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Equilibrium: Basic Calculations

1. Fill in the table and determine the composition at equilibrium and the total pressure at equilibrium

$$2\,NH_3\,(g) \leftrightarrow N_2\,(g) + 3\,H_2\,(g)$$

n_i				$P_{tot\ initial}$ =
Δn				ΔP_{tot} =
n_{eq}				$P_{tot\ eq}$ =

Initial

$n(NH_3) = 2.2$ mol

$n(N_2) = 1.8$ mol

$n(H_2) = 2.0$ mol

P_{Tot} 6 atm

$2\,NH_3\,(g) \leftrightarrow N_2\,(g) + 3\,H_2\,(g)$

Equilibrium

$n(H_2) = 3.2$ mol

P_{Tot}

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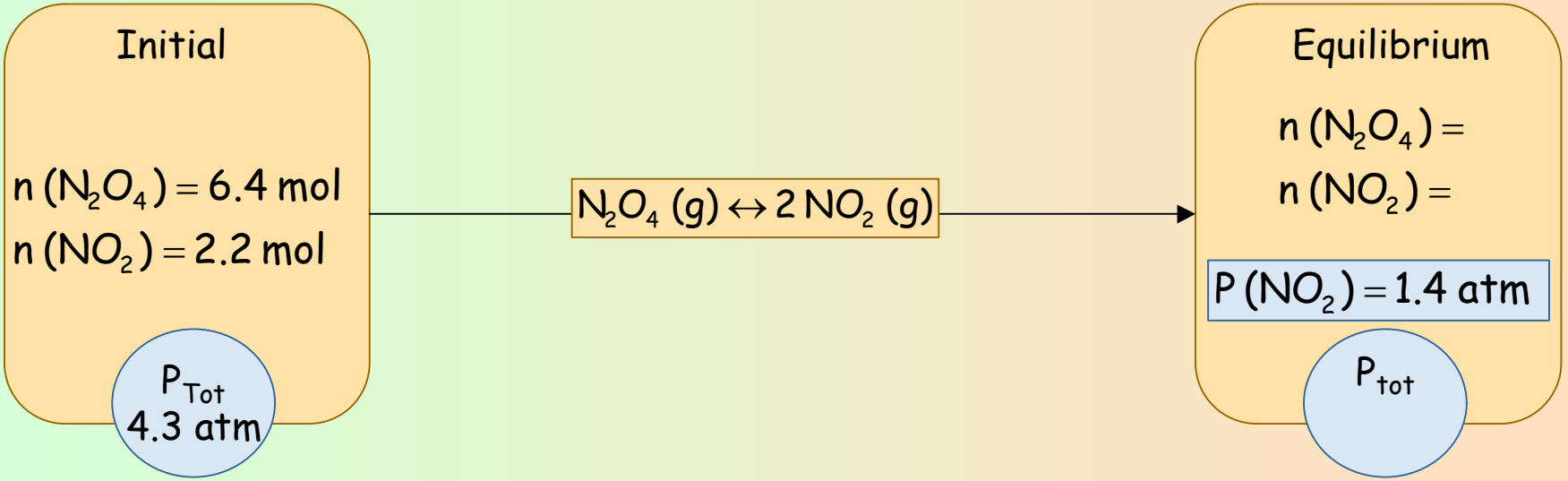
Equilibrium: Basic Calculations

2. Fill in the table and determine the composition at equilibrium and the total pressure

$$N_2O_4\ (g) \leftrightarrow 2\,NO_2\ (g)$$

n_i			$P_{tot\ initial}$ =
Δn			ΔP_{tot} =
n_{eq}			$P_{tot\ eq}$ =



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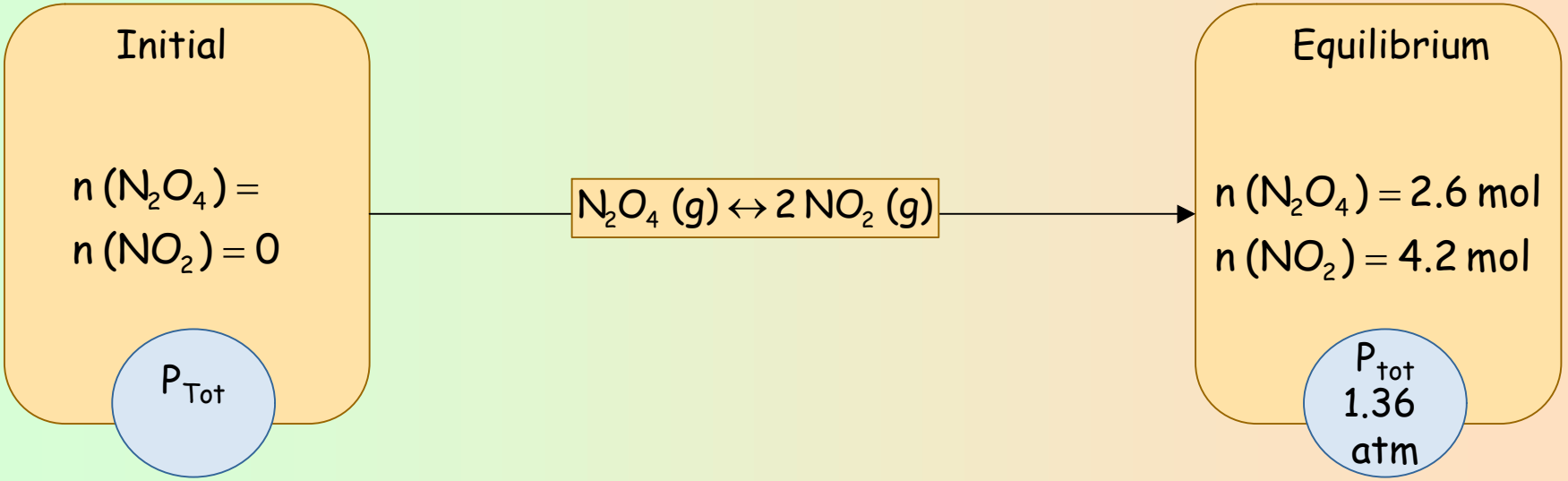
Equilibrium: Basic Calculations

3. Fill in the table and determine the compositions and total pressures

$$N_2O_4\,(g) \leftrightarrow 2\,NO_2\,(g)$$

n_i			$P_{tot\ initial}$ =
Δn			ΔP_{tot} =
n_{eq}			$P_{tot\ eq}$ =



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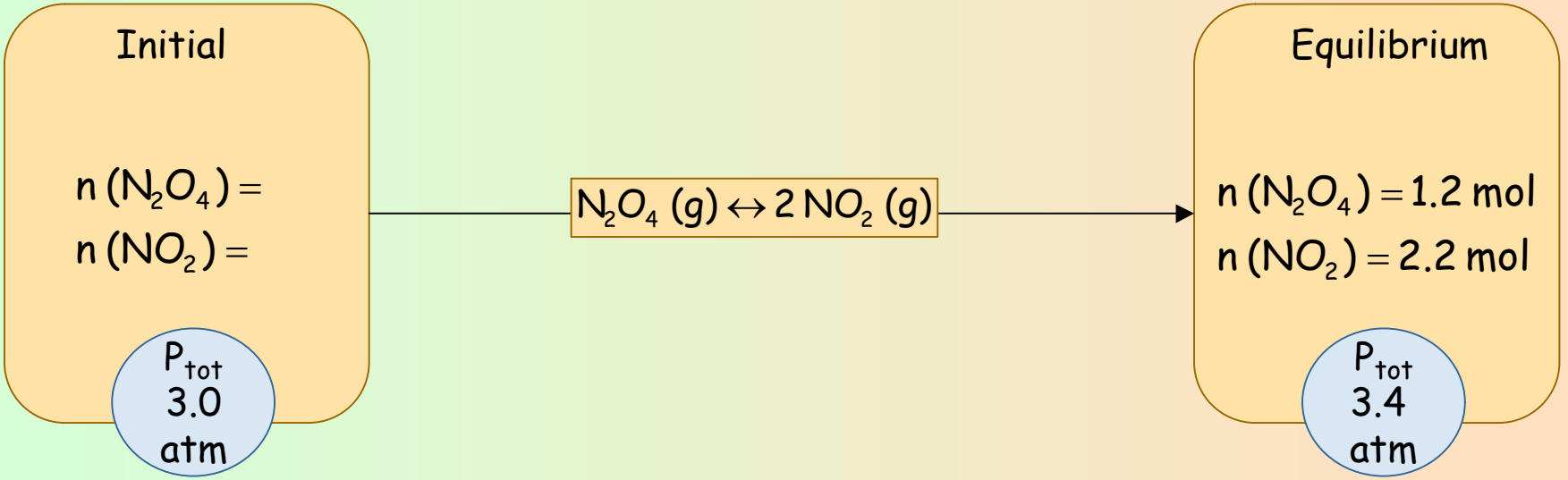
Equilibrium: Basic Calculations

4. Fill in the table and determine the compositions and total pressures

$$N_2O_4\ (g) \leftrightarrow 2\,NO_2\ (g)$$

n_i			$P_{tot\ initial}$ =
Δn			ΔP_{tot} =
n_{eq}			$P_{tot\ eq}$ =



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Equilibrium: Basic Calculations

1. Fill in the table and determine the composition at equilibrium and the total pressure at equilibrium

$$2\,NH_3\,(g) \leftrightarrow N_2\,(g) + 3\,H_2\,(g)$$

n_i	2.2	1.8	2.0
Δn	-0.8	0.4	1.2
n_{eq}	1.4	2.2	3.2

$P_{tot\ initial}$ = 6 atm

ΔP_{tot} = 0.8 atm

$P_{tot\ eq}$ = 6.8 atm

Initial

$n(NH_3) = 2.2$ mol

$n(N_2) = 1.8$ mol

$n(H_2) = 2.0$ mol

P_{Tot} 6 atm

$$\text{ratio} = \frac{6\ \text{atm}}{6\ \text{mol}} = 1\ \frac{\text{atm}}{\text{mol}}$$

$2\,NH_3\,(g) \leftrightarrow N_2\,(g) + 3\,H_2\,(g)$

Each mol exerts a presure of 1 atm

Equilibrium

$n(NH_3) = 1.4$ mol

$n(N_2) = 2.2$ mol

$n(H_2) = 3.2$ mol

P_{Tot} 6.8 atm

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Equilibrium: Basic Calculations

2. Fill in the table and determine the composition at equilibrium and the total pressure

$$N_2O_4\ (g) \leftrightarrow 2\,NO_2\ (g)$$

	N_2O_4	NO_2
n_i	6.4	2.2
Δn	-0.3	0.6
n_{eq}	6.1	2.8

$P_{tot\ initial}$ = 4.3 atm

ΔP_{tot} = 0.15 atm

$P_{tot\ eq}$ = 4.45 atm

Each mol exerts a presure of 0.5 atm

Initial

$n\,(N_2O_4) = 6.4$ mol

$n\,(NO_2) = 2.2$ mol

P_{Tot} 4.3 atm

$N_2O_4\ (g) \leftrightarrow 2\,NO_2\ (g)$

$$\text{ratio} = \frac{4.3\ \text{atm}}{8.6\ \text{mol}} = 0.5\ \frac{\text{atm}}{\text{mol}}$$

Equilibrium

$n\,(N_2O_4) = 6.1$ mol

$n\,(NO_2) = 2.8$ mol

$P\,(NO_2) = 1.4$ atm

P_{tot}

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Equilibrium: Basic Calculations

3. Fill in the table and determine the compositions and total pressures

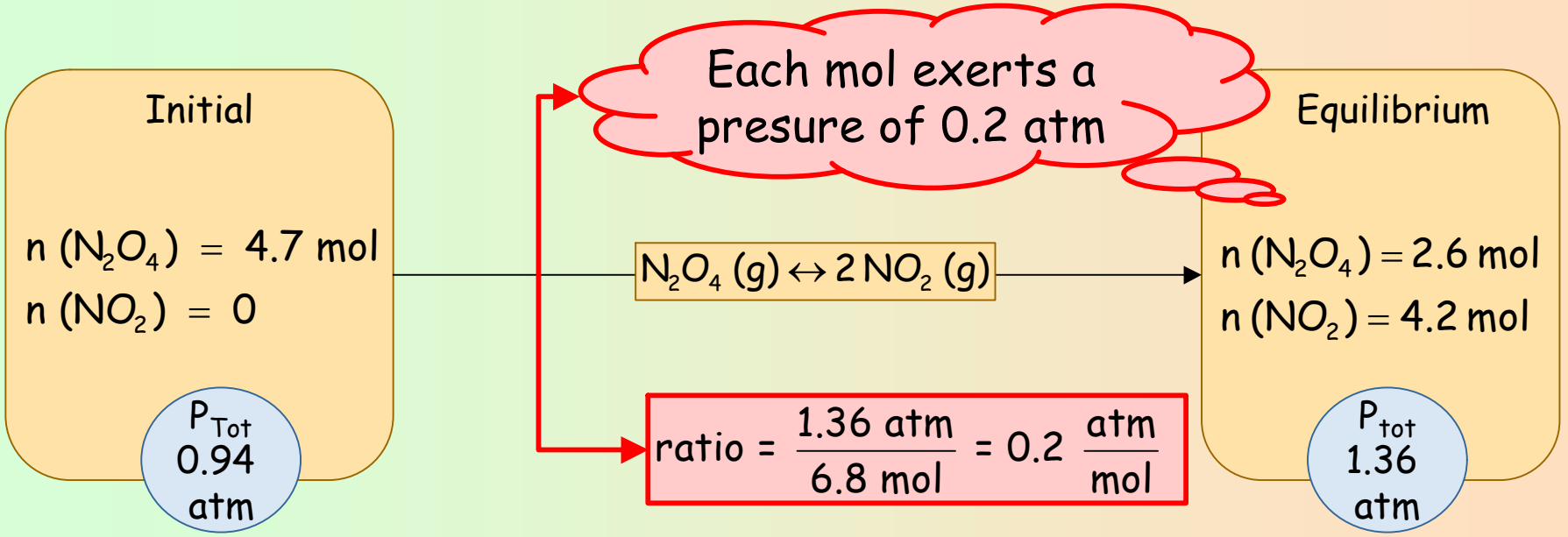
$$N_2O_4\,(g) \leftrightarrow 2\,NO_2\,(g)$$

n_i	4.7	0
Δn	-2.1	4.2
n_{eq}	2.6	4.2

$P_{tot\ initial}$ = 0.94 atm

ΔP_{tot} = 0.42 atm

$P_{tot\ eq}$ = 1.36 atm



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Equilibrium: Basic Calculations

4. Fill in the table and determine the compositions and total pressures

$N_2O_4\ (g) \leftrightarrow 2\,NO_2\ (g)$

n_i			$P_{tot\ initial}$ = 3.0 atm
Δn	-x	2x	ΔP_{tot} = 0.4 atm
n_{eq}	1.2	2.2	$P_{tot\ eq}$ = 3.4 atm

$N_2O_4\ (g) \leftrightarrow 2\,NO_2\ (g)$

n_i	1.6	1.4	$P_{tot\ initial}$ = 3.0 atm
Δn	-0.4	0.8	ΔP_{tot} = 0.4 atm
n_{eq}	1.2	2.2	$P_{tot\ eq}$ = 3.4 atm

$\Delta P = 0.4\ atm \rightarrow \Delta n = 0.4\ atm * \frac{1 mol}{1\ atm} = 0.4\ mol$

$\Delta n = 0.4\ mol = (-x) + (2x) = x \rightarrow x = 0.4\ mol$

Initial

$n(N_2O_4) =$

$n(NO_2) =$

P_{tot} 3.0 atm

Each mol exerts a presure of 1 atm

$N_2O_4\ (g) \leftrightarrow 2\,NO_2\ (g)$

$ratio = \frac{3.4\ atm}{3.4\ mol} = 1\ \frac{atm}{mol}$

Equilibrium

$n(N_2O_4) = 1.2\ mol$

$n(NO_2) = 2.2\ mol$

P_{tot} 3.4 atm