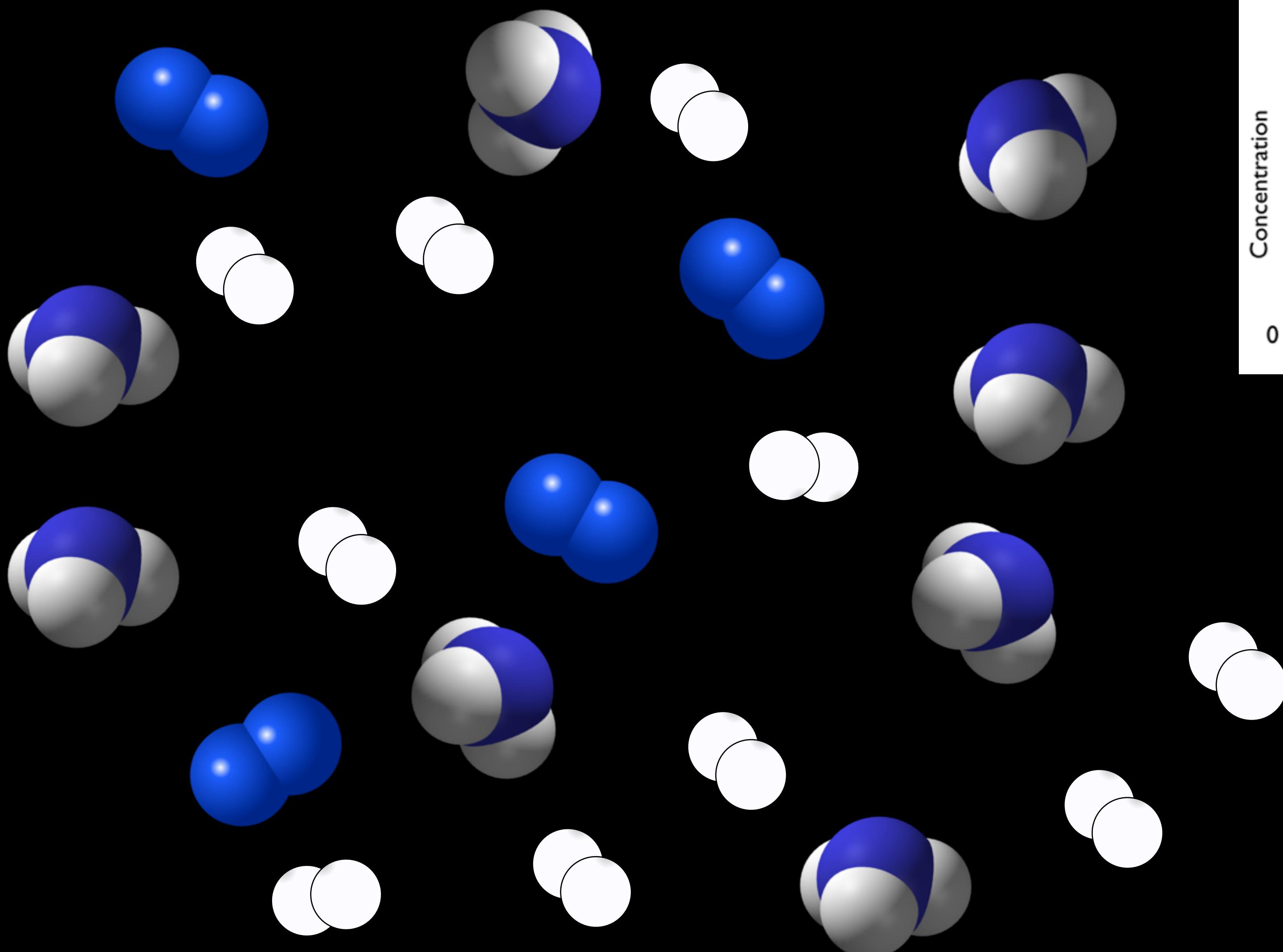
Disturbance



Concentration

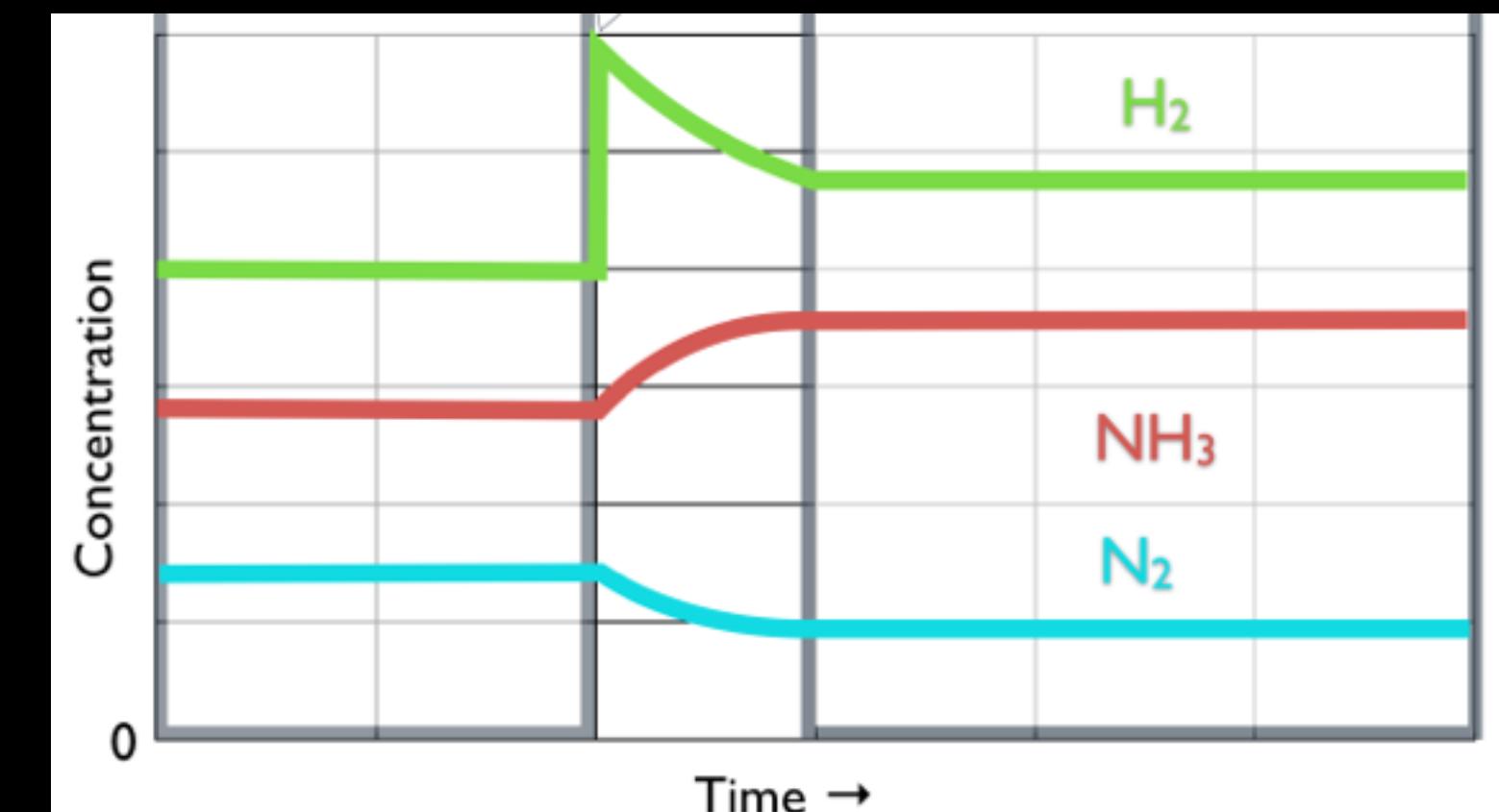
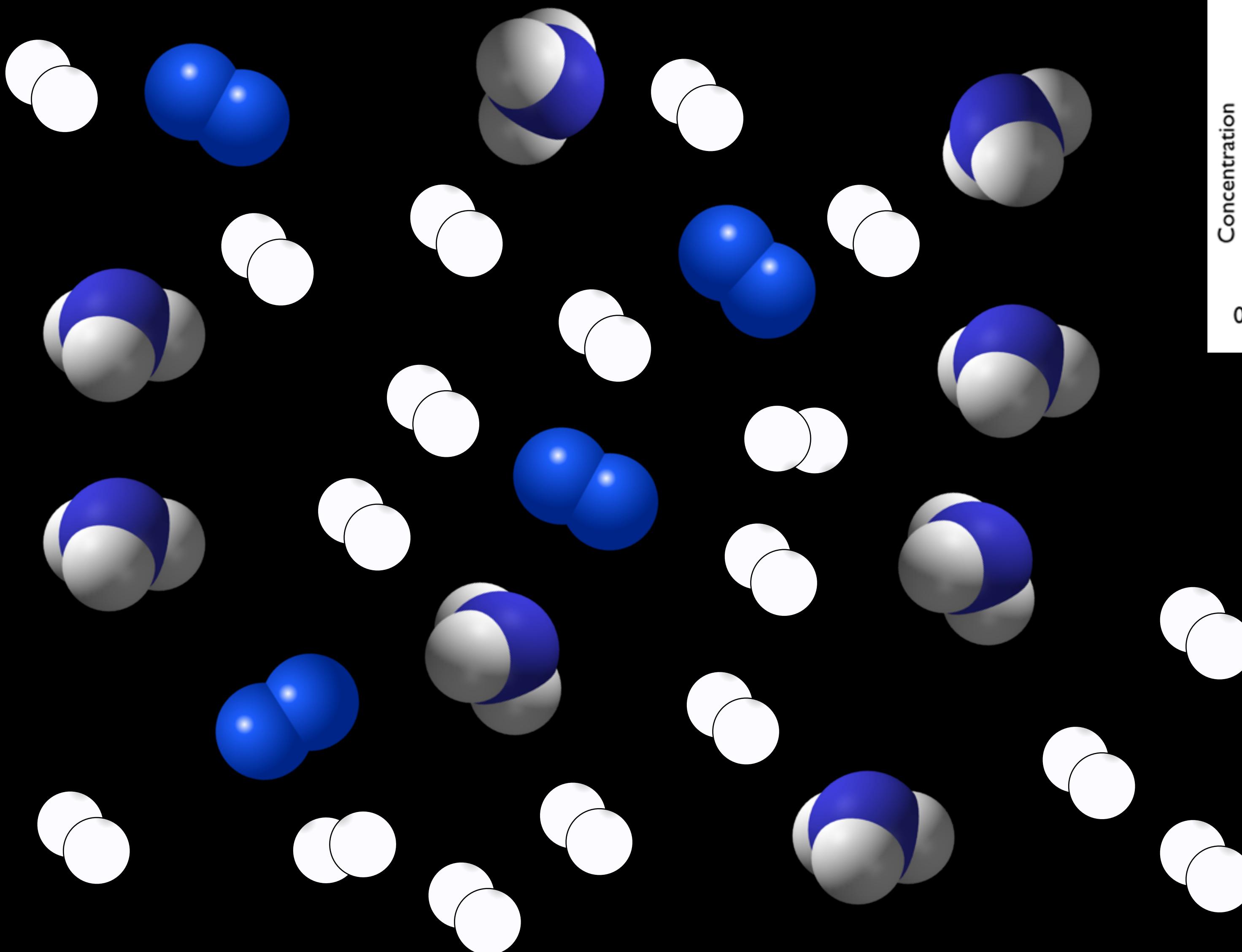
H_2 is added





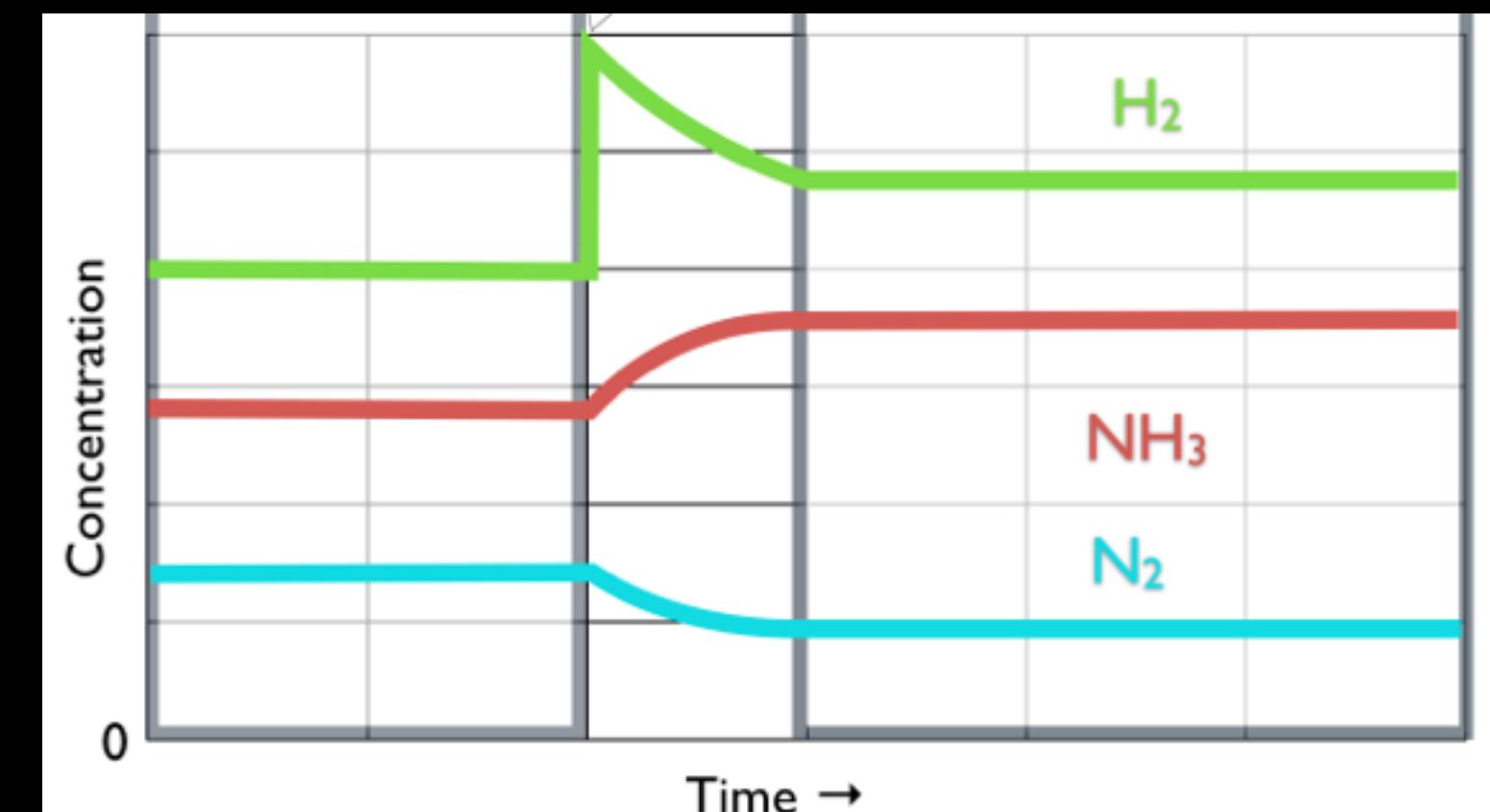
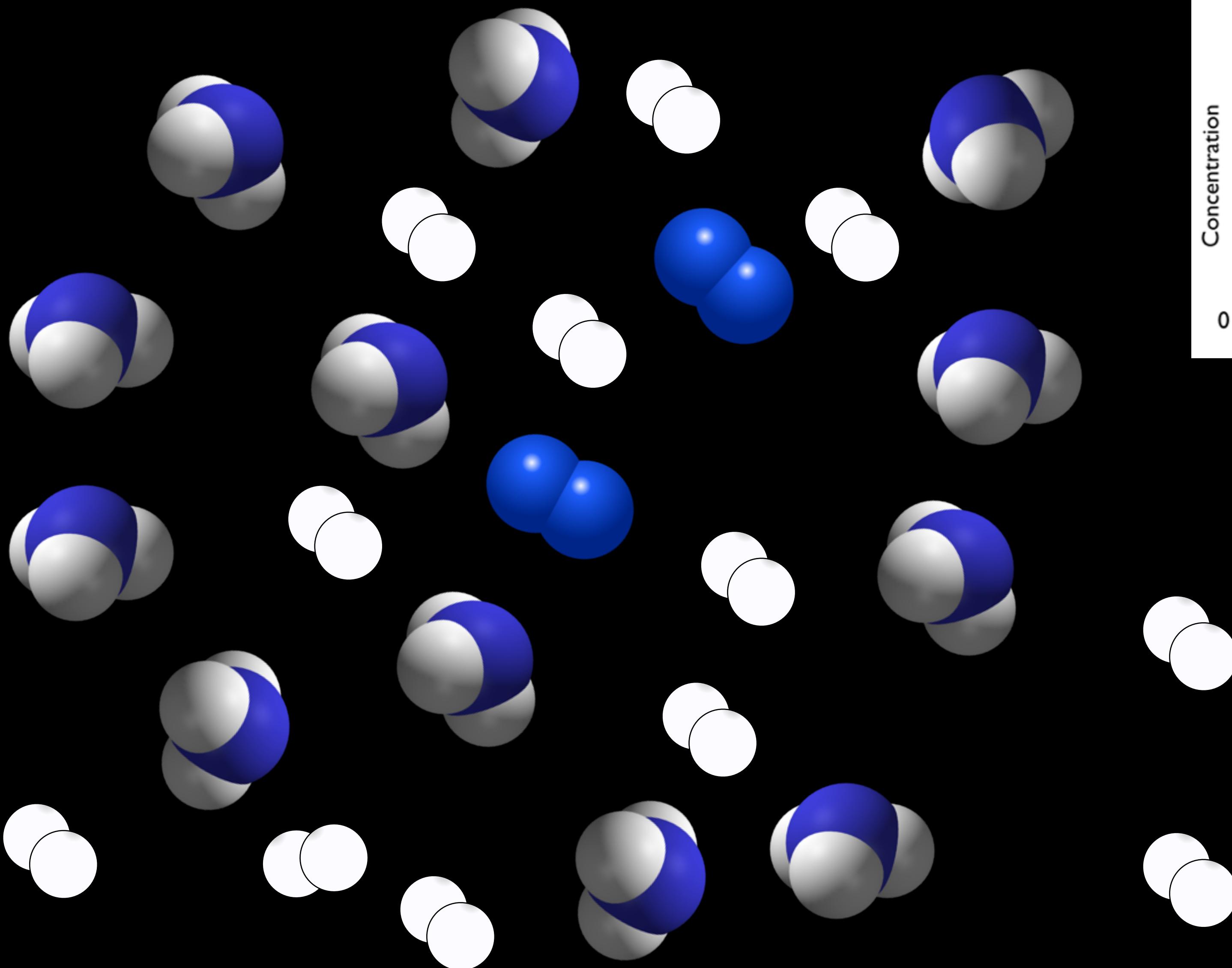
$$K = \frac{[\text{products}]}{[\text{reactants}]}$$





$$K = \frac{[\text{products}]}{[\text{reactants}]}$$

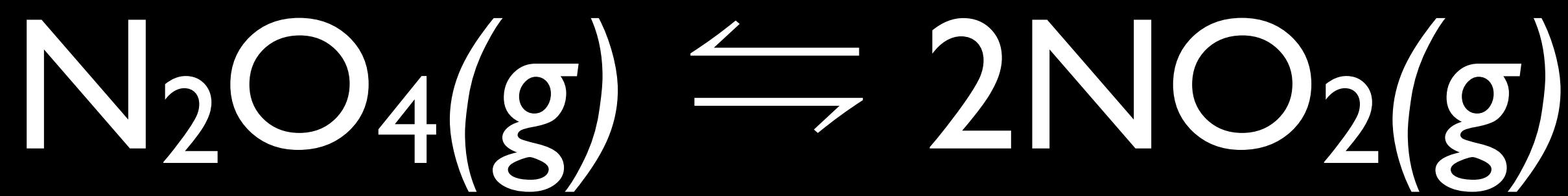
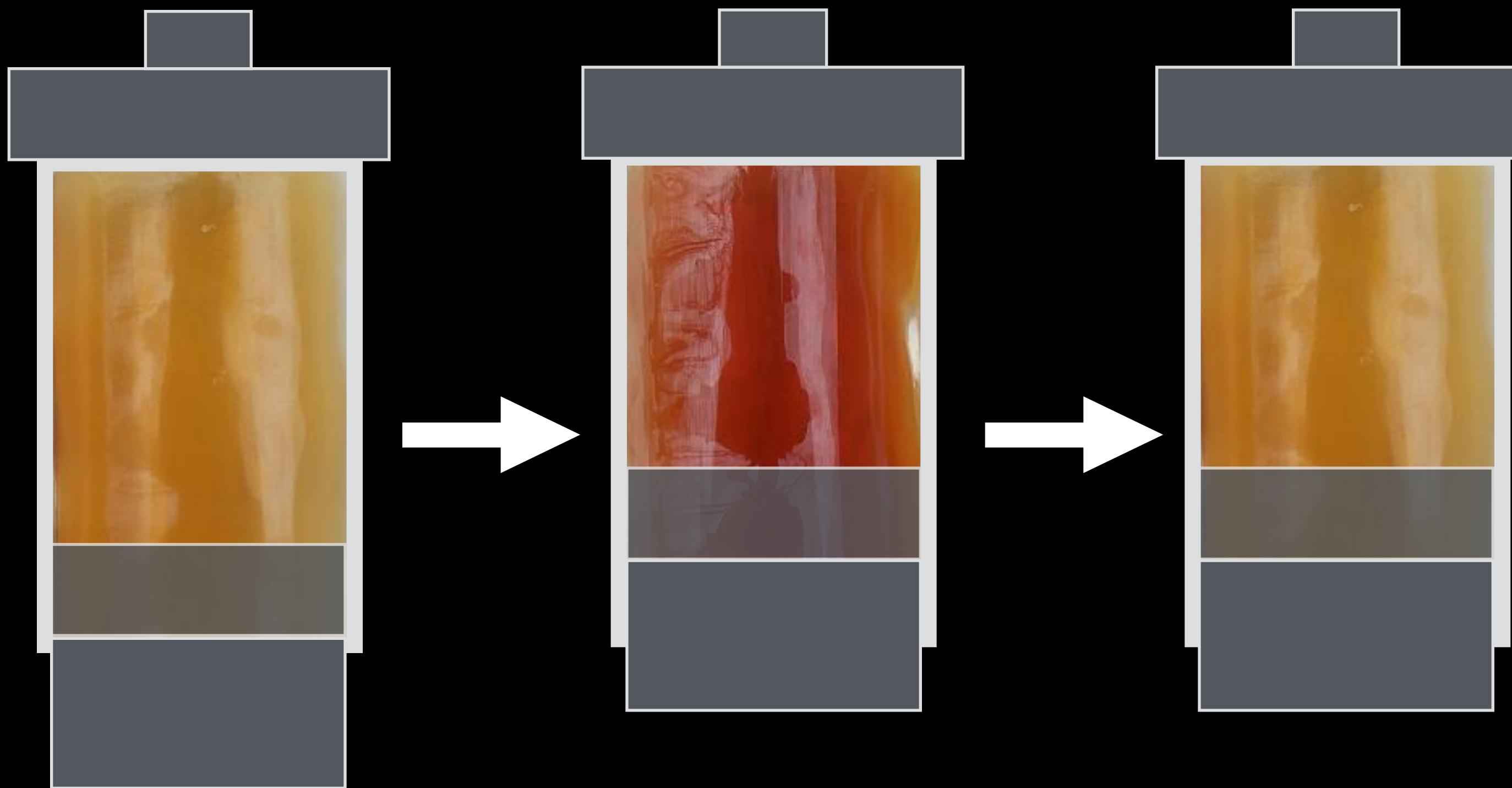




$$K = \frac{[\text{products}]}{[\text{reactants}]}$$

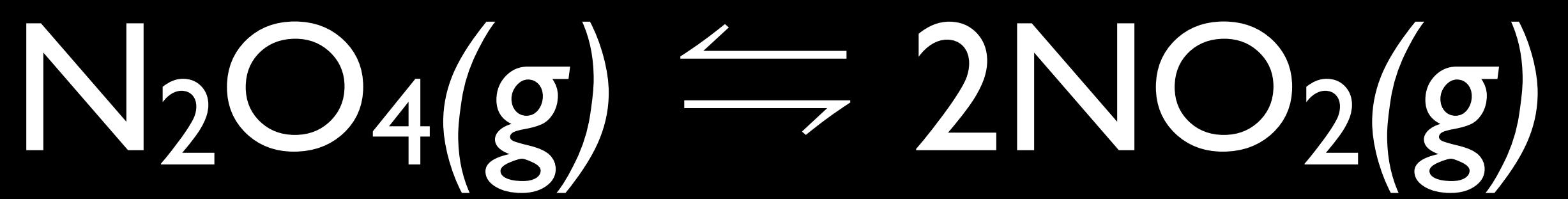
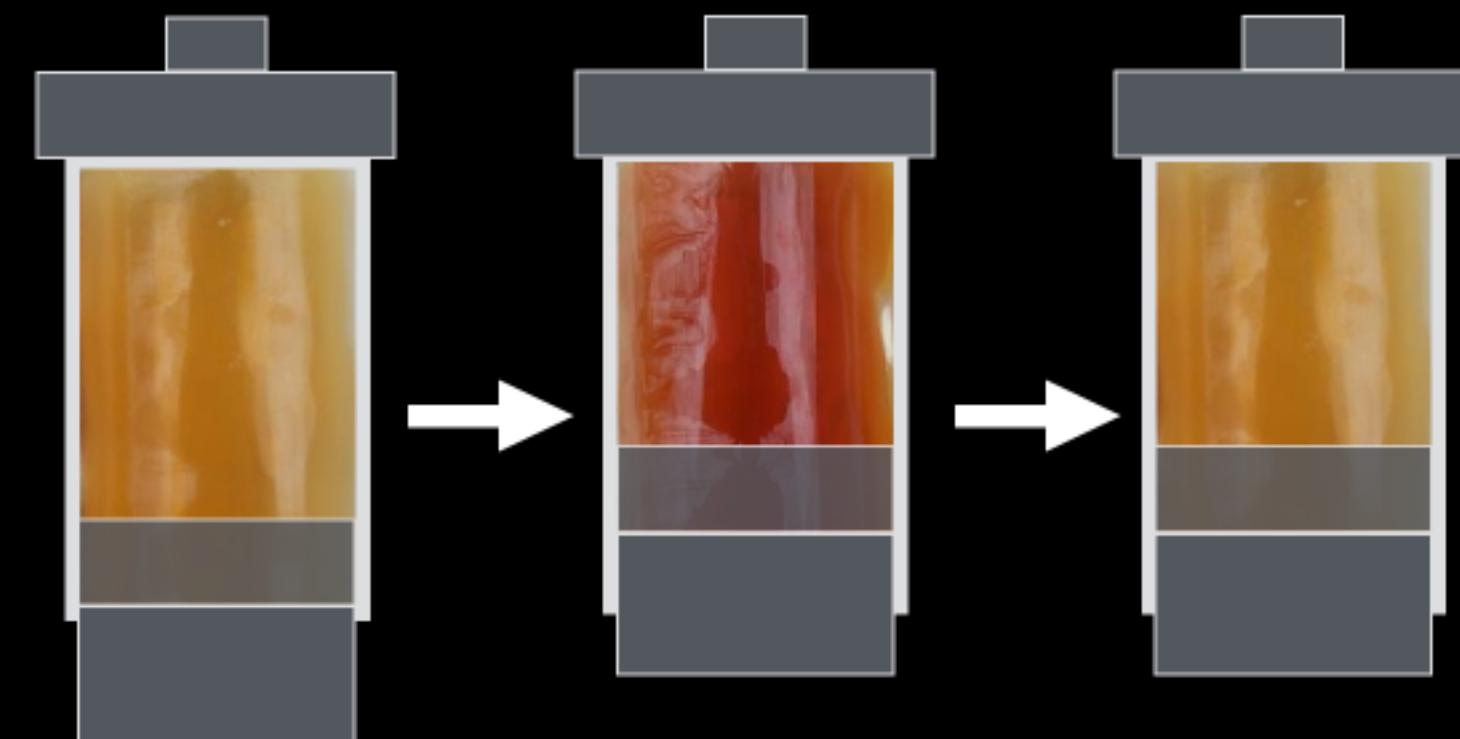
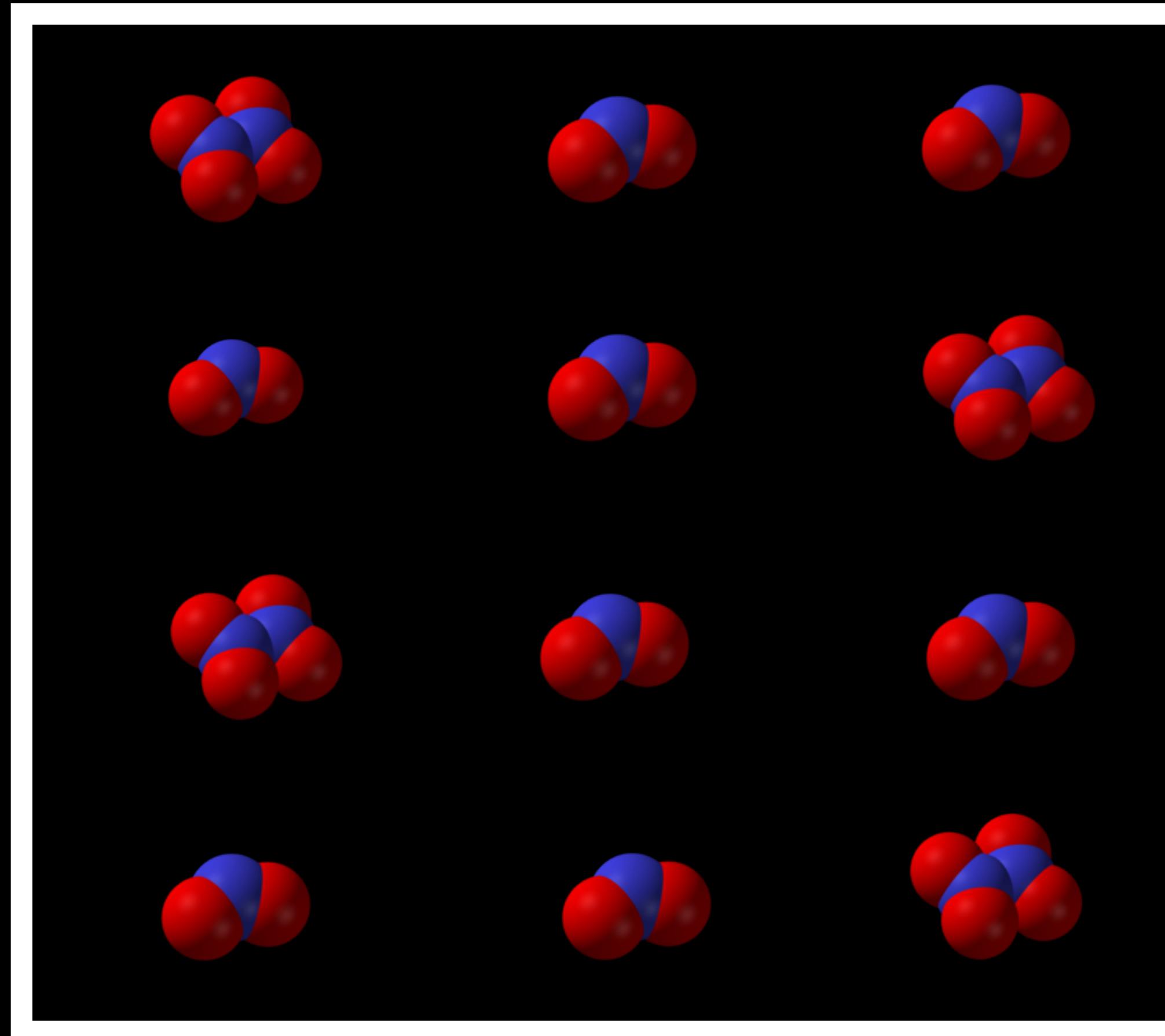


Pressure / Volume



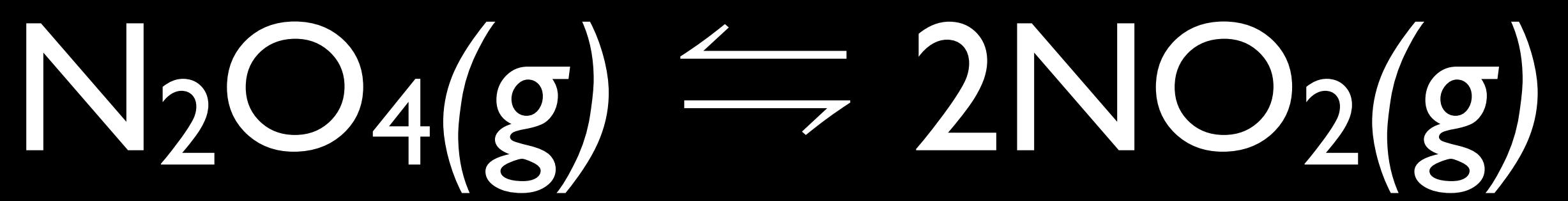
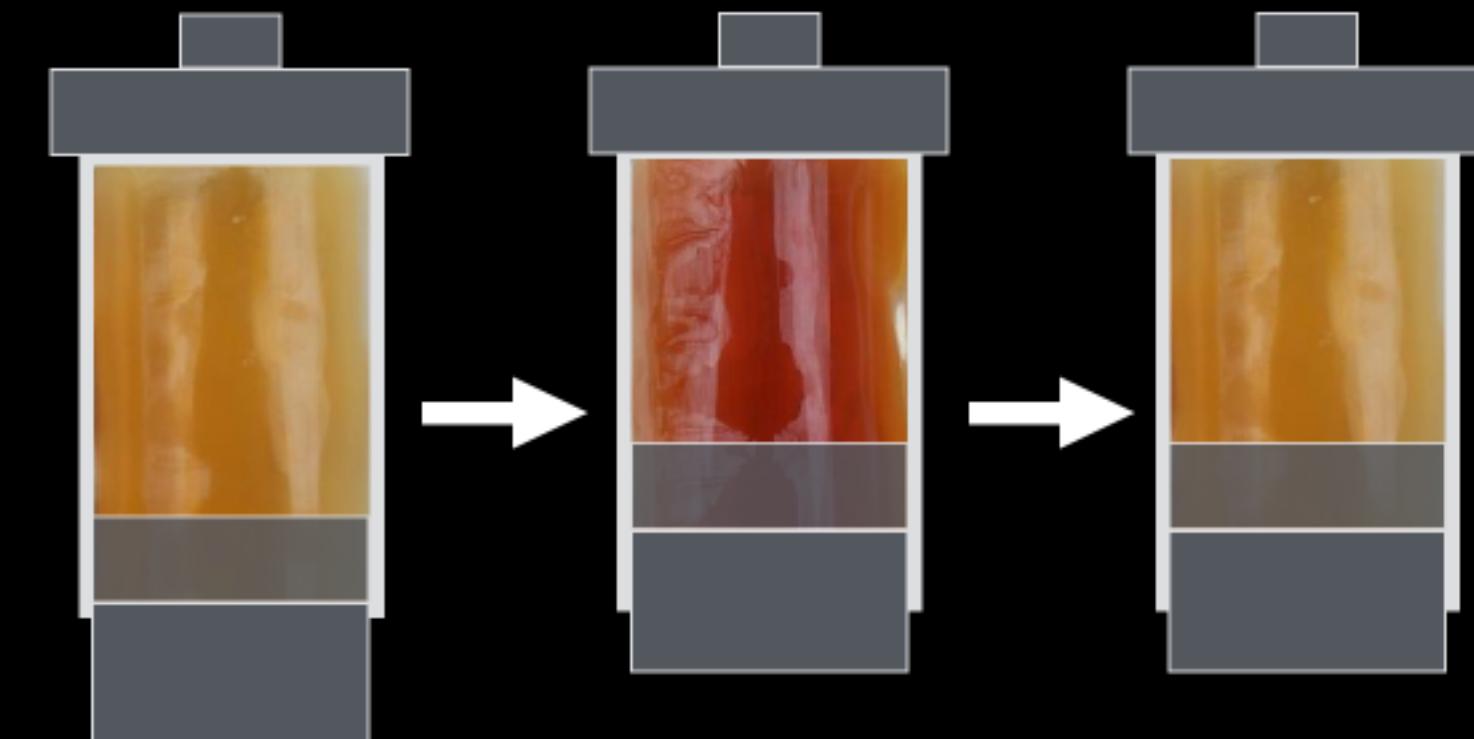
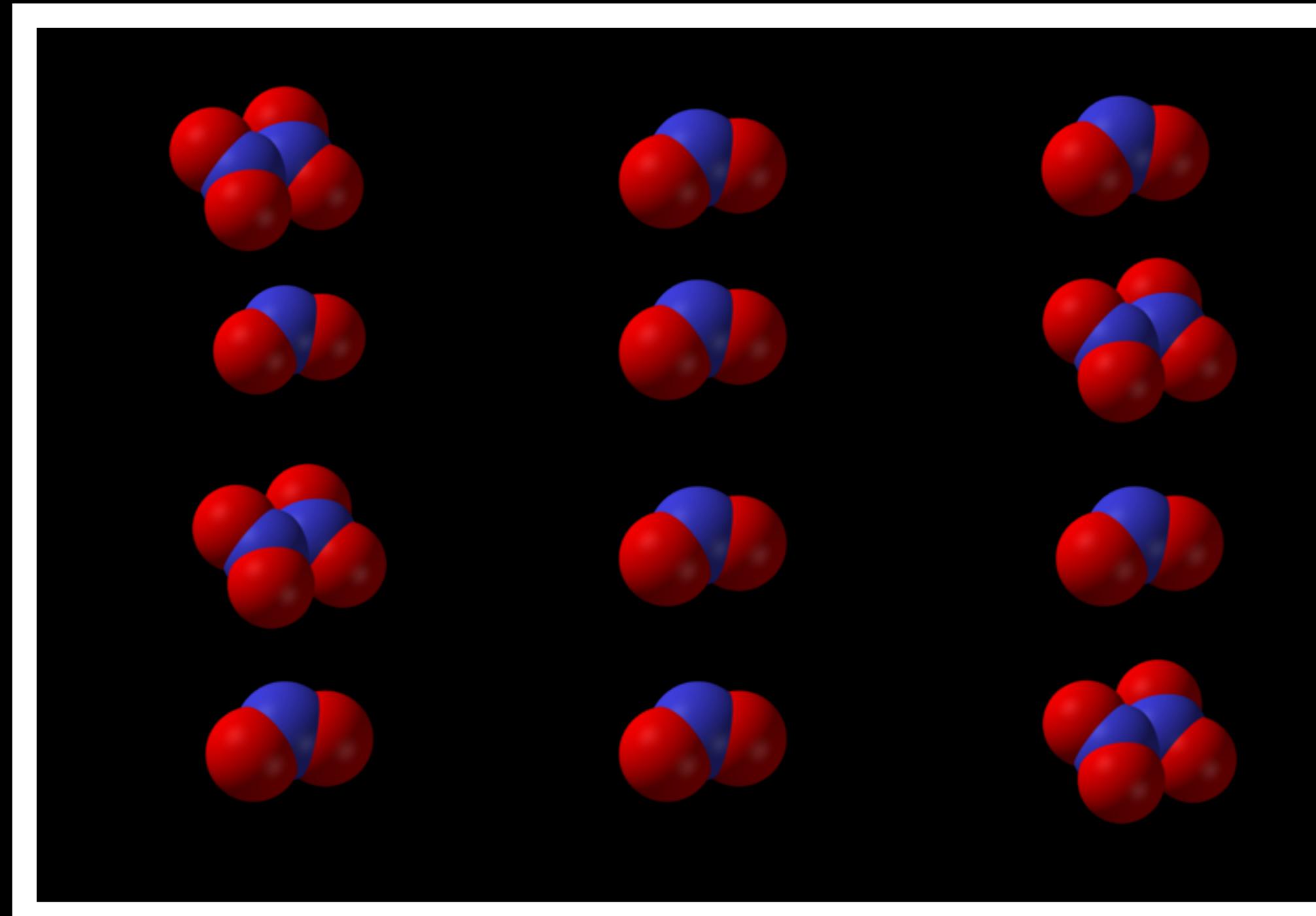
(colorless)

(reddish brown)



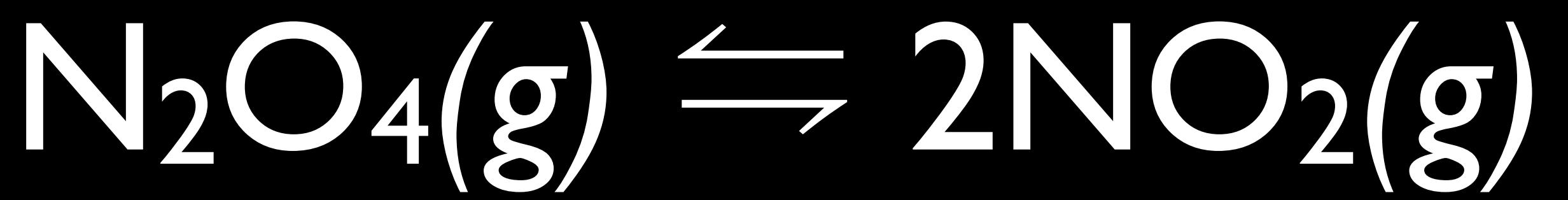
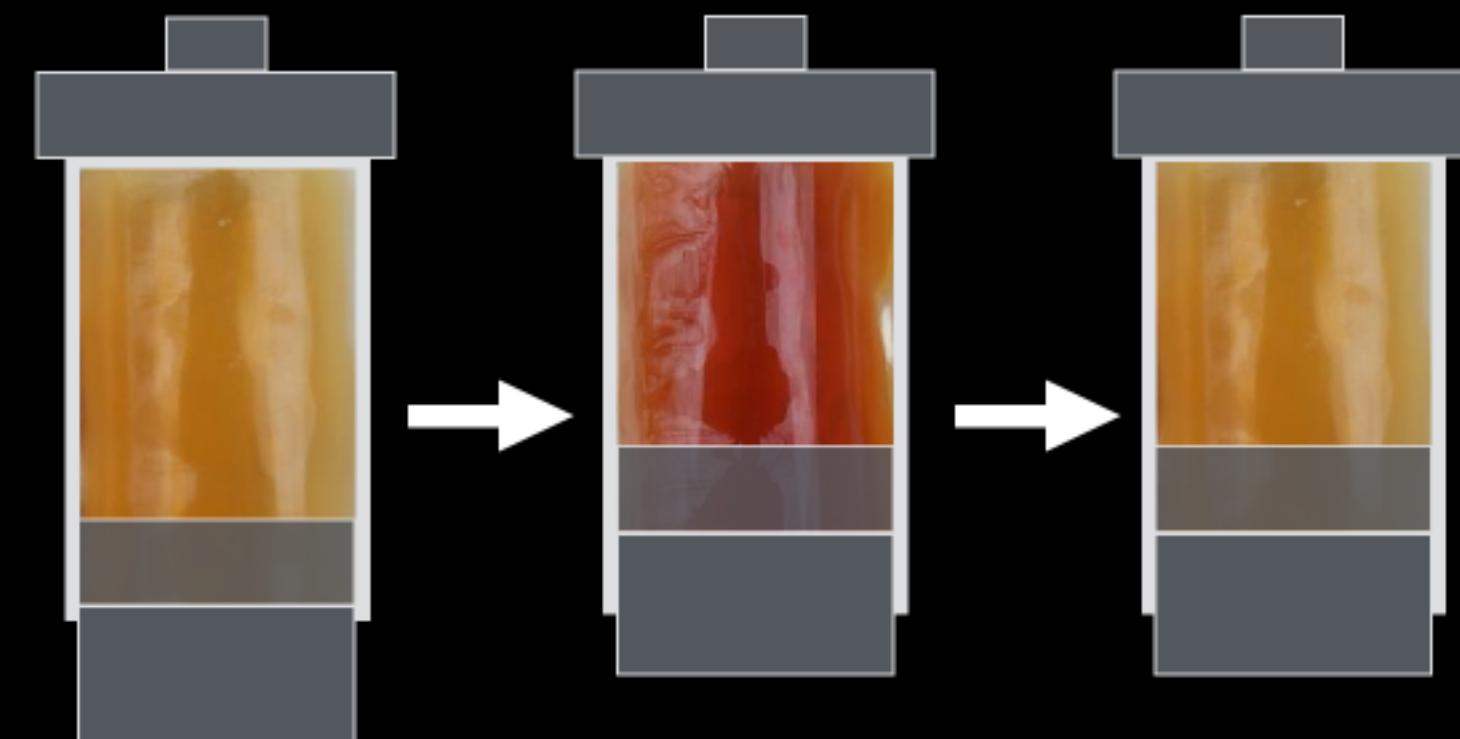
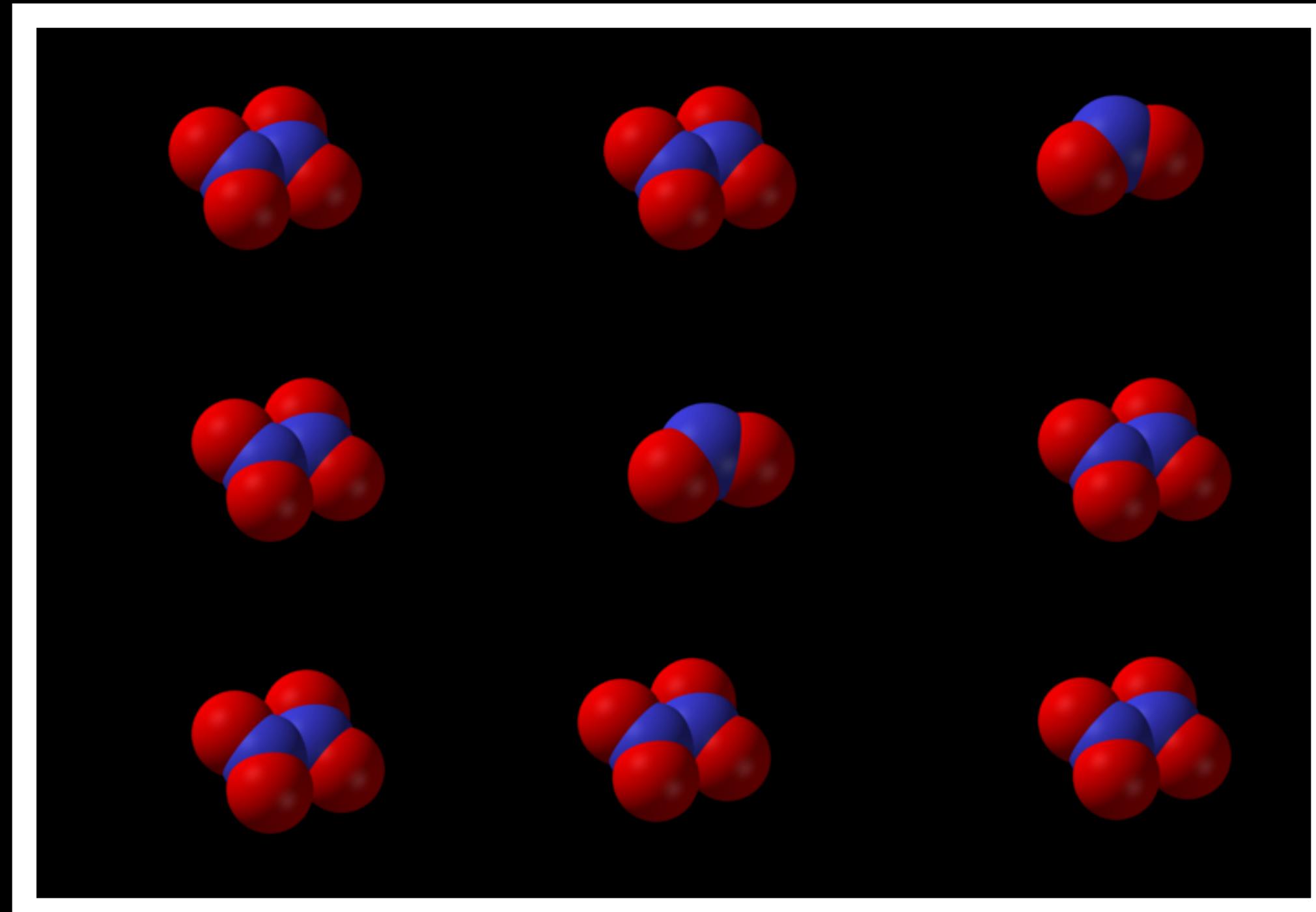
(colorless)

(reddish brown)



(colorless)

(reddish brown)

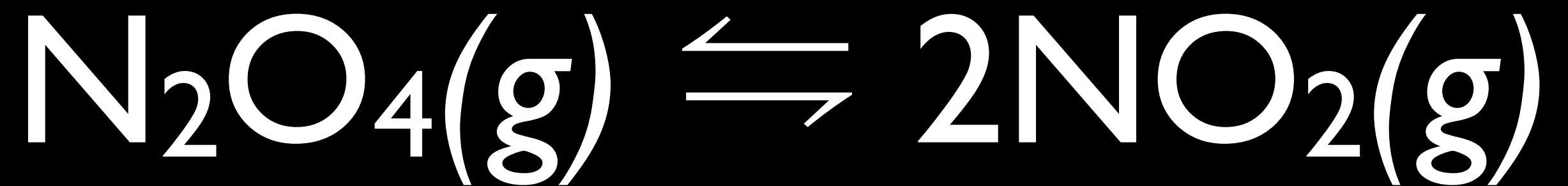


(colorless)

(reddish brown)

Temperature

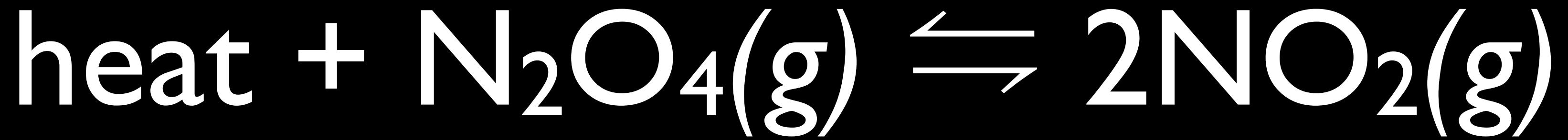
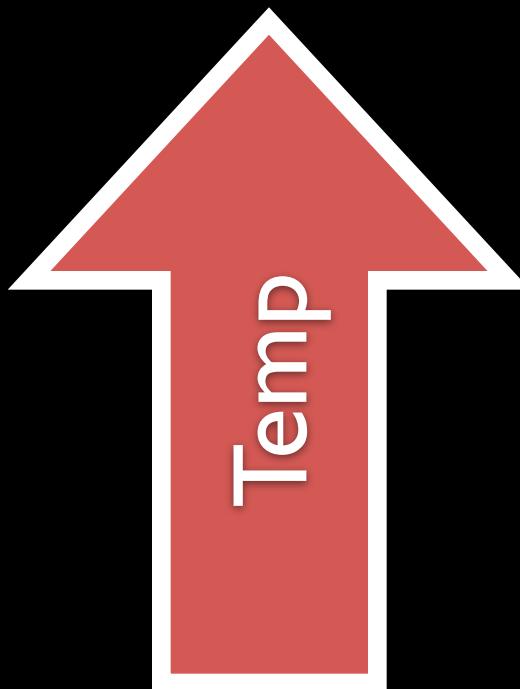
$$\Delta H = 57.2 \text{ kJ/mol}$$



(colorless)

(reddish brown)

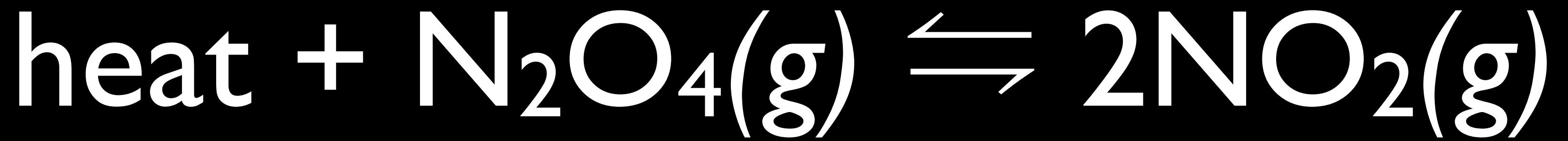
Temperature



(colorless)

(reddish brown)

Temperature



(colorless)

(reddish brown)

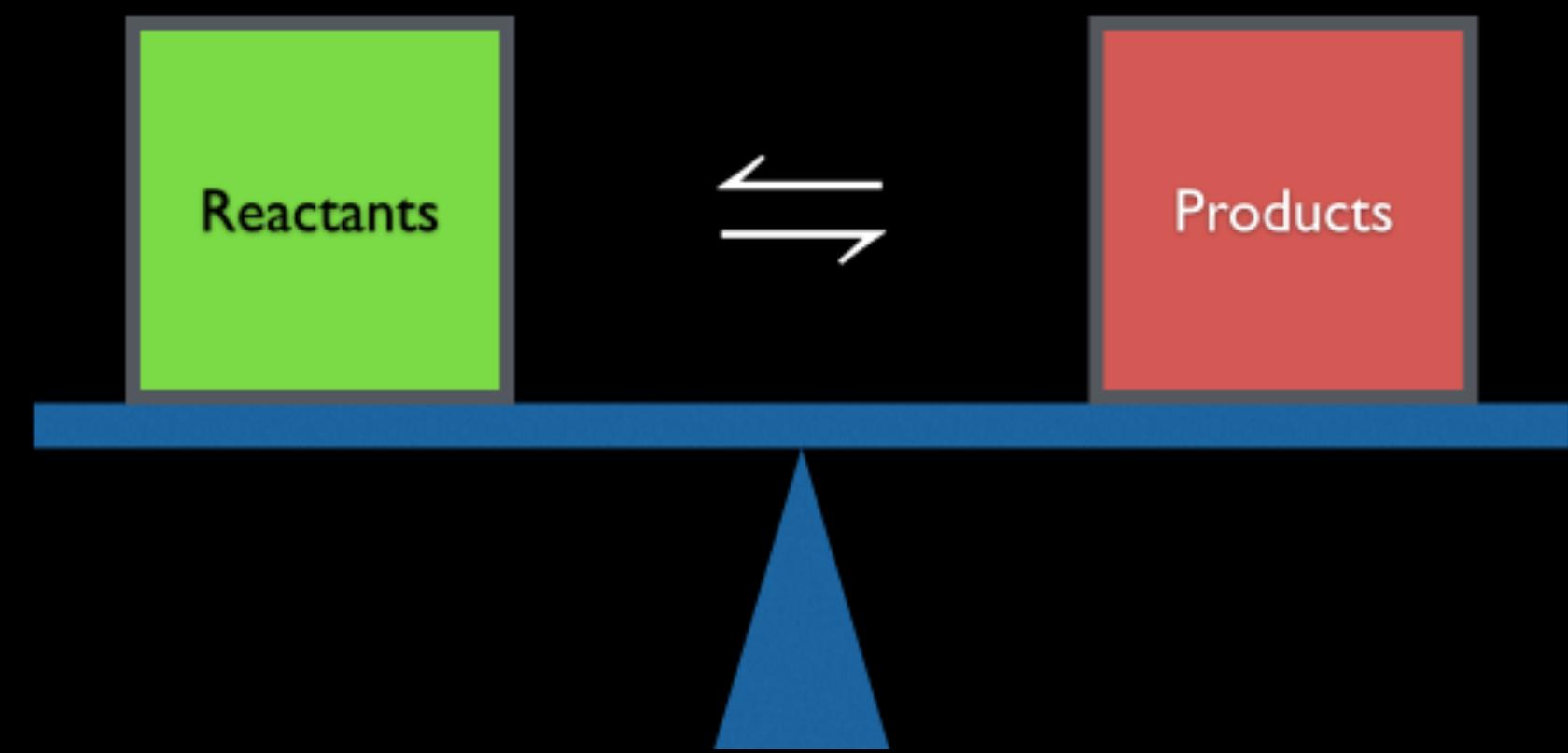
Increasing Yield



$$\Delta H = -92 \text{ kJ/mol}$$

- Concentration
- Volume / Pressure
- Temperature

Did you learn?



To predict the direction of the shift resulting from the various possible stresses on a system at chemical equilibrium.

Did you learn?



$$\Delta H = -92 \text{ kJ/mol}$$

To use LeChatelier's principle to design a set of conditions that will optimize a desired outcome.

Acknowledgements

Eframgoldberg. English: An Overlay of the Same 99.9% Pure NO₂/N₂O₄ Sealed in an Ampoule. From Left to Right -196C, 0C, 23C, 35C, 50C, July 16, 2013. Own work. http://commons.wikimedia.org/wiki/File:Nitrogen_dioxide_at_different_temperatures.jpg.
en:User:Greenhorn1. English: Nitrogen Dioxide (NO₂) on the Left and Dinitrogen Tetroxide (N₂O₄) on the Right., February 25, 2008. en:Image:N02-N2O4.jpg. <http://commons.wikimedia.org/wiki/File:NO2-N2O4.jpg>.
“File:Ammonia-3D-vdW.png,” January 3, 2014. <http://en.wikipedia.org/wiki/File:Ammonia-3D-vdW.png>.
“File:Dinitrogen-Tetroxide-3D-vdW.png,” January 3, 2014. <http://en.wikipedia.org/wiki/File:Dinitrogen-tetroxide-3D-vdW.png>.
“File:Tetrachlorocobaltate Aqueous Ion.jpg,” January 3, 2014. http://en.wikipedia.org/wiki/File:Tetrachlorocobaltate_aqueous_ion.jpg.
yinch. English: SVG Version of Nitrogen Molecule., November 25, 2010. Produced in Inkscape. <http://commons.wikimedia.org/wiki/File:Nitrogen2.s>



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