

Following the steps for redox balancing

- assign ox #
- identify Δ ox and Δ red
- Find least common multiple
- write coefficients
- determine $H_2O + H^+$

same H_2O to side deficient double H^+ to other side

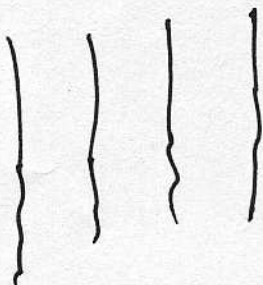


add $20H^-$ to side deficient and H_2O to opposite

37. ranking oxidizing and reducing agents

I will give you a list of $1/2$ reaction std. red. potentials

strongest oxidizing agents \rightarrow



weakest reducing agents \rightarrow

B^{1+} B^{2+} B^{3+} B^{4+}
 B^{1+} B^{2+} B^{3+} B^{4+} ,
 which is the
 weakest reducing agent. It is the most oxidizing agent.

I will give you a reaction, a current and a time. you tell me how much stuff is formed.

Example. For ~~2H₂O → 2H₂ + O₂~~ ~~2H₂O → 2H₂ + O₂~~ a current of 10 A was applied for 10 sec.

How much ~~O₂~~ O₂ was made?

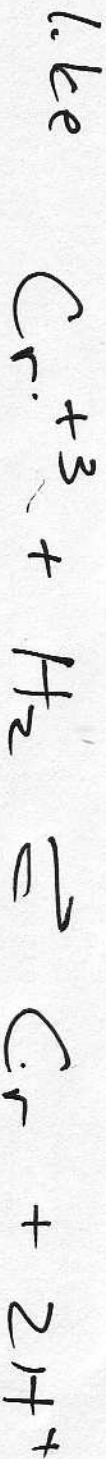
Put I. Find Vol # of coulombs

$$Q = I \cdot t = (10)(10) = 100$$

Vol # goes into a stoich problem
 ? mole O₂ = 100 C

$$\left(\frac{1 \text{ mole}}{9.65 \times 10^4 \text{ C}} \right) \left(\frac{100 \text{ C}}{1 \text{ mole}} \right)$$

I will tell you a chemical reaction.



Put into short hand cell convention



Hint
 It will go into PV = nRT
 $n = \frac{PV}{RT}$

40. cell convention: electrolysis versus voltaic

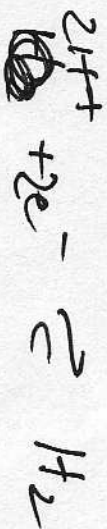
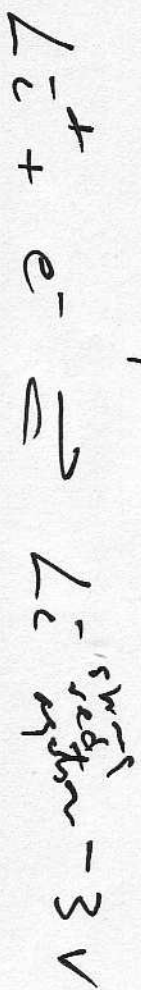
here you apply the cell convention chart

		ΔG	K	E	red / oxid	e ⁻ flow	anode / cathode
spont	batte	-	> 1	+	cat / anod	to cat	+ / -
non-spont	electrolysis	+	< 1	-	anod / cat	from anod	- / +

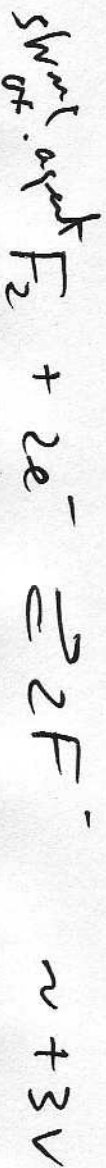
know this, the problem is easy.

41. understanding standard reduction potentials

I want you to know the table of std potentials

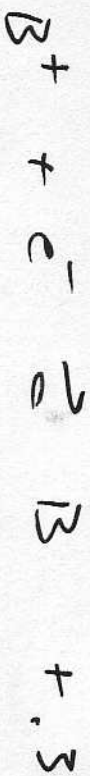
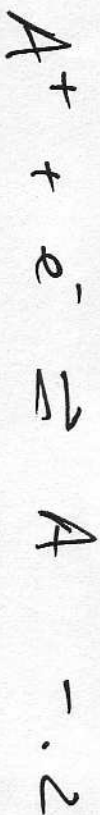


6V



42. calculating cell potentials (not Nernst)

I will solve a couple of $\frac{1}{2}$ cell reactions. They will be std (1M).
solve. $E_{cell}^{\circ} = E_{cat}^{\circ} - E_{anode}^{\circ}$



I will tell you if it is battery or not. Then you solve for E_{cell} .

For a battery, E_{cell}° is $+0.3 - (-0.2) = +0.5V$

like #42 except the conc. are not 1M.

$$\text{so } E_{cell} = E_{cell}^{\circ} - \frac{0.059}{n} \ln \frac{\text{stuff on right}}{\text{stuff on left}}$$

from problem
like #42

I have given you $\frac{n}{\text{---}}$ so you just need to know a shorthand notation into a chemical rxn to get Q

E_{cell}An_{ox}C_{ath}an_{ox}oth_s

Learn about NiCd battery

• 1.5 V battery

• ~~Don't need to be recharged~~

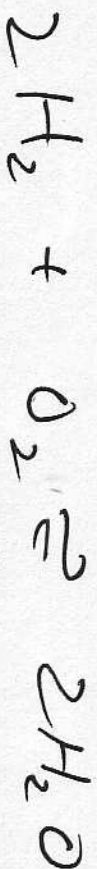
• IT is rechargeable

• $\text{Cd} + \text{NiO}_2 \rightleftharpoons \text{Cd}(\text{OH})_2 + \text{Ni}(\text{OH})_2$

why called alkaline battery

• you need to tell me what redox change is for these $\frac{1}{2}$ rxns. I will give you the equation.

for a reaction



you need to assign rate expression

$$-\frac{\Delta[\text{H}_2]}{2\Delta t} = -\frac{\Delta\text{O}_2}{\Delta t} = +\frac{\Delta[\text{H}_2\text{O}]}{2\Delta t}$$

Chapter 13

45. assigning rate expressions

46. factors affecting reaction rates

I will ask for a list of factors
influencing rate

$$\text{rate} = k [C]^x = A e^{-E_a/RT} [C]^x$$

- k → pre-exponential factor
- E_a → activation energy
- T → temperature

47. method of initial rates

I will provide a simple array
and you will create a rate law

A	B	rate
1	1	1×10^{-4}
1	2	4×10^{-4}
2	1	1×10^{-4}

∴ $B = 2$ $A = 0$

So $\text{rate} = 1 \times 10^{-4} = k [A]^0 [B]^2$

∴ $k = 1 \times 10^{-4}$

∴ $\text{rate} = 1 \times 10^{-4} [B]^2$

48. integrated rate law calculation

I will give a starting amount, a k and a react. m. you tell me what is left after certain time?

k (units)

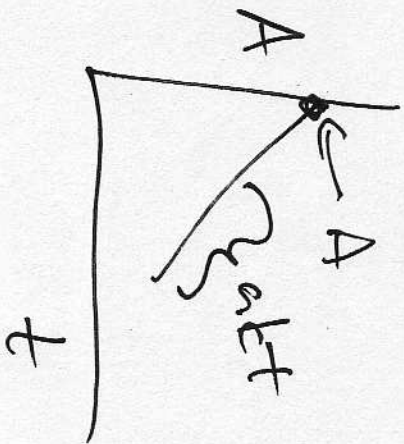
$\frac{M}{s}$ $A = A_0 - akt$ From k - units we which eqn to use

$\frac{1}{s}$ $\ln A = \ln A_0 - akt$ plug + check

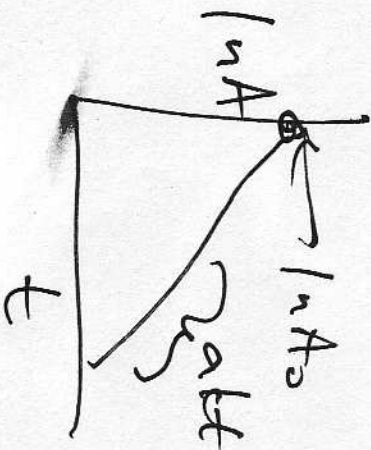
$M^{-1}s^{-1}$ $\frac{1}{A} = \frac{1}{A_0} + akt$

49. extracting kinetics info from straight line plots

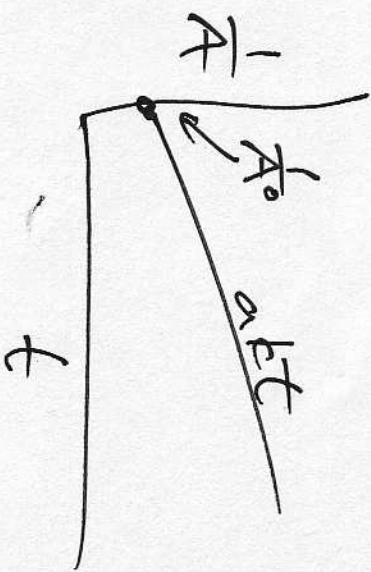
Using equations in # 48
~~Order~~ 1st order



1st order



2nd order



I will ask which of 4 ~~statements~~ ^{statements} is correct about transition state + collision theory.

Remember

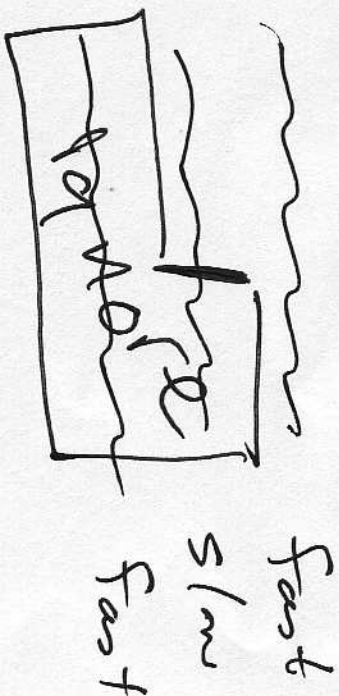
- collisions must be correct orientation and minimum energy
- an activated complex is formed ~~at~~ ^{with a} transition state at E_a

51. Arrhenius calculation

$$\ln \frac{k_2}{k_1} = \frac{E_a}{R} \left(\frac{1}{T_1} - \frac{1}{T_2} \right)$$

3 times or I will tell
 text variables from 1 or 2
 must as \ln $\frac{k_2}{k_1}$ \ln $\frac{k_2}{k_1}$ \ln $\frac{k_2}{k_1}$
 must as \ln $\frac{k_2}{k_1}$ \ln $\frac{k_2}{k_1}$ \ln $\frac{k_2}{k_1}$

I will give you a step wise reaction



• you identify the r.d.s.

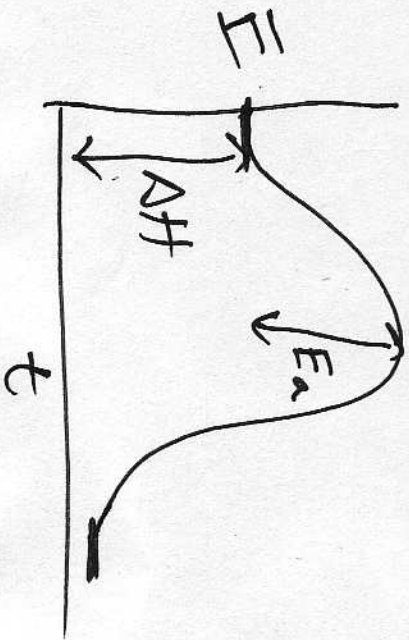
• ignore everything after the r.d.s

• put everything before the r.d.s into

$$\text{rate} = k [C]^n$$

• remember pos. exponents for reactants, neg exp for products

I will give you a potential energy diagram



remember

$$\Delta H = H_p - H_r$$

and ΔH for exo is $\Delta H_{exo} + E_a$

There are a lot of words in
This problem, ignore them and
remember definition of catalysis

- lower E_a
- E_a is positive
- doesn't affect overall rxn
- does affect the mechanism

Survey of Chapters 14-16 and 18, 19
55. properties and reactivity of main group elements

Hint: alkali metal s block
statements about group I

56. properties and reactivity of main group elements

Some things ~~are~~ common
about Group II

57. properties and reactivity of main group elements

Some things favored about Group IV

58. organic nomenclature

I will give you a molecule. Tell me the name -- no more than a simple hydrocarbon prefix and single functional group suffix.

59. organic reactivity

know the reactions

~~acid~~ + alcohol → ester
acid + amine → amide
alcohol + alcohol → ether

} by condensation

60. biopolymer nomenclature and function

know Fats, oils, waxes about

Sugars, fatty acids, proteins

fruits, veg. really well known