

Experimental Rate Law-Examples

Handout- p. 544 Table 17-3

* Find rate law + overall order of rxn.

Determine how changing the [] of reactants affects the rate.

A.

Trial	[A]	[B]	Rate
1	0.100	0.100	2×10^{-3}
2	0.200	0.100	4×10^{-3}

Same (control)

Change \rightarrow

$\Delta [A]$	Rate
$\frac{0.200}{0.100} = 2$ times	$\frac{4 \times 10^{-3}}{2 \times 10^{-3}} = 2$ times

$$\Delta [A]^n = \Delta \text{rate}$$

$$2^n = 2$$

$$2^1 = 2 \therefore \text{rxn. is first order for A.}$$

B. Use trials 2+3 ([A] is same)

Trial	[A]	[B]	Rate
2	0.200	0.100	4×10^{-3}
3	0.200	0.200	16×10^{-3}

[B]	Rate
$\frac{0.200}{0.100} = 2$ times	$\frac{16 \times 10^{-3}}{4 \times 10^{-3}} = 4$ times

$$\Delta [B]^m = \Delta \text{rate}$$

$$2^m = 4 \text{ or } 2^2 = 4$$

$m = 2$
2nd order

Overall Order - Rate Law

$$\text{Rate} = k [A] [B]^2$$

Overall order $1 + 2 = 3$
third order

Questions - p. 545 #16, 17, 18

- p. 555 #64, 69, 70, 71