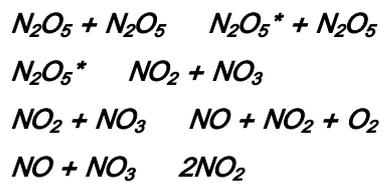


## Chapter 10.

8.

)  $N_2O_5(g)$



(elementary

process)

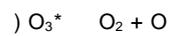
(reaction mechanism)

1)

(molecularity),

(unimolecular process)

(rearrangement)



(bimolecular process)

가

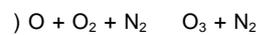


(termolecular process)

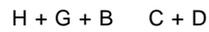
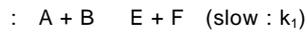
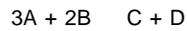
가

가

3 가



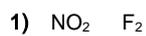
2)



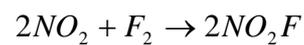
가

(rate determining step)

$$-\frac{1}{3} \frac{d[A]}{dt} = k_1[A][B]$$

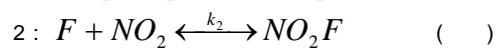
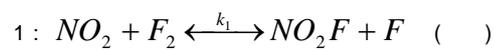
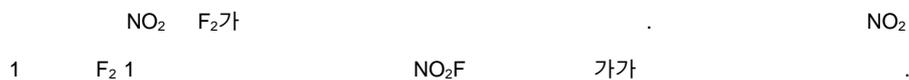


2

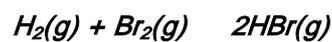


$$-\frac{1}{2} \frac{d[NO_2]}{dt} = k_{\text{exp}}[NO_2][F_2]$$

[ ]

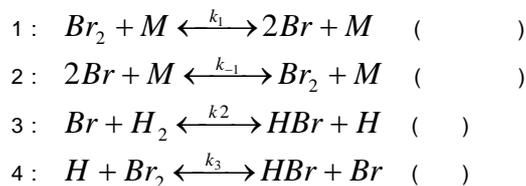


2)



3/2

$$\frac{1}{2} \frac{d[HBr]}{dt} = k[H_2][Br_2]^{1/2}$$



[ ]

1 2 M  
 Br<sub>2</sub> Br<sub>2</sub> , 가  
 3 4  
 HBr Br H<sub>2</sub>

$$\frac{1}{2} \frac{d[HBr]}{dt} = k_2 [H_2][Br] \dots \dots \dots (1)$$



$$K_{eq} = \frac{[Br]^2}{[Br_2]}$$

$$[Br] = \sqrt{K_{eq} [Br_2]}$$

(1)

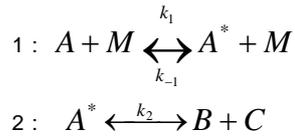
$$\frac{1}{2} \frac{d[HBr]}{dt} = k_2 K_{eq}^{1/2} [H_2][Br_2]^{1/2}$$

$$k_2 K_{eq}^{1/2}$$

가  
 가 가  
 가

9.

가  
(Steady-State Approximation)  
(reaction intermediate)  
가 가



A 가 가 A\*가 A\*  
가 가 A\*가  
A\*가 가  
A\* 가

(steady-state concentration)

$$A^* = A^*$$

$$k_1[A][M] = k_{-1}[A^*][M] + k_2[A^*]$$

$$[A^*] = \frac{k_1[A][M]}{k_{-1}[M] + k_2} \dots \dots \dots (2)$$

가

$$\frac{d[B]}{dt} = k_2[A^*]$$

A\* ( 2 )

$$\frac{d[B]}{dt} = \frac{k_1 k_2 [A][M]}{k_{-1}[M] + k_2}$$

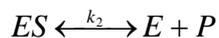
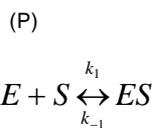
10.

(enzyme : E)

(substrate : S)

(enzyme-substrate complex : ES)

가



v

$$\frac{d[P]}{dt} = V = k_2[ES] \dots \dots \dots (3)$$

ES

가

$$k_1[E][S] = (k_{-1} + k_2)[ES] \dots \dots \dots (4)$$

E

$$[E_0] = [E] + [ES]$$

[E<sub>0</sub>]

[E]

(4)

$$k_1[S]([E] - [ES]) = (k_{-1} + k_2)[ES]$$

$$[ES] = \frac{k_1[E_0][S]}{k_{-1} + k_2 + k_1[S]}$$

(3)

$$V = \frac{k_1 k_2 [E_0][S]}{k_{-1} + k_2 + k_1[S]}$$

k<sub>1</sub>

(Michaelis )

$$K_m \equiv \frac{k_{-1} + k_2}{k_1}$$

Michaelis - Menten

$$V = \frac{k_2[E_0][S]}{K_m + [S]} \dots \dots \dots (5)$$

$$\frac{1}{V} = \frac{1}{k_2[E_0]} + \frac{K_m}{k_2[E_0][S]} \dots\dots\dots(6)$$

(6)

Lineweaver-Burk plot

1/V    1/[S]

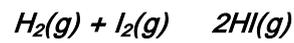
$$\frac{1}{V} = \frac{1}{V_{\max}} + \frac{K_m}{V_{\max}[S]} \dots\dots\dots(7)$$

10.1  $\text{H}_2\text{O}_2$  0.882M 225  $\text{H}_2\text{O}_2$   $\text{H}_2\text{O}_2(\text{aq})$  1  
k  $3.66 \times 10^{-3} \text{s}^{-1}$

10.2  $\text{N}_2\text{O}_5$  67 1

(s)	$\text{N}_2\text{O}_5$ (mmHg)
0	800
60	564
120	398
180	279
240	197
300	138

10.3 600K  $2.7 \times 10^{-4} \text{M/s}$  650K  $3.5 \times 10^{-3} \text{M/s}$   
700K



10.4 A 가 0.2M 8.4 가 0.166M A  
가?

10.5 45  $\text{N}_2\text{O}_5$  (1 )

t(s)	$[\text{N}_2\text{O}_5]$ (M)	t(s)	$[\text{N}_2\text{O}_5]$ (M)
0	2.33	867	1.36
184	2.08	1198	1.11
319	1.91	1877	0.72
526	1.67	2315	0.55

k

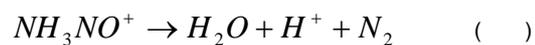
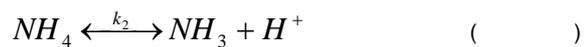
10.6  $2\text{NO} + \text{O}_2 \rightarrow 2\text{NO}_2$  25 가  
25

	[O <sub>2</sub> ] (mmol/L)	[NO] (mmol/L)	d[O <sub>2</sub> ]/dt (mol/L.s)
1	1.44	0.28	$-6.9 \times 10^{-7}$
2	1.44	0.93	$-7.5 \times 10^{-6}$
3	1.44	2.69	$-6.0 \times 10^{-5}$
4	0.066	2.69	$-3.0 \times 10^{-6}$

10.7 375K k  $E_a = 1.0 \times 10^2 \text{ kJ/mol}$  T=332K  
k =  $2.5 \times 10^{-3} \text{ s}^{-1}$

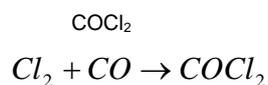


10.8

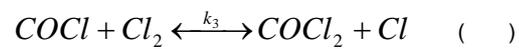


d[NH<sub>4</sub><sup>+</sup>]/dt [NH<sub>4</sub><sup>+</sup>], [HNO<sub>2</sub>], [H<sup>+</sup>]

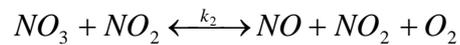
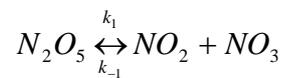
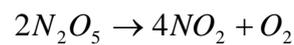
10.9



$$\frac{d[\text{COCl}_2]}{dt} = k[\text{Cl}_2]^{3/2}[\text{CO}]$$



10.10  $\text{N}_2\text{O}_5$



. [ :  $\text{NO}_3$   $\text{NO}$  . ]

10.11  ${}^{226}_{88}\text{Ra}$  1620 .

a)  ${}^{226}_{88}\text{Ra}$  1 .

b)  ${}^{226}_{88}\text{Ra}$  100 가?

10.12 52                      1.00g  $^{64}\text{Cu}$ 가 0.060g                      .  $^{64}\text{Cu}$                       ?

10.13 68                      1/4                      가                      .

10.14  $^7\text{Be}$                       0.1                      가?                      0.01  
가? ( ,  $^7\text{Be}$   $t_{1/2} = 53.3$  days)

10.15                      .                      -14  
1g 7.2 /min                      가? C-14  
5730 ,                      C-14                      1g 15 /min                      .

[       ]

10.1 0.387M

10.2  $5.83 \times 10^{-3} \text{s}^{-1}$

10.3 166kJ/mol,  $3.13 \times 10^{-2} \text{M/s}$

10.4  $4.05 \times 10^{-3} \text{M/min}$

10.5  $6.25 \times 10^{-4} \text{s}^{-1}$ , 1109s

10.6  $R = k[\text{O}_2][\text{NO}]^2$ ,  $6.1 \times 10^3 \text{M}^{-2} \text{s}^{-1}$

10.7  $1.5 \times 10^{-1} \text{s}^{-1}$

10.8  $d[\text{NH}_4^+]/dt = K_1 K_2 K_3 [\text{HNO}_2][\text{NH}_4^+]$

10.9

$$10.10 \frac{d[\text{O}_2]}{dt} = \frac{k_1 k_2 [\text{N}_2 \text{O}_5]}{k_{-1} + 2k_2}$$

10.11 a)  $4.29 \times 10^{-4} \text{yr}^{-1}$  b) 95.6%

10.12 12.8hr

10.13  $0.020 \text{min}^{-1}$ , 34min

10.14 177days, 354days

0.15  $6.1 \times 10^3 \text{yr}$