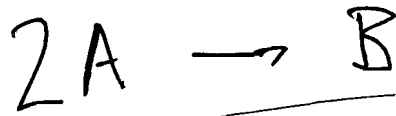


1. Assigning Rate Expressions

EAST

I will provide Balanced Equation.



$$\text{rate} = -\frac{\Delta[A]}{2\Delta t} = +\frac{\Delta[B]}{\Delta t}$$

$$\frac{\Delta[B]}{\Delta t} = ?$$

$\approx 5 \text{ M s}^{-1}$

$$\frac{\Delta[A]}{\Delta t} = -10 \text{ M s}^{-1}$$

2. Calculating Rates

$$\text{rate} = k \cdot [A]^x [B]^y$$

k , $[A]$, $[B]$, 1st order in A
2nd order in B

rate finite change.

$$x=1$$

$$y=2$$

$$t=0 \text{ s } [A] = 1.1 \text{ M}$$

$$t=2 \text{ s } [A] = 1.0 \text{ M}$$

3. Units of rate constant

rate	$M s^{-1}$
------	------------

0th order $M s^{-1}$

1st order s^{-1}

2nd order $M^{-1} s^{-1}$

know others!

6. integrated rate law

4. method of initial rates.

	rate	A	B	C
1				
2				
3				

find two exp. (trials) where only one conc. changes.

ratio rates = (ratio conc)⁺ ←

B. integrate rate. Classic Problem
0th, 1st, 2nd. Formulas given.

1. given order rxn is OR find it from k.

2. choose the correct formula.

3. solve $[C]$, $\ln[C]$, or $\frac{1}{[C]}$

$k, +$
ratio of concentrations. $[C]_0 = 1$
20% $[C] = .2$

C. half life.

1st order.

$$t_{1/2} = \frac{\ln 2}{k}$$

$t_{1/2} = 10 \text{ s}$. $[A]_0 = 32 \rightarrow 16 \rightarrow 8 \rightarrow 4$

$[A]$ after 30s

7. straight line plots

0th

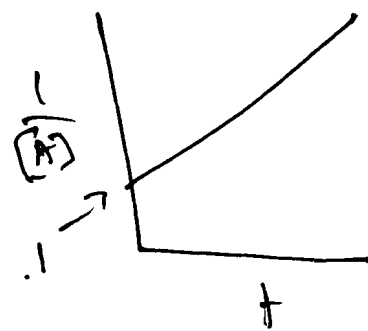
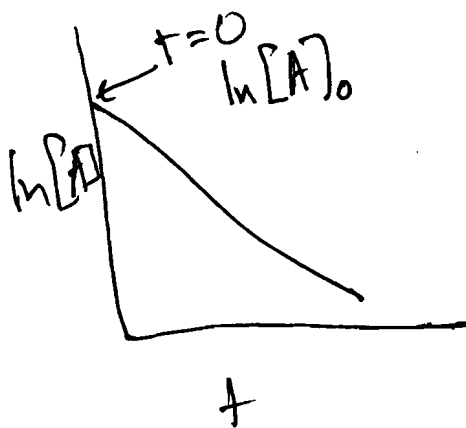
$$[A] = [A]_0 - akt$$

1st

$$\ln[A] = \ln[A]_0 - akt$$

2nd

$$\frac{1}{[A]} = \frac{1}{[A]_0} + akt$$



8. kinetic theory collisions

$$\frac{1}{[A]_0} = .1 \quad [A]_0 = 10$$

- collision must occur.
- must have high enough energy
- must have proper orientation

collisions
"ineffective"

11. combined Arrhenius calculation

$$k_1, T_1, \cancel{k_2}, T_2, E_2$$

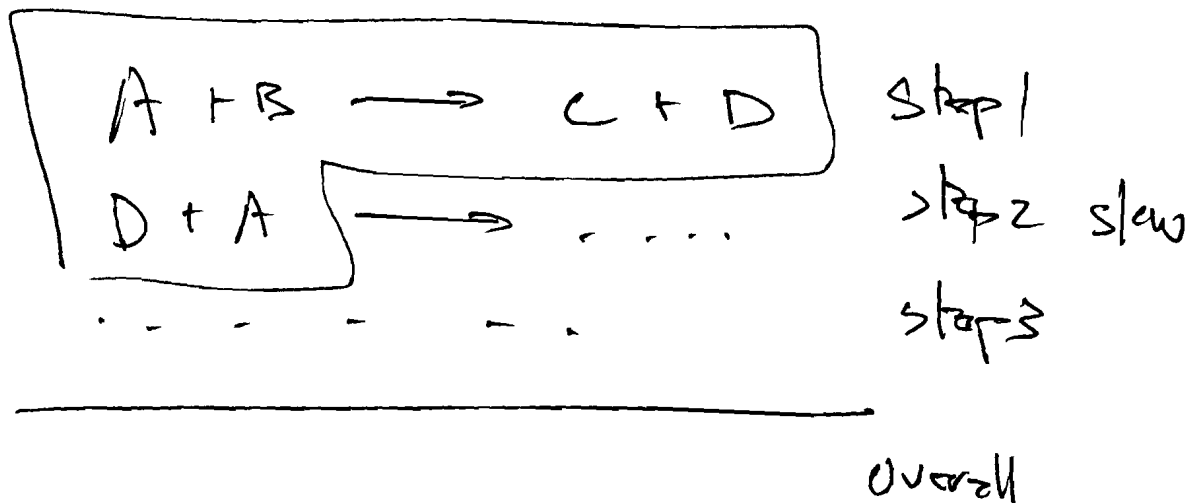
4 things \rightarrow 5th

$$\frac{k_2}{k_1} = 2 \quad T_1 = 300 \quad E_2 = \text{given}$$

$$T_2 = ?$$

12. reaction mechanism

Multistep mechanism

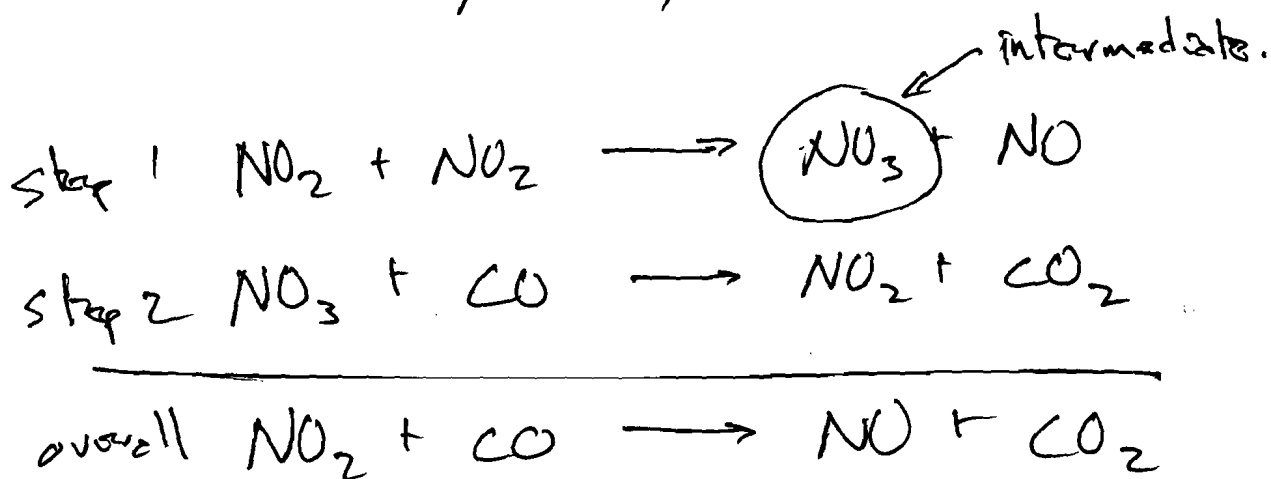


R in slow step ; R is P in step before.

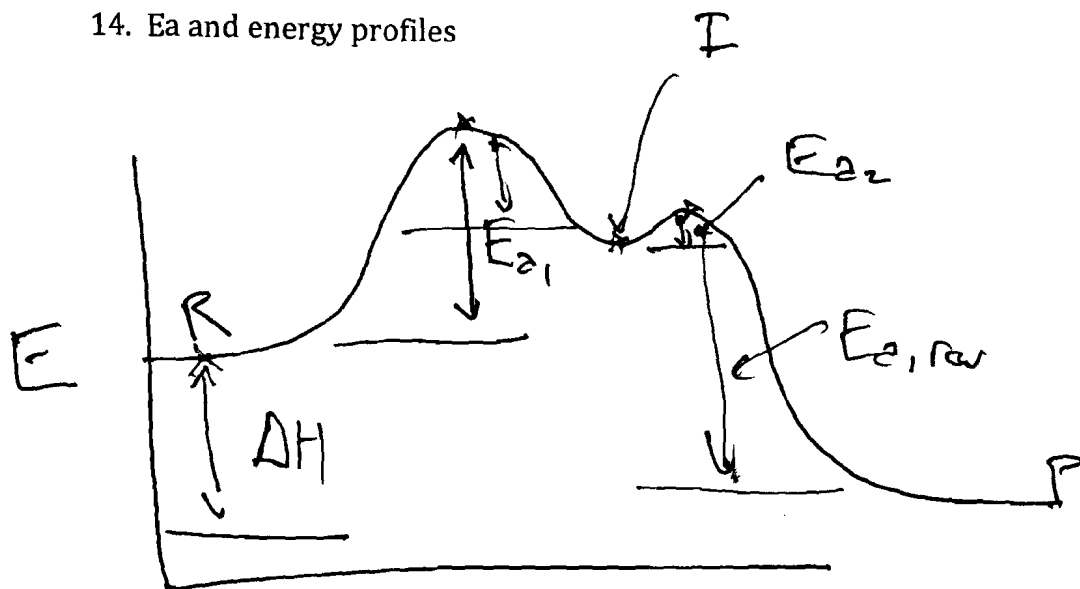
$$\text{rate} = \frac{k [A]^2 [B] \cancel{[D]}}{[C] \cancel{[D]}}$$

13. Reaction Mechanism

Catalysts, intermediates.



14. E_a and energy profiles



RXN coord.

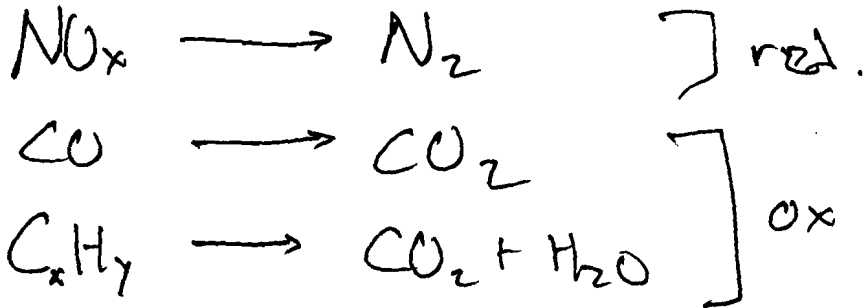
$\Delta H < 0$ exothermic.

15. famous catalyst

Catalytic converters.

Pt in car exhaust

Enzymes
= catalysts.



Haber Process
Formation of NH_3

16. alkali metals

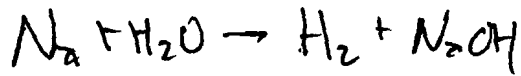
16-22 lecture notes + course pack.

Type I
property

Type II

Type III

rxn



random
amusing
fact.

metals

basic oxides

basic hydrides.

mostly

H ions

reactive.

NaCl .

found as ions in nature.

17. Alkali Earth

+2, metal, reactive w/H₂O

(emerald) Be covalent cmpds. (others ionic)

Mg chlorophyll.

Ca in structural backbone (cement, teeth, limestone, shells, ...)

Basic Oxides
" Hydrides.

18. group III

+3

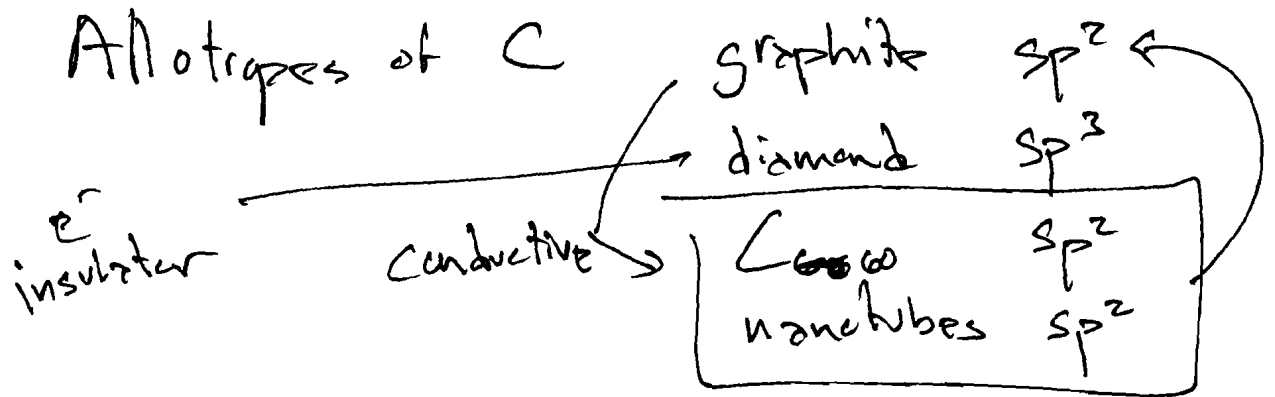
B oddball. usually no octet rule.

Boric Acid + NaBH₄ (red agent?)

Al metal, light.

↳ Bayer Hall Iceland.

19. Group IV

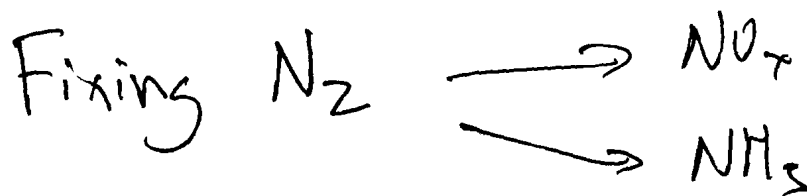


Si. bigger than C (no double bonds
no triple ")

\rightarrow semiconductor p-doping
n-doping.

20. Group V

NH_3 Phosphate, Nitric.



Haber

HNO_3 oxidizing agent

Phosphate good for plants.

21. Group VI

O₂ very important.

↳ H₂SO₄ properties.

nearly all comp. form oxides

22. Group VII (halogen)

F small - generally insoluble.

all usually -1 oxidation state

Teflon → fluorinated polymer

NaOCl

bleach.

HOCl

pool chlorine



23. Process

know same as quiz 6

24. minerals gemstones

same as quiz 6

25. hydrocarbon isomers

practice.

C_2H_6 , C_3H_8 , C_4H_{10} , C_5H_{12}
+ cyclic.

26. naming organic molecules

know lecture notes
for the remaining questions