Final Exam Review: Part 3 Elec. + Kinetics

- In question type 3 on theory of dissolving stuff, be prepared for a question on dissolving gases in liquids. In general
  - Henry's Law says the higher V.P., the more that dissolves
  - In general there is an inverse relationship between T + solubility of small gases.

- In general, the test is long with a lot of stuff on it. But, the one area you have to know or you'll die is the 6 steps of solving A/B problems.

Electrochemistry.

35. Relating ΔG, K, E. A really straight ahead prbs & chng involving $-nFE^\circ = \Delta G = -RT\ln K$
very straight ahead, no tricks.

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36. Balancing redox. Use Landes approach
- assign ox #
- determine Δ ox & Δ red
- find least common multiple
- assign coefficients
- balance the H + O (in acid)

H.nt. make sure that you account for multiple atoms in a molecule

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37. Ranking ox + red. You will be given a list of ½ rxns. In general, the more positive an $E^\circ_{1/2}$, the stronger.

H.nt 1: Be able to do both the strong oxidizing and strong reducing ← this one you reverse the sign

H.nt 2: The ½ rxns are not in order so be careful.

	$E^\circ_{1/2}$	
———	.5	not in order
———	−.2	
———	1.6	

38. Stoichiometry from current. Very straight ahead. Similar to both the quiz + the exam 3 question but easier.

# of C = g of stuff ( )( )( )
↑ find ↑

or g of stuff = # of C ( )( )( )

# of C = i × t

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39. Interpreting an EC cell diagram. I will give you a balanced chemical rxn. you need to write it as shorthand cell convention.

$$Cu^{++} + Zn \rightleftharpoons Zn^{++} + Cu$$

↳ tell me

$$Zn^{++} \,|\, Zn_{(s)} \,||\, Cu^{++} \,|\, Cu$$

oxidation at anode — reduction at cathode

40. cell convention. Know your table

	E	ΔG	K	anode	cathode	e⁻ flow	signs cath	signs anode
spnt	+	−	>1	ox	red	anode→cat	+	−
nonspnt	−	+	<1	ox	red	anode→cat	−	+

Then respond to a collection of true & false statements

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41 Understanding std cell potentials.

This is a combination of knowing

- #40 table
- calculating $E_{cell} = E_{cath} - E_{anode}$

A very simple calculation.

Hint. Remember that confronted by two ½ rxns, you can subtract the first from second or second from first. The result is either

+ ≡ battery

− ≡ electrolysis

42. Calculating E°. A very simple

$$E^\circ_{cell} = E^\circ_{cath} - E^\circ_{anode}$$

for when all the concentrations are 1 M.

So just like #41.

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43 Calculating E: Nernst equation.

This is a plug + chug for when [ ] ≠ 1M

$$E = E^\circ - \frac{.059}{n} \log Q$$

E°: from $E^\circ_{cath} - E^\circ_{anode}$

These values are a plug + chug once you have balanced a VERY simple redox reaction and plugged in numbers.

Hint: It is as simple as the rxn in #39.

44. Famous Batteries. Look at the list of famous batteries in the EC notes. All you need to do is relate battery name to function.

Pb acid ≡ car
Li ion ≡ calculator + cell phone
alkaline ≡ everything but not rechargeable
Zn air ≡ hearing aid
Ni MH ≡ everything but rechargeable
Ni Cd ≡ " " " but sucks

45. Assigning Rate expressions.
Just like Exam 3. I give you a value for one rate in a balanced equation, you tell me rate for other compd in equation.

$$2H_2O \rightleftharpoons 2H_2 + O_2$$
$$-11\ M/s \qquad +11\ M/s \qquad +5.5\ M/s$$

46. Factors affecting rxn rate
- T make rate ↑ exponentially
- Ea makes rate ↓ exponentially
- pre Exp factor makes rate T linearly
- Concentration makes rate change w.Th rxn order.

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47. method of initial rates. I give you an array w.ll starting concentrations and rates. you tell me the rate law. This one is easier than either the exam 3 or the quiz 5 problem.

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48. Integrated rate Law calculation. A Plus+ chug problem. First determine the order of the reaction (from units of k) Then stick into

0th	1st	2nd
$R = R_0 - rkt$	$\ln R = \ln R_0 - rkt$	$\frac{1}{R} = \frac{1}{R_0} + rkt$

Very straight ahead. Hint. I will tell you help that r=1 on the sheet. r=1 r=1

49. extracting information from straight line plots.
Given the equation in #48, you should be able to determine both R_0 + k. This will be asked of you in a problem that is very straightforward. Don't make it hard.

Y int.	slopes	slope = -11 for r=1 in second order rxn so k=11
0th R_0	-rk	
1st $\ln R_0$	-rk	
2nd $\frac{1}{R_0}$	+rk	

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50. kinetic theory. I will provide a collection of true + false statements about collision + transition state theory. Find the false one.

- collisions must occur
- collisions may be multistep so stoichiometry is not same as collision eqn.
- collision must be correct orientation
- catalysts reduce E_a
- E_a is reverse to reach transition state

51. Arrhenius Eqn. Straight Ahead Plug + chug of the combined Arrhenius

$$\ln \frac{k_2}{k_1} = \frac{E_a}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right)$$ ← stick in the numbers with correct units and solve.

very straight ahead.

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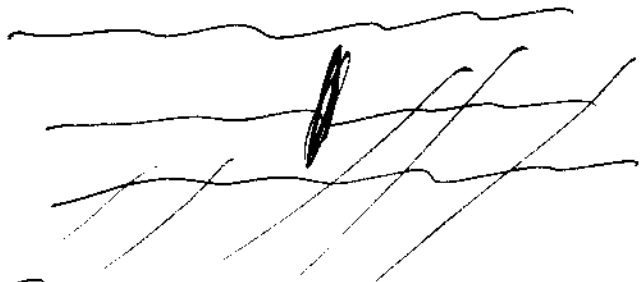
52. reaction mechanism. The rate law is found for a series of multistep reactions w/ everything before the r.d.s. contributing to rate law.



} combine these two to get rate = k [ ][ ]

Hint This one is so easy I want to cry.

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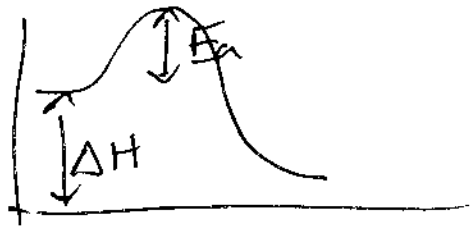
53. Ea + potential plot.



For this problem be able to name the important parts of the plot.

Easy

~~Easy~~

54. Famous catalysts. hole in ozone. KNOW the steps.

55. Know the reaction: I have done this one a m.11. times in class.

56. Know the elemental forms of the n=1, 2, 3 main group species.

57. Know the elemtl forms of the n=1, 23 main group species.

58. Know the components of the famous biopolymers (fatty acids, carbohydrates, proteins, oligonucleotides)

59. organic nomenclature.
- count the # of C to get root
- assign the functional group to suffix
- add a simple prefix.

60. Know #59. amine aldehydes ketones alcohols carboxylic acids aromatic alkyl -ene -yne ethers esters amides