

1. Calculating simple buffers Easy

I will give a weak acid / conj base and a K_a or K_b

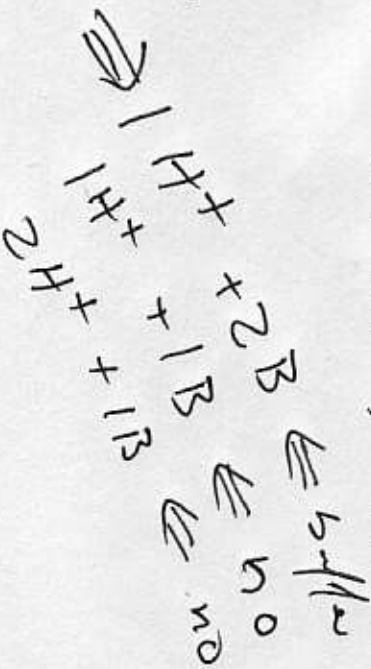
$$H^+ = K_a \frac{C_a}{C_b} \quad \text{or} \quad OH^- = K_b \frac{C_b}{C_a}$$

This is really easy this is the first don't neutralize one same on

2. Identifying buffers (after neutralization) hard for us good reason

Just like the size. I will give a collection of acids + bases. Neutralize and see what is left. If HA/A^- or B/BH^+ , it is a buffer.

Get need to look at simple + F.S. simple + a number of



3. Ranking acidity and basicity based on K values easy.

As the K_a increases, acidity increases.

$K_b = 10^{-10} \leftarrow$ weak \rightarrow $K = \infty$ strong

As K_b increases, basicity increases.

H.t. I may ask for the salt of an acid or base in which case you convert to appropriate K.

Example salt of weak base with $K_b = 10^{-10}$ Convert to
get all
into K_a 's
 $\therefore K_a$ is weak acid of 10^{-4}

4. Buffer capacity magically easy.

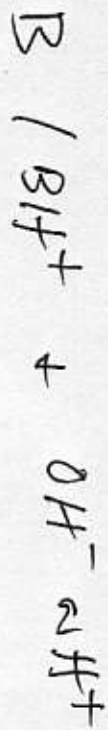
A buffer has same moles of HA as BH⁺ and same moles of A⁻ as B

Three rules are the buffer capacity.

Example 0.1 mole acetic acid + 0.03 mole acetate capacity for strong base
 \uparrow
capacity for strong acid

5. Buffer neutralization calculation ^{hard} The why problem w. TR

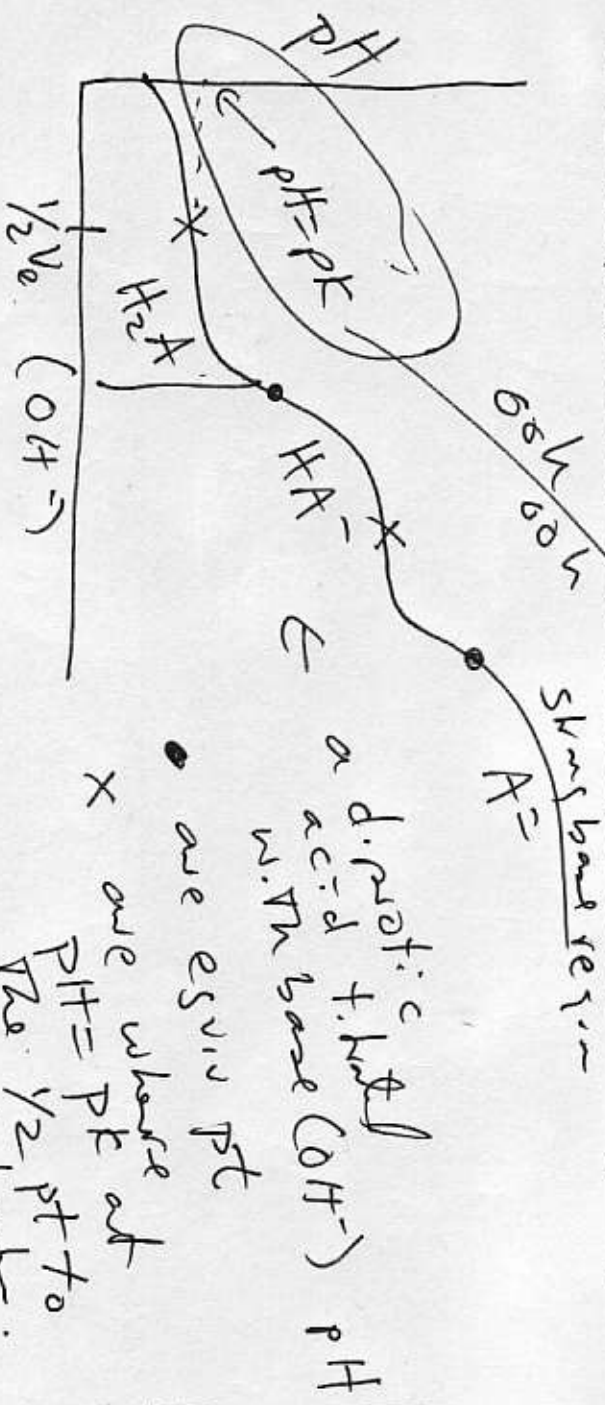
3 acids + bases mixed.



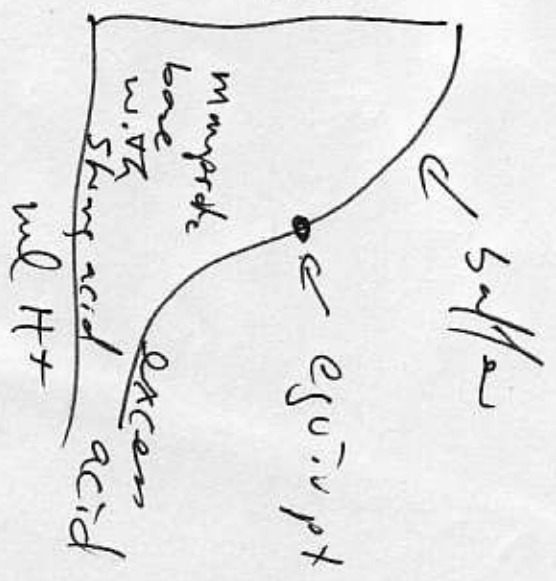
Simply follow the 7 steps for solving acids/base problems.

This is the one where every box on RICE gets filled to start.

6. Identifying features of a titration curve medium.



• a diprotic + total w. TR base (OH^-)
 • are equiv pt
 • are where $pH = pK_a$ at $V_0 / 2$ pt to neutralize.

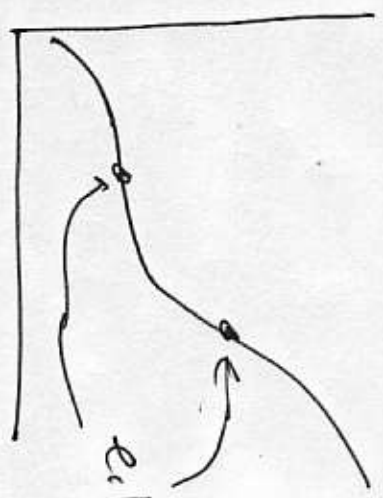


Hint: It is possible that since a buffer $pK_a \approx pH$ that you can estimate the correct answer w. that calculation (like on quiz 3)

7. Titration calculation ^{easy}

7 step acid/base calculation. I ignore that it is a titration + just follow the 7 steps.

← easy case will be monoprotic A/B t.t. when.



either to a buffer region or equiv pt. just like s.v.e

8. Titration calculation ^{hard}

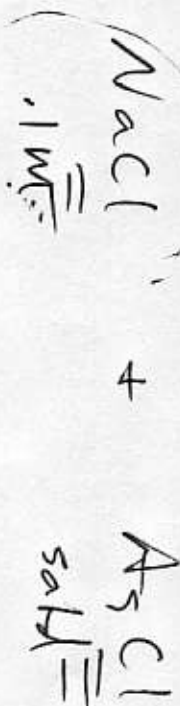
Still do 7 steps but it will involve a polyprotic acid!!

I have 1 mole of H_3PO_4 . I add 2 mole OH^- . The first mole convert everything to $H_2PO_4^-$ and second mole to HPO_4^{2-} case it is amphiprotic

11. Common ion calculation hard. I will give you two

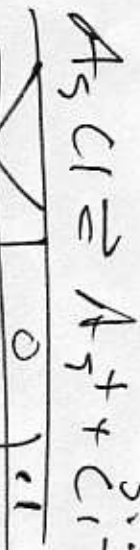
salts that have an ion in common.

Example



keep it, this is like to H_2SO_4 problem

step 2. one of the salts is soluble. (speck in). take that amount + put it into the simple molar solubility calc. like prob. 10.



0	0	0
x	x	x
0	.1	x

only thing new

$$K_{sp} = (x)(.1+x) \leftarrow \text{easy}$$

12. Selective precipitation hard.

I will give you a collection of salts with common ions but varying K_{sp} s. you tell me which ppt. first, second, last.

Example

CuBr	K_{sp}
10^{-10}	
AgBr	10^{-15}
AuBr	10^{-20}

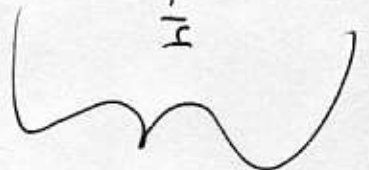
with that as I add Br^- dropwise, the least soluble (AuBr) ppt. first, then CuBr .

13. Approximations of acid base equations

• $H^+ = (K_a C_a)^{1/2}$

because

$C_{\text{carbonate}} \approx 10^{-14}$
 $10^{-2} < K_{a1}$



H. nt. That me.

easy because you have seen every example on last quiz or practice sv.t.

• $H^+ = (K_1 K_2)^{1/2}$

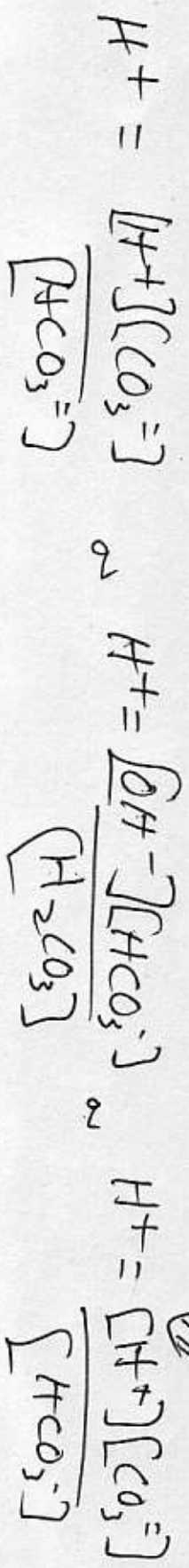
because K value are for eq. H

eg. 1. ~~polyprotic acid equilibria~~ ^{experiencing for polyprotic acid} easy. + sh. s. w. a head.

I will ask you to set up the K

eg. 1. for a di- or tri-protic acid. you will look at a collection of answers and see which is valid.

Example, for second dissociation of H_2CO_3



backings

15. polyprotic acid calculations

hard, but pay attention (start solving)

what is pH of a 0.1 M Li_3PO_4 solution.

This is a weak base problem for PO_4^{3-} fully deprotonated salt.

So set up as



(~~****~~ get K_b from $\frac{K_w}{K_a}$ of weak acid K_a value)

16. Mass and charge balance medium just like size but easier

I will put a couple of examples in H₂O. set up e.g. Na_2CO_3 charge or mass balance.

$$\underbrace{\sum \# \uparrow}_{\# \uparrow} = \underbrace{\sum \# \downarrow}_{\# \downarrow}$$

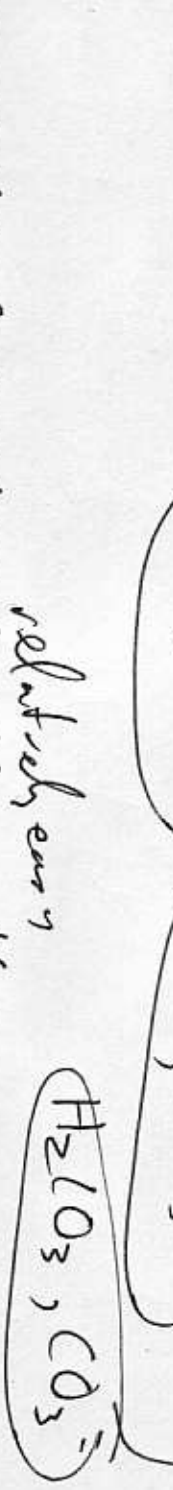
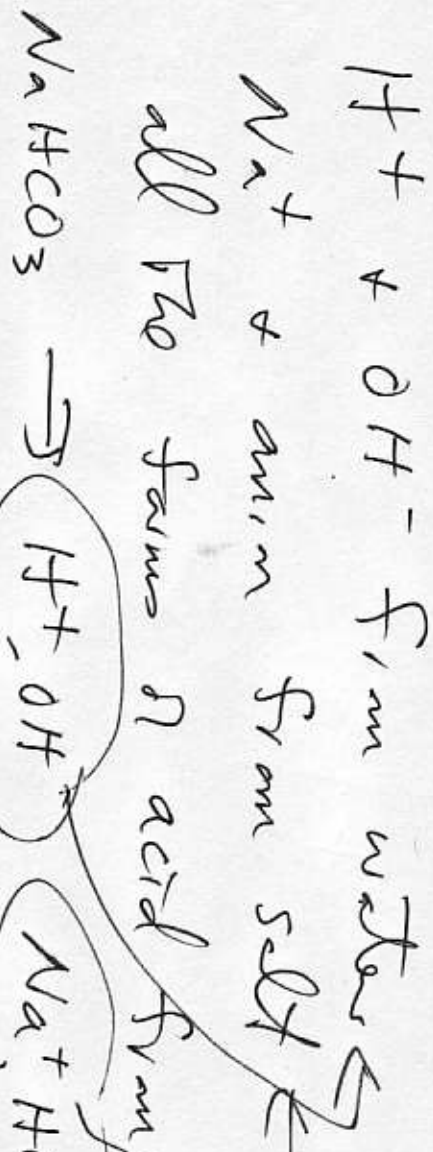
$$C_{\text{anion}}^{\text{free}} = [] + [] + []$$

all PO_4 forms PO_4^{3-} atom

17. Setting up complex equilibrium problems easy. Just like 50.2

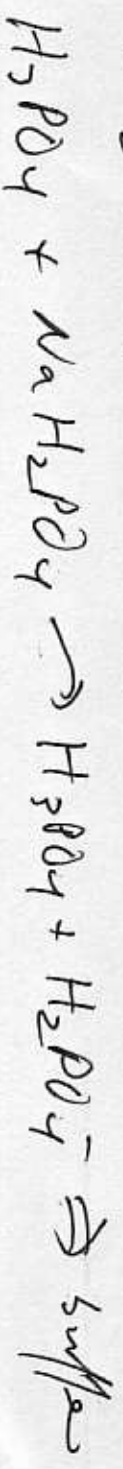
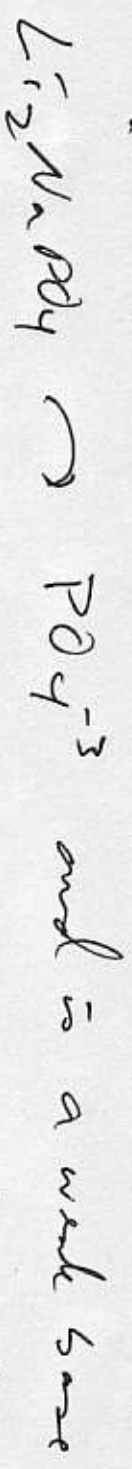
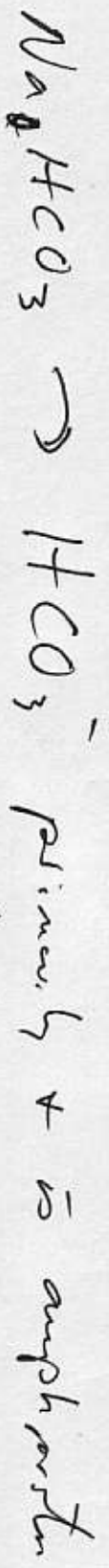
I will give you a compound then in water. you tell me how many unknown species there are.

3
 Strong
 species



18. Equilibrium expressions for a polyprotic acid e.g. H_2CO_3

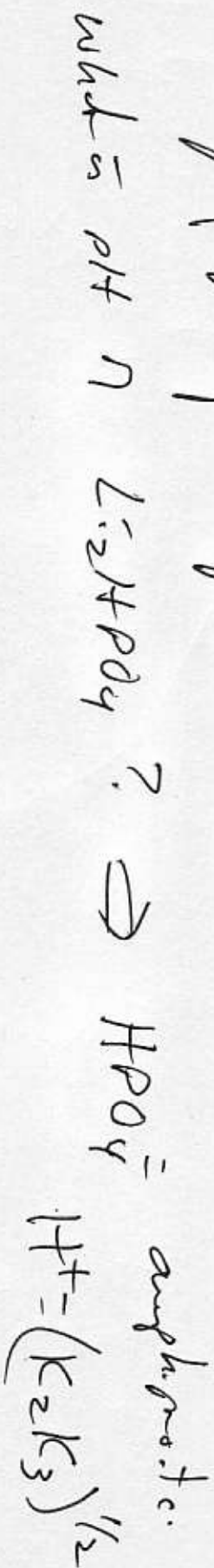
I will turn stuff in water. you tell me what is present and rank the amounts



21. Equilibrium Calculations: weak polyprotic acids easy Just like 50.2

I've done the weak base of a triprotic acid. I guess this means.

Amphiprotism !!!



22. Balancing redox reactions (in acid or base) are so easy.

Just balance a $1/2$ reaction and basically find the number of e^- transferred like in the same

23. Balancing redox reactions (in acid or base) hard. A legit

redox problem in either acid or base.

Problem, not all the steps. You will be asked to find the Σ of the coefficients

use change of oxidation method.

- assign ox #
- Δe^- for ox + red
- find l.c.m. assign coeff.
- solve for H_2O

24. Ranking oxidizing and reducing strengths

I will give you a list of $1/2$ cell reduction potentials.

As written, the more positive E is easier to reduce strongest ox. agent.

The reverse of what is written,

the most negative E is easiest to oxidize and strongest red. agent.

25. Assigning EC cell nomenclature easy - know the chart below.

	Ag	Fe	cat	anode	e ⁻ flow	concentration	
spont	-	+	red	ox	to cathode	+	-
nonspont	+	-	red	ox	to cathode	-	+

For one problem you will be asked to apply this chart directly to a cell reaction telling what is in the chart.

26. Assigning EC cell nomenclature easy

I will give you a cell reaction. You need to identify which electrodes are cathode & which are anode in addition to knowing the chart.

29. Stoichiometry calculation from current **hard.**

Remember to keep this a a high school problem. Instead of $9 \rightarrow$ moles it is change to moles.

Hint: ^{see the exam} ^{practice} ^{exam} is change to moles.

Example what is 9 g Cu if I run a current of 0.2 A for 5 seconds.

or what is current if 155 g Cu was produced in 5 seconds?

30. Calculating cell potentials (Nernst) **hard.**

The only E.C. problem with molar concentration.

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

Just like question 27

From addition redox like just balance!

stuff on right / stuff on left

I will work this + show u.s. in class will put it in the practice exam.