CARNICOM INSTITUTE LEGACY PROJECT

A Release of Internal Original Research Documents

Authored
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Chemistry Vol. 1

Chemistry
Vol 1

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1 Subject

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Chemistry Notebook

April 4th 2009

Lab Notebook

Vol 1

Phenolpthalein solution:
CRC says 1.0 g in 50 ml of "alcohol"
& add 50 ml of water.
Let's use this and figure out what alcohol.
It is ethanol (denatured alcohol)

We are going to make 60 ml vs 100 ml total
so we will use
30 ml ethyl alcohol vs 50
so
(3/5) 1 gm = 0.6 gms

So
0.6 gms phenolpthalein
30 ml ethyl alcohol
30 ml water

Chemicals available:

Phenolphthalein Solution
Strontium Nitrate
Barium Nitrate
Oxalic Acid
Potassium Chloride
Barium Hydroxide
Sulfur
Ammonium Nitrate
Potassium Nitrate
Strontium Chloride
Barium Chloride
Silver Nitrate
Ammonium Hydroxide
Copper Sulfate
Guar Gum
Cobalt Chloride (solid)
Borax
Potassium Iodide Solution (slight)
Sodium Polyacrylate Copolymer
Iron Filings
Ferric Ammonium Sulfate
Sodium Carbonate

Acetic Acid
Ammonium Hydroxide
Bromophenol Blue Indicator
Calcium Nitrate
Glycerin
Hydrochloric Acid
Lead Nitrate
Nickel Nitrate
Phenolphthalein Indicator
Potassium Iodide
Sodium Acetate
Sodium Hydroxide
Sodium Oxalate
Sodium Sulfate
Sodium Thiosulfate
Universal Indicator Paper Strips
Zinc Nitrate
Magnesium Sulfate
Potassium Hydrogen Phthalate
Cetyl alcohol
Palmitic acid
Acetic Acid 28%
Aquarium [Sulfuric Acid
Sodium Hydroxide
Hydrogen peroxide

Carolina
Kastle Meyer Blood Test kit
$17.50
1 800 334 5551 8am - 6pm ~~ET~~ M-F
6am - 6pm MST M-F

Copper Smelting Experiment:
Need:
1. Copper Carbonate (ore)
2. Activated Charcoal
3. Crucible

The Blood Test:
5 Methods now:
1. Direct Observation
2. Wright's Stain
3. Glacial Acetic Acid - Salt (unreliable?)
4. Phenolphthalein
5. Hemaxstx

Copper Sulfate:

"Lowest toxic" dose 11 mg/kg.
Readily absorbed through the skin.

Lethal Dose for rats is 30 mg/kg (50% ethol)

1% solution, 3oz by "animals" - which animals?
Vineyard sprayers - Live disease, 3 to 15 yrs
using Bordeaux mixture.
Copper sulphate contains 25% copper.
Bordeaux:
1 kg copper sulfate = a 1% solution.
1 kg lime
100 kg water.

1 millionth of a gram.

Estimate we are dealy w/ about 30 mcg / kg

$= \frac{30E-6 \text{ gms}}{1000 \text{ gms}} \overset{a}{=} .000003\%$ solution.

EPA limit in water is 1 ppm

One source says adults require 1.5 - 3 mg of Copper per day.

What is this in terms of copper sulfate?
Copper Sulfate = 25% copper so
If we use 2mg day, this would mean we would take 8mg 8mg per day of Copper sulfate.

Now, if I measure 175 lbs
= 69 kg call it 70 kg.
Online says ~~175~~ kg 79.5 kg ≈ 80 kg.

So $\frac{8\,mg}{80\,kg} = \frac{.1\,mg}{1\,kg} = 100\,mcg$ Kilogram.

This is 1/300 of the LD 50 for rats.
So if we were to make a solution having this much.
Assume 1/4 liter = 250 gms.

$\frac{8\,mg}{250\,gms} = \frac{8E\text{-}3\,gms}{250\,gms} = .0032\%$ solution. This would be for 1 day.

or in a liter of water, this would be
$\frac{32\,mg}{1000\,gms} = \frac{32E\text{-}3\,gms}{1000\,gms} = .0032\%$ This would be for 4 days.

Mayo Clinic also says Normal recommended daily intakes are 1.5 to 2.5 mg per day for an adult male. This matches everything we have said.

EPA drinking water $< \frac{1300\,ug\ (mcg)}{liter} = \frac{1300E\text{-}6}{1000\,gms} = 1.3E\text{-}4\%$ solution

Institute of Medicine, Academy of Sciences says Tolerable Upper Intake of Copper is
10,000E-6 gms = 10
10,000 mcg = 10 mg This means 40 mg/day. But we are planning on 8.

Now, you could easily form a more concentrated solution.

One cup of water = 236.6 cubic centimeters.
or 1 cup of water = 236.7 ml of water.

So lets assume we make a solution up in 1 liter of water.

This is as we have determined $\frac{32\text{mg}}{1000\text{gm}} = .0032\%$ solution.

Now if use 100 ml of water
We make up the same solution

$\frac{32\text{mg}}{100\text{ml}} = \frac{32\text{E-3 gms}}{100\text{gms}} = .032\%$

But THIS IS too strong! by a factor of 10.

So now we would like to add this to water to make the right solution

$$X\text{ml} + .00032(Y\text{ml}) = 236.3\text{E-5}(X+Y)$$

$$X + Y = 236.6$$

So make up solution of

1. 32 mg / 100 ml of water = .032 gms (= .032% solution)

2. Dilute this by a factor of 10 (= .0032% solution)

3. Drink 250 ml (~ 1 cup) of that solution per day for a total intake of approx 8 mg Copper ~~Sulfate~~ per day which is equivalent to

4. approx 2 mg per day of pure copper.

Because our scale was not sensitive enough we have changed the layout.
We have .09 gms $CuSO_4$ in 100 ml of water.
Since $CuSO_4$ is 25% Copper we now have
$\frac{.09}{4} = .0225$ gms Cu / 100 ml H_2O = 22.5 mg Cu / 100 ml of H_2O.

Now we are entitled to take in 2 mg per day.
So this means we can take
1/10 of this solution per day, or 10 ml / day

Seek out Broad Category Definition of
Cultic sample.
Test for

1. Protein
2. Fat
3. Starch (Cellulose)
4. plastic?

Filament Breakdown

is occurring with a mixture of

1. diluted ethanol ~ 1:1 ~ 5 ml
2. Curling solution (2 drops)
3. Copper sulfate (2 drops)
4. heating the solution before adding the Copper sulfate

(1)

Distended blood cells & bacterial form appears to be prevalent. ????

Dilute

(2) Ethanol + CuSO4 + Curling Solution does produce a dark precipitate

This precipitate has no similarity to the structures that are found in #2. This precipitate is amorphous. This is without heat!

(3) Curling Solution + Water + CuSO4 + Filaments

Produces the strong precipitate but the filaments do not dissolve. Now add ethanol: (a few drops to about 10 ml, so weaker)

Filaments still do not dissolve. Now add heat. Heat causes a significant reaction of the precipitate (it congeals) but the filaments have still not dissolved.

(4) Sufficient heat appears to be important. This is when things are breaking down.

Same structures repeated. This method, or a subset of it, appears to be a method of breaking down the filaments.

(5) Solution
Sodium Hydroxide + Potassium Hydroxide
& (i.e Strong alkali) + HEAT
Does break down the filaments !!!

6. The answer is:

NaOH + KOH + Heat + Filaments
in Concentrated form
on Slide
appears to be a form of artificial blood.

Left Slides

1 Dental + Lye + Heat
2
3 +
4 Kastle Meyer

Right Side

1 Blood in Water
2 +
3 Kastle Meyer
4. Kastle Meyer Alone

Hemoglobin reaction is immediate w/ live blood dissolved in water.

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We are going to make 1.5 liters of medicinal Copper Sulphate.

From 2 sources, required daily Copper intake is ~2 mg
Tolerable upper limit is stated to be ~ 10 mg/day
Our Copper is 25% so this would mean ~40 gm/day.
But we will cut this in half to ~20 mg/day
Now lets mix up 1.5 liter bottle ≅ 1500 ml
Assume we will take 100 ml/day
This gives us 15 days @ 20 mg/day in 100 ml of water.
For 100 ml:

$$\frac{20\text{mg}}{100\text{ml}} = \frac{20\text{E-3gm}}{100\text{gms}} = .02\% \text{ solution by wgt}$$

So if we want to mix it up in 100 ml of water the total amt we use

$$\left(\frac{20\text{E-3gms}}{100\text{ml}}\right) \cdot 15\text{days} = 0.30\text{gms.} = 300\text{mg.}$$

So we place 300 mg in 100 ml of water and then dilute by 15.

Let's now learn how many sulfates we are ingesting.

$\frac{.3 \text{ gms } CuSO_4}{1500 \text{ ml}} \cong \frac{.3 \text{ gm } CuSO_4}{1500 \text{ gms } H_2O}$

Now, 25% of this Cu, so expected 75% is Sulfates

$\frac{.75(.3) \text{ gms } SO_4}{1500 \text{ gms } H_2O} = .0150 =$ ~~.15~~ and we take

100 ml per day = $.75\ (.3)\ (ml/15) = .015$ gms/day of sulfates

$= 15$ mg/day

Assume I drink ~~1.5 liters~~ 1 liter per day.

$= \frac{.015 \text{ gms}}{1000 \text{ gms}} = .0000\_\_ = 15$ ppm

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$\frac{1.0 \text{ gms } CuSO_4}{500 \text{ gms } H_2O} = .002 = .2\%$

$\frac{58 \text{ drops}}{4 \text{ ml}} = \frac{1 \text{ drop}}{X \text{ .069 ml}}$

1 drop = .069 ml

1 drop

$(.069 \text{ ml}) \frac{.002 \text{ gms}}{100 \text{ ml}} = .0014 \text{ mg}$

$\frac{\text{mg}}{\text{drop}}$

$(.4545)(180 \text{ lbs}) = 81.8 \text{ kg} = 80 \text{ kg}$

.4545 kilos/pd

$\frac{2.2 \text{ pds}}{\text{Kilo}}$ 82 kilos/pd

$\frac{.0014 \text{ mg}}{.1 \text{ kg}}$ $\frac{? \ 1.12 \text{ mg}}{80 \text{ kg}}$

It will be simple to determine the strength of the drain cleaner.

We will put one drop of drain cleaner in 100 ml of water & add phenol phthalein.

20
20
+13
53 drops = 3 ml

$\frac{53 \text{ drops}}{3 \text{ ml}} = \frac{1 \text{ drop}}{.057 \text{ ml}}$

1 drop = .000057 liters.

This is the plastic disposable pipet.

We will put 5 drops of the unknown lye into 100 ml of water.
We have 107 ml of H_2O
+ 5 drops unknown lye + ½ drop phenol

It took 7 drops of 31.45% Muriatic (HCl) acid to change color. (ie, to neutralize it)
What is the strength of the unknown base?
From the MSDS sheet we learn that it is 38 to 50% NaOH
and 0 to 3% KOH
& 47–62% H_2O

Use averages:

44% NaOH	40	(23 + 16 + 1)
1.5% KOH	56	(39 + 16 + 1)
54.5% H_2O	18	(2 + 16)

Sr Molecular Wt is: .44(40) + .015(56) + .545(18) = 28.25 gms/mole
HCl Molecular Wt is 1 + 35.5 = 36.5 gms/mole

The relationship is:

$n_B \cdot V_A \cdot C_A = n_A \cdot V_B \cdot C_B$

We need C_B.

$C_B = \frac{n_B \cdot V_A \cdot C_A}{n_A \cdot V_B}$

$V_B = 10$ ml

$V_A = 7$ drops $= 7(.05$ ml$) = .4$ ml

$C_A = 31.45\%$ HCl

$= .3145(36.5$ gms/mole$) + .6855(18)$

$= 23.82$ gms/mole

Molar Mass $= 35.5 + 1.69 = 36.2$ gms/mole

and for C_A we are using 7 drops $= 4E-3$ liters

C is in units moles/per Liter.

We need to know how much a mole weighs.

A mole weighs 23.82 gms.

31.45% HCl:

1 Liter weighs 1000 gms

31.45% HCl means we have $.3145(1000) = 314.5$ gms HCl and 685 gms H_2O.

gms / gms/mol $= \frac{314.5}{36.2}$

Should be about 10 I think I can right.

From table we found 37% HCl = 12 Molar

Should be about 10 Molar, Why & How?

Molecular Weight of Clean Cleans:

$\frac{.44(40) + .015(56)}{.44 + .015} = 40.53$ gms/mol

We used: 10 ml + 5 drops (.05 ml) =

A solution in our particular case is given by

$V_a M_a = V_b M_b$

$M_b = \frac{V_a M_a}{V_b}$

$V_a = 107ml$

$V_b = 7 drops (.057ml) = .4ml$

$M_a = 8.7M$

~~$M_b = 2327M$~~

But we put 5 drops of the HCl in the 107 water

so $M_a = \frac{5(.057)ml}{107ml}(8.7M) = .0232M$

So our problem is:

$M_b = \frac{107ml}{.4ml}(.0232M) = 6.3M$ NaOH approx in original form

This is right.

So when we put 1 drop in 1 ml of water we are creating a

$(1)\left(\frac{.057ml}{1ml + .057}\right)(6.3M) = .34M$ Solution of NaOH.

In approx .35 M Solution when it is diluted, in the test tube.

You need the chemical reaction when you do this

$NaOH + HCl = H_2O + NaCl$

Lets look @ Molarity in more detail.
A mole is an amount of something, like pound of lead, or a pound of gold, it is still a pound.

Here is what we know:
You have an acid solution of a known strength 31.45% HCl. an unknown strength of NaOH
You take 5 drops of ~~this solution~~ & add it 100 ml of H_2O. Each Drop is .057 ml.

Then you find it takes 7 drops of HCl to neutralize this. What is the Concentration of the unknown NaOH?

First, what does 31.45% HCl mean?
HCl has a molecular mass of 35.5 + .69 gms = 36.2 gms / mole
If something is 31.45% HCl it means in one liter, 314.5 ml (or 314.5 gms) are HCl and that 685.5 gms are H_2O.
Now in one liter we have $\frac{314.5 \text{ gms}}{36.2 \text{ gms/mole}}$ = 8.69 Moles in the liter.
This means the HCl is a 8.7M solution.

Now NaOH has a molar mass of 40 (23+16+1) $\frac{\text{gms}}{\text{mole}}$

We have 5 drops of this of unknown Concentration in 100 ml of water.

Molarity = $\frac{\text{n. moles}}{\text{liter}}$ molality = $\frac{\text{n moles}}{\text{Kilogram of solvent}}$

Solved for Molarity of Drain Cleaner = ~ 12.2M NaOH (assumes Pure NaOH)

A-2 Chemistry gives the more general relationship which is

(1) $n_A A + n_B B \rightarrow$ products

So the chemical reaction involved is critical.

(2) The second general relationship is

$$\frac{V_A \cdot C_A}{V_B \cdot C_B} = \frac{n_a}{n_b}$$

V_A is volume of Solution A
V_B is volume of Solution B
C_A is Concentration of A in moles/L
C_B is " " "B" " "

So you must define the chemical reaction before proceeding. For us the reaction is

$$HCl + NaOH \rightarrow NaCl + H_2O$$
(1) (1)

so one mole of Na reacts with 1 mole of Cl
This is critical knowledge.
Now we can say that and only now that

$$\frac{V_A \cdot C_A}{V_B \cdot C_B} = \frac{1}{1}$$

or $V_A \cdot C_A = V_B \cdot C_B$
Volume · Concentration = Volume · Concentration

for us:
so we need C_B

$$C_B = \frac{V_A \cdot C_A}{V_B}$$

let V_A = HCl C_A = HCl
V_B = NaOH C_B = NaOH
V_A = 7 drops (.057ml) = .399 ml
C_A = 8.69 moles/liter
V_B = ~~100ml~~ + $\frac{4}{5}$(.057ml) = ~~100.4ml~~ .285ml

So

$$C_B = \frac{.399E\text{-}3\,l \cdot 8.69 \text{ moles/}l}{.285\ \ \cancel{100.4E\text{-}3\,l}} = 12.2M\ NaOH$$

very reasonable.

This is one Strong base!

Now assume we put one drop of this in 1 ml of H_2O! How strong is our base then?

1 drop = .057 ml

.057E-3l.

12.2M NaOH means $\frac{12.2 \text{ moles}}{1 \text{ liter}}$

So $\frac{12.2 \text{ moles}}{1 \text{ liter}} = \frac{x}{.057E-3l}$

$x =$ .000695 moles in one drop

~~.0001~~ $\frac{.000695 \text{ moles}}{.057E-3l}$ ~~$\frac{x}{1E-3l}$~~ ~~$\frac{x}{1 \text{ liter}}$~~

This is right

~~x =~~ We have $\frac{.000695 \text{ moles in one drop}}{(1 ml + .057 ml)}$

$= \frac{.000695 \text{ moles}}{1.057E-3l} = \frac{x}{1l}$

This is right

$x =$ .6575 M OK this is right.

So first is the hydroxide being used is about 0.5 M NaOH

The reaction is not always so simple.
What if it was KOH?

$KOH + HCl \rightarrow KCl + H_2O$ probably ok
yes, this is right. Idea would be the same.

Prepare Stock Solution of NaOH

$nA + nB \rightarrow$ products

$$\frac{V_A \cdot C_A}{V_B \cdot C_B} = \frac{n_A}{n_B}$$

We have a first estimate of NaOH @ 12.2M NaOH
We know the HCl is 8.7M

There is some confusion about the molarity of the Muriatic acid. My work shows 8.7M The MSDS for this particular product says that it is 10.0M, Why the difference? How can this be?

$$\text{Molarity} = \frac{\text{moles of solute}}{\text{liters of solution}}$$

$$\text{Molality} = \frac{\text{moles of solute}}{\text{kilograms of solvent}}$$

Also a useful reaction for further calibration may be:

$NaHCO_3 + HCl = CO_2 + NaCl + H_2O$
(Baking Soda)

Baking Soda + Hydrochloric Acid → CO_2 + Salt + Water.

$Na_2CO_3 + 2HCl \rightarrow 2NaCl + H_2O + CO_2$

Calculate the molarity of HCl?
if 32.75 ml fully reacts w/ .4811gm of Sodium Carbonate!

moles Na_2CO_3 = $\frac{.4811 gms}{105.9888 gms/mole}$ = .004539 moles

moles HCl = 2 * .004539 = .009078

Moles = $\frac{.009078}{.03275 Liters}$ = .2772 M

Let's try this method.
First, let's dilute the acid & put 1 ml of acid in 10 ml of water.

Let's calculate the drop of a standard 1 ml ~~bur~~ pipette
We have 50.0 ml of H_2O in the large beaker.

~~50 drops~~
100 drops
+3
103 drops = 3 ml

$\frac{103 drops}{3 ml} = \frac{1 drop}{X}$ X = .0291 ml

So 1 drop of the standard disposable pipette is .0291 ml ≈ .03ml

This is an important reference.

There fore 1ml in drops = $\frac{1ml}{.0291 ml/drop}$ = 34.3 drop = 34

So now we add
34 1 drop

Actually, we only want to dilute the HCl by a factor of 10.

So now imagine we have 1 ml of the strong HCl. Assume we add this to 9 ml of H_2O. Now we have a total solution of 10 ml where before we had 1. So the diluted solution is 1/10 of the original.

So Dilution $= \frac{1}{1+X}$ or $\frac{1}{1+9} = \frac{1}{10} = 10\%$

yes Dilution $= \frac{\text{Input}}{\text{Input + Extension}}$ eg $\frac{4}{4+50} = \frac{4}{54} = .0741$

this is it. $\frac{X}{X+50} = .1$ or $X = (.1)(X+50)$

$X = .1X + 5$

$.9X = 5$ $\quad X = \frac{5}{.9} = 5.56$

$\frac{5.56}{5.56+50} = .10$ ok

So we would add 5.56 ml to get a 10% solution of the original

at -2.5 in pipette

$-2.5 + 5.56 = 3.06$ we have this.

So we have $\frac{5.56 \text{ ml}}{5.56 \text{ ml} + 50 \text{ ml}} = 10\%$ solution.

Now we find out how much Sodium Carbonate reacts with this.

1.13
Tablespoon weighs 1.13 gms

.49
.62
.66
.64
.05
.06 This pretty close:
Σ 2.52 gms

moles Na_2CO_3 = $\frac{2.52 gms}{105.9888}$ = .0238 moles

moles HCl = ~~55.56~~ ml
2(.0238 moles) = .0476 moles

Molarity = $\frac{.0476}{55.56 E-3 l}$ = .8567 M

but this is a 10% dilution rate So we get 8.6M Solution which is exactly what we had before by Computation, 8.7 moles
Even though "the table" from the net says it is 10.0M. We must now accept our results. It makes perfect sense by 2 Completely different methods

Revised:
+ .06
= 2.58 gms

$\frac{2.58 gms}{105.9888}$ = .0243 moles

moles HCl = 2(.0243) = .0486

$\frac{.0486}{55.56 E-3 ml}$ = .8747 @ 10%

= 8.75 M @ full strength.

This is a perfect match to the 8.7M as a small portion of the Sodium Carbonate did not react. A perfect Solution.

this is even easier than titration.

Now we find at how much Sodium Carbonate reacts with this.

.49
.62
.66
.64
.05
.06 This pretty close:
Σ 2.52gms

1.13
Tablespoon weighs 1.12gms

moles Na_2CO_3 = 2.52gms / 105.9888 = .0238 moles

moles HCl = ~~5556~~ ml
2(.0238moles) = .0476 moles

Molarity = .0476 / 55.56E-3 l = .8567 M

but this is a 10% dilution rate So we get 8.6M Solution which is exactly what we had before by Computation, 8.7 moles
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= 8.75 M @ full Strength.

This is a perfect match to the 8.7M as a small portion of the Sodium Carbonate did not react. A perfect Solution.

this is even easier than titration.

Now we go after the NaOH.
Is there something similar to neutralize it
that we have? We we know that HCl
works. & we have it & we know how
strong it is. So just do it.

So we start by diluting the NaOH also.
Same thing. 50ml + 5.5b NaOH = a 10% solution

-2.8 + 5.5b = 2.7b done ok in pipette.
Now we have a 10% Solution of the unknown NaOH.
We add ~~one~~ two drops of phenolphthalein

Now we prepare a ~~10%~~ 20ml of water
and add 3 ~~5~~ pipette drops of HCl pure.
Stronger

this is one set

Now count the pipette drops to neutralize
It took 65 drops.

So you need to strengthen the HCL. by about 3
So we do it again.
-2.9 + 5.5b = 2.6b

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1. Saw w/ 10^{no} NaOH
2. 2 Drops Phenol
3. 20 ml of H_2O + 10 drops full strength HCl
4. No of drops to neutralize:

30
30
31
30
121 ya need to use full strength HCl..!!

Ø 50 + 5.56 NaOH
1. -3.1 + 5.56 = 2.46
2. 1 drop phenol
3. Straight HCl:

30
20
30
30
30
30
30
30
30 this neutralized
230 drops (.029 ml/drop) = 6.69 ml of Full Strength

base → $C_B = \frac{V_a C_A}{V_B}$ ← acid

$V_a C_a = V_B C_B$

$C_B = \frac{V_a C_A}{V_B} = \frac{(6.69\ ml)(8.7\ M)}{55.56\ E{-}3\ l} = 1.05M$???

↑ this is a 10^{no} solution!!! not 100^{no}

Does this make any sense?

So full strength solution is:

$C_B = \frac{(6.69\ E{-}3\ l)\ 8.7M}{\left(\frac{55.56\ E{-}3\ l}{10}\right)} = 10.5M$ this is Correct

Now just verify it

1. Ok, you have your 2nd solution.
   Your first answer was 12.2 M
   but this should only have been approximate.
2. Now we get 10.5M NaOH.
   This should be a good solution. Now
   just verify it.

You need to knock down the drops by about
2/3. or 1/3 total. So about 60 drops.
This means we need to increase the concentration
of NaOH by about 3. We are using a 10%
solution. So we need about a 30% solution.

How about 30ml of solution instead of 50.

$$\frac{X}{X+30} = .3 \qquad X = .3(X+30)$$

$$X = .3X = 9$$

$$.7X = 9$$

$$X = 12.85$$

So we put
12.85 (~13ml)
in 30ml of H_2O. $\Rightarrow$ 42.85 ml NaOH
@ 30% solution.

3. Now count drops straight.
   10 drops cleared it up?

base acid

$C_B = \frac{V_A C_A}{V_B} = \frac{10(.0291E-3\,l)(8.7M)}{(42.85E-3\,l)(.3)} = .1969\ldots$??? M

This is totally different. Why? I do not understand this.

$\frac{12.85}{12.85+30} = .3$ =

If you put in more phenol it makes a difference. Why?

13 drops HCL = .3783 ml = .3783E-3 l = V_B

$\frac{(.3783E-3\,l)(8.7M)}{(42.85E-3\,l)(.3)} = .25M$ I do not understand this.

This makes no sense to me.

Lets try again w/ 100 ml of NaOH @ 10%

$\frac{X}{X+100} = .1$ $\quad X = .1(X+10)$

$X = .1X + 10$

$.9X = 10 \quad X = 11.11$

So we add 11.1 ml of NaOH to 100 ml of H_2O

Now count drops of straight HCl

20	30
30	30
30	30
30	$\Sigma = 340$
30	
30	
20	
30	
30	

This is our best answer NaOH ≈ 9.0M

$C_B = \frac{340(.0291)E-3}{111E-3\,l}(8.7) = 7.75M$

We got 60.5 before Ans = 9.12M almost the same as the 1st!

Now we need to make a 1M Stock solution

Straight is approx 9.0M
we want Dilution to be 1/9

$$\frac{X}{X+100} = 1/9$$

$$X = (1/9)(X+100)$$

$$X = .111X + 11.11$$
$$.889X = 11.11$$
$$X = 12.5 \text{ ml}$$

So to make a 1M Stock solution we add 12.5 ml of Hair Clog Cleaner ($NaOH$) to 100 ml of H_2O.

This is final result.

You appear to have succeeded w/ reasonable limits.

We also know the pipette calibration @ .0291 ml/drop

3 drops pipette of 1.0M NaOH in 1 ml of H_2O
also keep track of time.

3(.0291) = .081ml 1.0M NaOH + 1ml H_2O

= 1.081ml of Solution

$\frac{.081}{1.081} = .08 = 8\%$ $\&.08(1M) = .08M$

should be the strength of the solution.

Heating very gradually.

It used to be ~ $\frac{1}{1.05}$ M =

Heating gradually over 1/2 hr
Deep red color results.

Attempt @ Extracting DNA from Cultured Samples

20 ml H_2O
20 Drops Pipette (.029 ml) 1.0M NaOH = .32 ml
Culture Sample
Heat
Estimate 1/2 gm Culture material (dental)

1. Compare cultures
2. Plan an inhibition
3. Call PH
4. Disappointing news — Charges
5. Describe tests
   3 minist
6. Can meet what we can do —

1. PH
2. Enzymes
3. Salt
4. Electrolysis
5. DNA

Bmic

Tmic Chlamydia

White

Definition of pH solved for hydrogen ion molarity is

$H^+ = 10^{-pH}$ so $e^{\ln x} = x$

$\ln(e^x) = x$

$H^+ = \frac{1}{10^{pH}}$

so $10^{pH} = \frac{1}{H^+}$ or ~~$pH \log 10 = \frac{1}{H^+}$~~

$pH = \log\left(\frac{1}{H^+}\right)$ eg $H^+ = 1E\text{-}5$ $pH = 5$

$H^+ = 1E\text{-}6$ 6

So it is a log function. (10 times less)

Dilute something by 10 times, (concentrated) the pH changes by a value of 1

This is not hard, it is a log scale.

$\log(x) =$ $y = \log_b(x)$ if $x = b^y$

b = base

$\log(100) = 2$

$10^2 = 100$

$\log 10 = 1$

$\log(x) = .3$

$x = 10^{.3} = 1.9953$

yes, you have this right.

Changed concentration by a factor of 2.

pH changed by 0.3

So we should be able to take the wine 1ml and dilute by 10

$\frac{X}{X+1} = .1$ $\quad X = .1X + .1$

$.9X = .1$

$X =$

$\frac{X}{X+1} = .01$

$\frac{X+C}{X} = .1$ $\quad X + C = .1X$

$.9X = -C$

$X =$

$\frac{1ml}{1ml + X} = .1$

This works

$\frac{C}{C+X} = .1$ $\quad C = .1X + .1C$

$.9C = .1X$

$X = \frac{.9C}{.1}$ $\quad$ If $C=1$, $X=9$

C = original amt of solute
X = added solute, ie water.

$\frac{C}{C+X} = .01$

$C = .01C + .01X$

$.99C = .01X$ $\quad$ * let $C=1$.

$X = \frac{.99(1)}{.01} = \underline{99}$

1. So take wine 1ml
   add 9ml H_2O pH should change by 1.
2. now add 99ml pH should change by 2.

Strength of an acid is determined by 2 things, not 1.

1. K_a – dissociation constant
2. molarity, ie to concentration.

.03M .06M / .03M .03M .06M

$Mg + 2HCl \rightarrow H_2 + Mg^{2+}(aq) + 2Cl^-(aq)$

Atomic wgt of Mg = $\frac{\text{wgt of Mg consumed}}{\text{moles of } H_2 \text{ evolved}}$.

based on relation: moles of H_2 evolved = moles of Mg consumed.
but why does chemical properties show – no OK it says $MgCl_2$ is in solution.

"There is a one to one relationship between the no. of moles of hydrogen gas evolved and the moles of Mg metal consumed in the reaction."

You have performed a simulated experiment in Chemlab. It is amazing to me that you can calculate the atomic mass of an element by simply mixing some compounds together ie HCl & Mg. The reason as all because the equation is balanced. This is what allows this to be done. Quite amazing
This shows the importance & value of being able to balance equations.

Balancing:

$C_4H_{10} + O_2 \rightarrow CO_2 + H_2O$

$1C_4H_{10} + O_2 \rightarrow CO_2 + H_2O$

$1C_4H_{10} + O_2 \rightarrow 4CO_2 + H_2O$

$1C_4H_{10} + O_2 \rightarrow 4CO_2 + 5H_2O$

$1C_4H_{10} + \frac{13}{5}O_2 \rightarrow 4CO_2 + 5H_2O$

$2C_4H_{10} + 13O_2 \rightarrow 8CO_2 + 10H_2O$ OK!

This method is great & simple & it works. Described in Chemix software use manual

You can now balance equations & it is not hard.

Our skeleton equation is

$Mg + HCl \rightarrow H_2 + Mg^{+2} + Cl^{-1}$

the balanced form is

$Mg + 2HCl = H_2 + Mg^{+2} + 2Cl^{-1}$

1 mole of H = 1.0079 gms
so 1 mole of H_2 = 2.0158 gms

Now what we learned from this is that a balanced equation can be used to determine the atomic mass of an element if one of the elements can be measured and we know the molar relationship. So here we can see that one mole of H_2 corresponds to 1 mole of Mg^{+2}. So if we can measure how many moles of Mg "disappear" from the initial sample on the left & we measure how much gas is produced we can determine the atomic mass. Now how exactly?

Assume we measure the H_2 gas, and we find we had .0605 gms. How would we do this?

By measuring volume of gas. $PV = nRT$

The solution to this is w $P = 1$ atm $n = .03M$, $T = 297°K$

$V = .7313\ dm^3$

d must be decimeter?? yes.

a deci is a 10^{th} of a meter

So this would be

$.7313 (E-1m)^3$

$= [.7313 (.1m)]^3 = .0004\ m^3$

$1\ cm^3 = (1E-2m)^3$

$= .000001\ m^3$

Or so $.7313\ dm^3 = (.7313E-1m)^3$

$= .0004\ m^3$

$= 391.\ cm^3 \cong 391.1\ ml$

in a beaker OK

Now let's figure out how much this weighs.

1 mole = 1.0079 gms so .03 moles = .0302 gms but we have H_2 so gms it is .0604

Now the next thing to do is to take

391.1 ml, ie 391.1 cm^3 of H_2 and

see if it weighs .0604 gms.

Density of H is .08988 gms/liter

we have .391.1 liters

so = .3911 (.08988) = .0352 gms

but this is for H

and we have H_2 so this would be .0703 gms

The answer (Chemlab) is .06 gms. Close.

Wonder what the allowance is??

It is certainly close.

Must be some variations in temp - pressure

So this means we would have measured ~.0703 gms H_2. So this measured

Back to orig equation ~~meas. 391 cm^3~~ ~~.0703 gms~~

391 cm^3 .0703 gms

.0703 gms

$Mg + 2HCl \rightarrow H_2 + Mg^{+2} + 2Cl^-$

.03M .03M

of H_2

1 mole of H_2	1 mole of H_2	.03M
1.0079 gms	2.0158 gms	.03 X

X = .0605 gms

Now we measure that .7292 gms of Mg have disappeared from the block.

.03 M H_2 → we measure how much gas.
.0605 gms → we measure how much "disappears"

and .7292 gms of Mg = .03 M of Mg^{+2}

$$\frac{.7292 \text{ gms Mg}}{.03 \text{ M}} \quad \frac{x}{1 \text{ M}} \qquad x = 24.305 \text{ gms}$$

Should be the atomic mass of Mg.

It is. Good job.

So,
1. We measure how much gas is formed.
2. We measure how much magnesium disappears
3. We know the molar mass of hydrogen
4. From the molar relationship known from the balanced equation, we can determine the atomic mass of Magnesium.

Procedure.
1. Measure gas. From $PV = nRT$ we can determine n
2. From a molar relationship we know how many moles of Magnesium have been lost.
3. We measure how much Mg has been lost in grams.
4. From relation:

$$\frac{\text{measured loss in gms Mg}}{\text{known moles of Mg lost}} = \frac{\text{no of gms in 1 mole}}{1 \text{ mole}}$$

and this is the determination of atomic mass!

also see p72

Pase 41

Now to next question I have, is there a metal that I could actually do this experiment with.

??? Metal + HCl → H_2 + Metallic Ion + Cl^-

What other metal?? yes. Iron!!!
Aluminum Big Time. Can be dangerous.
Cu - No
Lead - yes
Zinc - yes
Silver No
TIN - very little
Mg yes

Aluminum is very reactive! Remember!?
Can be explosive.
Iron might be safer.
You could weaken the acid & then it would take longer.

Yes. Iron can work.
$Fe + 2HCl \rightarrow Fe^{2+} + H_2 + 2Cl^-$

What type of reaction is this?
p72 Moore is saying that this is a decomposition process.

From EZ Chemistry, types of reactions are:

1. Combination
2. Decomposition
3. Single replacement
4. Double replacement
5. Hydrolysis Reactions

OUIS is a ~~decomposition~~ reaction apparently since ~~it is not~~

Actually it appears to be a single replacement reaction p 196 EZ.

1200 uS/cm = X Siemens/meter?

The longer the rod, the greater the resistance so the less the conductance.

$G = \frac{1}{R}$ Si 1200 uS/cm = 12 uS/m
= 1.2E-5 S/m

$R = \frac{1}{G} = (1.2E\text{-}5)^{-1} = 83.3K\Omega/meter$

Measurements. uS/cm

Distilled Water 1
Wine 10/1 dilution 512
11/07 Culture w/ lye & Heat 910
Green culture, no lye 675
Black mature culture, dental, no lye 1229
Drop of lye in ~~20~~ m 13 ml of H_2O = 1120
(1M)

Successfully made weak nitric acid.
w/ Potassium Nitrate, HCl, Copper & water

If you know the concentration of a strong acid you can find the pH.

$pH = -\log_{10}(H_3O^+)$ apparently equivalent to

$pH = -\log$ (the molarity) this is cool.

Nitric Acid our pH is 3.5

so 10^{-pH} = the molarity

so molarity $\cong .00032$ yes This is weak alright, but it works.

What is 1 M $AgNO_3$

Ag^{+1} NO_3^{-1} 169.87 gms/mole

So a 1 molar solution is

$\frac{169.87 \text{ gms}}{\text{liter}}$ Our bottle is 80 ml.

so a 1 M solution in our bottle is

$\frac{80}{1000}(169.87) = 13.59$ gms. We have a total of 2 gms we would like to use no more than 0.5 gms.

So $\frac{0.5}{13.59}(1M) = .037\ M$

Could we use Colloidal Silver?

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Lets create a 0.05 M solution of silver nitrate.

$.05\left(169.87\text{gm}\right) = \underset{1000\text{ ml}}{8.4935\text{ gms}}$

but we have 80 ml so

$8.4935\left(\frac{80}{1000}\right) = .6795\text{ gm} \approx .68\text{ gms}$

We made a mistake. It is 70 ml of H_2O not 80

$\frac{.68}{169.87} \approx \frac{.68\text{gm}}{80\text{ml}} = \frac{169.87\text{gm}\,(x)}{1000\text{ ml}}$

$x = .05\text{M}$ still close enough.

$\frac{.68\text{gm}}{169.87} = .0040\text{M}$ if it were dissolved in 1000 ml of water. but it is dissolved in 70 ml, so

$.004003\left(\frac{1000}{70}\right) = .057$ This is our molarity.

Testing for Ions:

Silver Nitrate Test for
Bromide Chloride & Iodide.
a total success

Need to have

$X^- Cl^- + Br^- + I^-$ + Weak HNO_3 + $AgNO_3$ → white Cl^- off white Br^- yellow I^-

Wine tests begin:
Wine shows almost none, but there is some white tinge of precipitate that forms
Lye is NaOH.

Metal Ion tests:
Fe Ion shows up in wine & in culture.
No difference.

Conductivity Tests again:

10/1	Wine	515 uS	(had 512 before)
10/1	Culture 1	1245 uS	mature culture
10/1	Culture 2	790 uS	green culture - mid level
10/1	EPA Culture	753 uS	
	Culture 2 again	775 uS again	

Clearly we have an increase in Conductivity w.r.t to the growth of the culture. Species Ion determination Shows no result yet but if it is either H^+ or OH^- it would make perfect sense. Anticipate increase in H^+ or becomy more acidic.

Looking @ Oxidation - Reduction.

A reaction NO! ~~+2 -2~~ +2 -2

$Cu + O_2 \rightarrow Cu$ Balanced: $2Cu + O_2 \rightarrow 2CuO$

You performed this w/ a torch

It is a Covalent Compound (not a metallic salt)

Oxygen always has an oxidation number of -2 in its Compounds except for peroxide which is -1

So how do you know if an element has a charge or not?

** Here it is: Elements in the true unCombined (free) State have an oxidation of zero.

This is why! This is an important statement.

But what about salt in water.

When salt dissolves in water, it is NOT a Chemical reaction. It is only a physical change

No new substances were created.

But aren't ions different than the salt crystalline Compound.

pH Meter has arrived!

	pH	
Wine	3.2	
Culture 1	3.0	nature
Culture 2	3.1	green - mallard
EPA Culture	3.5	

So it is not changing pH.

So what ions are involved.

$\frac{X}{X+C} = .1$ let $X=1$

$\frac{1}{1+C} = .1$

$1 = .1(1+C)$

$1 = .1 + .1C$

$1 - .1 = .1C$

$C = \frac{1-.1}{.1} = 9$

So in general

$C = \frac{X - (\%/100)}{(\%/100)}$

Where X is original solution
C is addition to solution
~~as a factor~~ to
make % desired.

Yar tests of ions are not determinate yet.
What about Ba ions?

Ba^{+2} ion does not give a hydroxide precipitate because Barium Hydroxide $Ba(OH)_2$ is too soluble.

Mature Culture has been subjected to electrolysis.
1 ml of wine solution diluted to 10^7.
It appears as though the biologicals are attracted to the positive terminal at the battery
We have a major precipitate that is forming.
The solution turns perfectly clear. The precipitate is a dark green color.
Need to measure pH & conductivity of the final solution. pH appears to be going to ~ 10.0 but may need to stabilize. pH test paper shows pH @ ~ 7.0

Wine by itself has some green coming out
We know that alkaline, ie OH^- seems to turn wine green. If the pH goes from 3.5 to 7.0 in the wine, does that not mean that OH^- ions are being released? What is interesting in wine is that the green color is forming at the - terminal of the battery.

This is opposite of the culture solution — !!!
The culture is the + terminal!!!

What you are working w/ is electrolysis not electrochemistry

You have now studied the activity series & you see generally how that works. An electrode & a metallic salt that is reacted

Now what exactly is electrolysis?
The passage of current through an electrolyte. This indeed is what we are doing and a precipitate is forming.

What electrolysis accomplishes is the decomposition of the electrolyte.

Our current flow in our example is 2.6mA

Equivalent mass = $\frac{\text{Atomic Mass}}{\text{Oxidation Number}}$

Our conclusion is
that we have a salt in solution since Conductivity increases but pH did not increase or decrease. Salts are: substances that ionize in solution but produce neither H^+ or OH^- ions. Thus is so, since pH did not change we have a salt.

Solubility of major ions is in PHO Move.
Na^+, K^+, NH_4^+, Ag^+, $C_2H_3O_2^-$
NO_3^- Cl^- SO_4^{2-} OH^- CO_3^{2-} S^{2-}

Metal A + Salt Solution of B → Salt Solution of A + Metal B

eg $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$

Conductance of a solution is a measure of the current that flows under a given applied voltage (2.6mA, 6V) and is proportional to the number of charged particles in solution.

Current density is proportional to field strength

$i = \sigma E$

σ is the conductivity! $\frac{Amps}{m^2} I = \frac{volts}{ohms}$ $\frac{E}{R}$

Conductance = K · Z

$I = .007A$

$\mu S/cm = \frac{S}{m}$ E has

Current density = $\frac{\text{electrical current}}{\text{unit Area}} = \sigma E$

Work at Units here

$\frac{Amps}{m^2} = \frac{S}{m^2}\left(\frac{V}{m}\right)$ or $\frac{\text{siemens}}{\text{equivalent}}$ $\frac{22}{\text{Newton}}$ $\frac{1245E\text{-}6\,S}{cm} = \frac{.1245\,S}{m}$

??? Coulomb

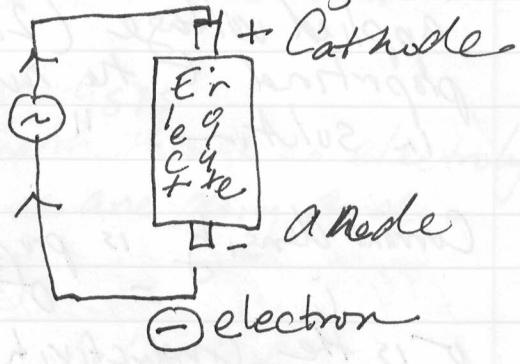
$= \frac{.747A}{m^2} = \frac{.1245S}{m} .6V$

We have measured 2.6mA

$= \frac{.000075A}{cm^2} = \frac{.075\,mA}{cm^2}$

Electrons originate at the anode in a voltaic cell. The anode has a - charge. Electrons enter the cathode which has a + charge.

Ions do not "migrate" toward an electrode. But at this stage it appears as though the biologicals do.



So for us, the materials are congregating at the positive terminal. This would suggest that the "materials have a negative charge to them. But remember ions do not ~~migrate~~ migrate.

12/19/09

10/25 Solution Lye + Heat Dental
– Nov 15th white, 10 drops .2% $CuSO_4$
1 drop = .07 ml .2% $CuSO_4$

50 ml of water is approximate

.07 ml

Straight towards brown
no green stage

Nov 17 Start a new culture
w/ 3 ~~old~~ week old material
in lye. w/ dental sample.
Dec 05 w/ Lowe growth

Molecular Mass of $CuSO_4$ is 159.6 gms/mol.
We have .2% M or .319 gms ~~[illegible]~~ / mol
or $\frac{.319 gms}{1000 ~~[illegible]~~ 1K ml} = \frac{319 mgms}{1000 liter}$ or Molarity = ~~.319M~~ .002M
= .002M

~~Assume we take~~:
but we are using 10 drops @ .07 ml per drop.
So we are using $.7ml \left(\frac{.319 ms}{1000 ml}\right) = .000223$ gms / per 10 drops

So $\frac{.000223 gms}{50 ml}$ (50 gms) (petri dish) $= 356$ mg ~~.000~~ $\frac{.357 gms}{80E3 gms}$ (human body)

2/20/12 x .05 gSS
10l .05 gSS
pH
Growth

We are putting 10 drops of .2% $CuSO_4$ in approximately 50 ml (of water (wine) (= approx 50 gms)

1 drop ≈ .07 ml so we are putting .7 ml of .2% $CuSO_4$ in 50 gms of wine.

How does this equate to the human body?

$.002M\ CuSO_4 = .002\left(\frac{159.61\ gms}{mole}\right) = \frac{.319\ gms}{1000\ ml}$

So the solution is about what I am drinking.

Now the fact that we are putting in .7 ml:

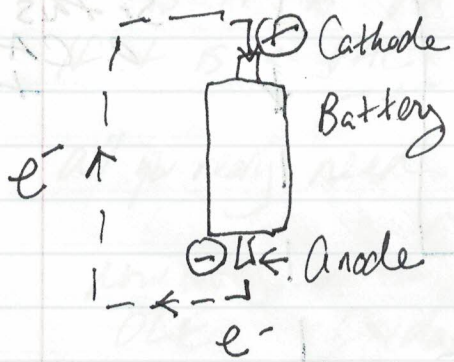
$\frac{.319\ gms}{1000\ ml}(.7\ ml) = .000223\ gms$ or $.223\ mg$

So $\frac{.223\ mg}{50\ ml\ (gms)} = \frac{X}{80E3\ kgms}$ $X = 350\ mg$ in a body

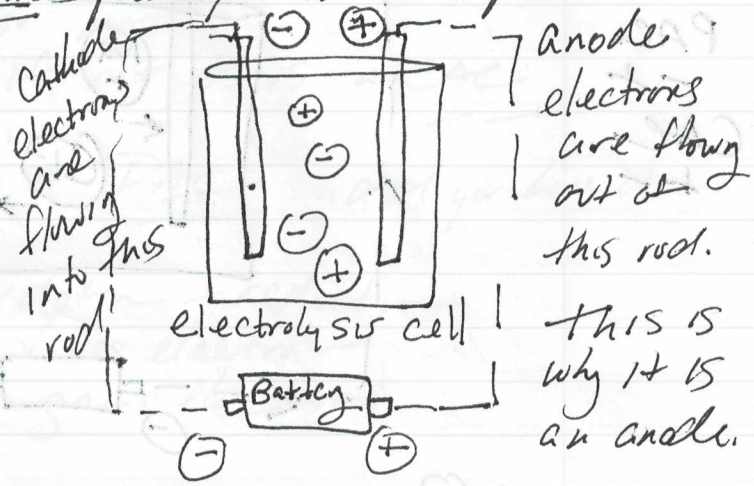
Anode vs Cathode.

We finally have a workable definition for an anode. It is:
"an electrode from which electrons flow out from a polarized electrical device".

~~An anode is~~
In a device which supplies power the anode is negative.
In a device which consumes power, the anode is positive.



A Battery supplies power. Anode is negative.



This device consumes power.
The anode is the positive terminal

OK, now the first time you understand which is the anode & which is the cathode in an electrolysis cell.

So the next question is, when do you have a reaction and why?

Anode: A E F O D
! ! v a
e o t polarized
c w of electrical
t e
r v
o i
n c
s e !

Electrolysis is used to DRIVE an Oxidation Reduction reaction in a direction in which it does not occur spontaneously.

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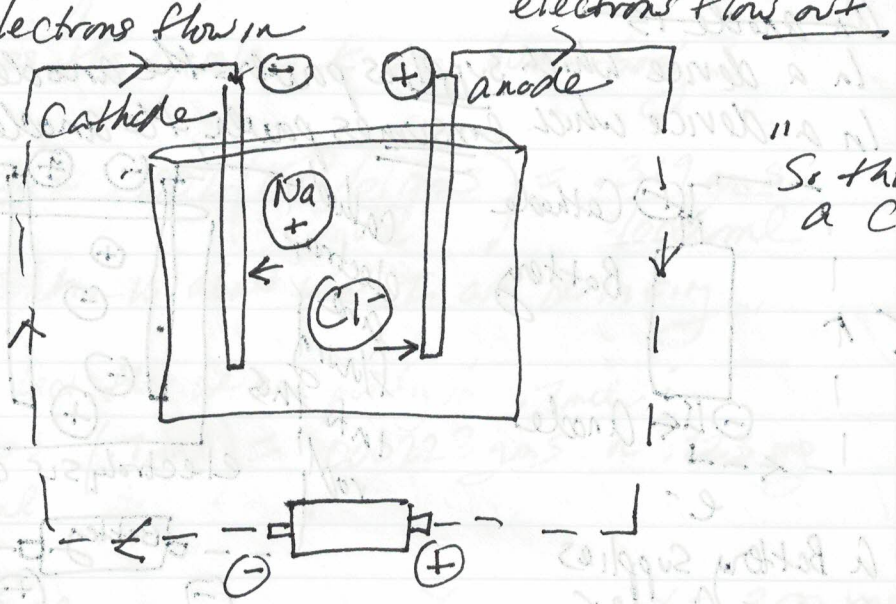
So ~~no~~ now we see that an electrolysis cell is actualy an oxidation reduction reaction.

So we start studying this by assuming the electrodes are inert. They are not but we ignore this for now.



PAC
− +
CAC
+ −

"So this is a CAC"
+ −

Na^{+} migrates toward the cathode (negative here)
Cl^{-} migrates toward the anode (positive here)

	SUPPLIES POWER	CONSUMES POWER
ANODE	−	+
CATHODE	+	−

A mnemonic would be helpful here

	Provide POWER	CONSUME
"A	Anode −	+
C"	Cathode +	−

PAC	CAC
~~Supply~~ Provide − +	Consume + −

So our Mnemonic is

"PAC" Provides Power, A comes before C
− + If A < C, A is − and C is +

"CAC" Consumes power and
+ − "a CAC is not a PAC"

So your first question is
IS IT A PAC or NOT?
If it is a PAC − + If not it is a CAC + −
all you really need is "A PAC" − + and you have it.

Now we go on to Oxidation − reduction
OLE Oxidation loses electron
Reduction gains electrons

Oxidation: Ion Species —with energy gives→ No longer ionized + Electrons given off.
(Could be a negative ion, could be neutral could be positive

I now have a program called Chemical prediction that will analyze redox.

Reduction

Ion species + Gain an Electron or more → Now it is neutral or could be negative
could be positive, could be neutral

This is going great.

Chemical Predictor will tell you if this reaction will occur spontaneously or not. If not, you can now determine the voltage that will make it happen!

also Chemix will compute this for you but it requires selection of reduction first on the left side and then oxidation on the right side.

Now you are starting to get there. You are understanding redox & anode - cathode relationships now. Now go through the redox equation for salt.

Now we have learned that wine is one of the most complex solutions that there is. It has, minerals, acids, sugar, alcohol, & a whole lot more!
I do not think that you could ever isolate the ions introduction by testing wine.

Aluminum Oxide - Specific Heat
880 J / kg. K°

Aluminum 900.

Barium 204 J / kg

Air 1.003
Water 4.184
Barium 0.19

Best thing to cool down
earth would be water.

Aluminum still heats up more readily than air.
Falls to ground
10 - 100 microns

Barium heats up roughly 5 times
as fast as air

Aluminum - Wellsbach

1. Size is wrong 10 - 100 um is huge
2. Not suitable for cloud nuclei - Size
3. No direct observational evidence
4. Would fall to ground
5. Specific heat questions - not that different than air
6. Does not ionize w/ sunlight - it might - but #3
7. Does not act as a dessicant
8. Highly insoluble
9. An electrical insulator, but not soluble in water.
10. only slightly soluble in acid or alkali (true)

An aluminum reaction which can take place spontaneously is

$$2(Al + 3OH^-) + 3(2H_2O + 2e) \rightarrow 2(Al(OH)_3 + 3e) + 3(H_2 + 2OH^-)$$

So Aluminum in lye will produce aluminum oxide, but it is only slightly soluble.

So are we talking about aluminum? or aluminum oxide? They are completely different.

Barium is the one that is confirmed. Specific heat .2 Magnesium also.
Aluminum Oxide (ie Ø.9) Ø.88

Magnesium sulphate is also a drying agent, (readily absorbs water from the air).

Barium & Magnesium have some similar chemical properties.

Earth's Crust - Aluminum is 3rd after Oxygen & Silicon.

Barium Oxide + $H_2O \rightarrow BaOH_2$

$MgSO_4 + H_2O \rightarrow$

1. Aluminum oxide does not dissolve

2. Barium Hydroxide & Magnesium Sulphate are hygroscopic

3. Ba & Mg compounds will exist as ions in solution.

3. Ba — Directly observed — Ba & Mg compounds love water & ionize & heat up easily

$2AlOH_3$ is inert, essentially insoluble, heating is same as air, size range

4. 10 - 100 microns
drift settly rate
light effects

5. Specific heat

$2Al_2O_3$	is 0.9
Air	1.0
Ba	.2
Anhydrous $MgSO_4$	.9

6. Commonality of elements

$2Al_2O_3$ is
Basically inert. Why would you put something up that is inert & then not tell you about why it was done?
If it was for your benefit, why would you not tell what you have done?
No direct observation of $2Al_2O_3$ was in 10-100 micron range.

Barium Oxide generates heat when mixed with water.

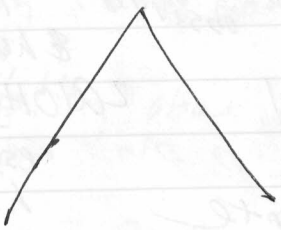
Ca & Potassium

(2) 1. Chemistry Ba Mg vs Al

(3) 2. Size & Where it done

(1) 3. Observational Evidence

(4) 4. Subsequent Consequences such as conductivity, ionization, HAARP



(5) 5. Disclosure Issue

technically
A Redox reaction is when a change in oxidation states occur.

There are many reactions that are "classified as redox" even though no electron transfer takes place (such as in covalent bonds).

Ionic vs Covalent

Solid @ Room Temp

Crystalline Metallic Salts are primarily Ionic bonds
(ie between a metal & a non metal)
Everything else is usually a Covalent bond.
(two non metals that have similar electronegativities

Liquid or Gas at Room Temp

ZnI$_2$ is definitely an Ionic bond.
but it "behaves like a Covalent bond. Strange

PAC Provides Power, Anode −, Cathode +
CAC Consumes Power

Now lets go on with our electrolysis cell of NaCl.

PAC provides CAC consumes This is us. So Anode is +
− + + − Cathode is −

Now, the anode is positive in this case, so it draws the negative Cl ions also at the anode!

$Cl^- \rightarrow Cl_2 + e$ unbalanced.

$2Cl^- \rightarrow Cl_2 + 2e$ balanced.

~~This is reduction.~~ This is oxidation. electrons are freed (lost).

~~Now at~~ the Cathode two things can happen.
Na^+ ions are drawn ~~to~~ the cathode (negative)
and water dissociates ~~to some degree~~ so
$H_2O \rightarrow H_2 + OH^-$
So ~~now~~ you can see that H_2^+ can also be drawn

We need to finish up with the anode.
Since water disassociates to some degree
$H_2O \rightarrow H_2^+ + OH^-$
This means the OH^- is also drawn to the anode.
$H_2O \rightarrow O_2 \quad H^+ + e$ Oxidation of water.

$2H_2O + e \rightarrow H_2 + OH^-$ Reduction of water.

The Global Warming Hypothesis

1. Observational Evidence
   No direct atmospheric observation
   Aluminum Hydroxide
2. Chemistry
   Inert, Solubility, Ionization, Heat Properties
3. Size
   10-100 μ?, Haze, Drift Rate
4. Subsequent Consequences, Conductivity
   Ionization, ELF
5. Disclosure
   Inert, benign purpose?
6. Ignores Biologicals

Oxidation - Reduction Experiment

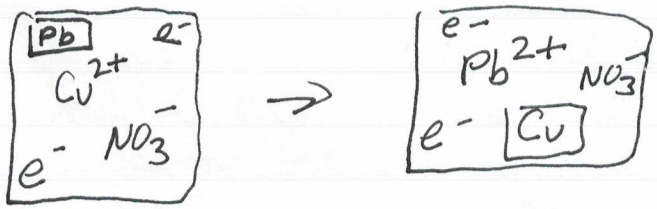
Our reaction is between Pb & $CuNO_3$.

Activity List: A metal higher on the list will REPLACE the ions of a metal (means a metallic salt in solution) that is lower on the list.
Pb is higher than Cu
So
Lead replaces Cu ions in solution.
So this means we had Cu^{2+} ions running around in solution. So now it becomes Lead ions in solution & Cu becomes solid.
The reaction is

$$Pb + Cu^{2+} + 2e \rightarrow Pb^{2+} + 2e + Cu$$

The lead (higher on the list) is oxidized. Loses electrons. So $Pb \rightarrow Pb^{2+} + 2e$
So it becomes an ion. ↑ this represents the loss.

Reduction:
$Cu^{2+} + 2e \rightarrow Cu$
this represents a ↑ becomes Cu metal
gain in electrons
and we join them:
$Pb + Cu^{2+} + 2e \rightarrow Pb^{2+} + 2e + Cu$



A balanced reaction from CHEMIX is

$$Pb + 2CuNO_3 + H_2O \rightarrow Pb^{2+} + 2Cu + 2NO_3^- + H_2O$$

That is really pretty cool.
Chemical Predictor tells you that the reaction will occur.

$Pb \rightarrow Pb^{2+} + 2e$ .1262V (loses electrons)
$Cu^{2+} + 2e \rightarrow Cu$ .3419 (gains electrons)

Total Voltage = .4681 V.

E = potential
K = equilibrium Constant = 6.93e15
ΔG° = Gibbs free energy change = -90.3 KJ/mole
V = volts
KJ/mole = kilojoules per mole
log = base 10 log

The balanced reaction from Chemix says that 1 mole of Pb produces 2 moles of Cu.

Substituting this in Chemix, using 2 moles, does indeed give us 90.3 KJ "per mole?"

Chemical Predictor is easie to understand.

So what is K? $K_{eq} = \frac{[C]^c \cdot [D]^d}{[A]^a \cdot [B]^b}$
What is ΔG°? $\Delta G = -RT \ln K_{eq}$

$pH = -\log_{10}[H^+]$

let $H^+ = .01 = 1 \times 10^{-2}$

$H^+ = .10 = 1 \times 10^{-3}$

$pH = 2$

$pH = 3$

the greater the H^+, the lower the pH

1E-2 H^+ ions. Now dilute by a factor of 10. There are less ions, so the pH increases.

In our case, we diluted the wine & the pH went to 3.5 does this mean it is lower?

Dilution			Conductivity
1.0	Straight wine is 3.07 pH		7200
.1 1ml/10ml	Diluted by 10 it is	3.6 ????	585
.025 ml/40ml	by 40	3.7 ????	224
.005 200	200	4.0	71

Conductivity $\cong 1762 + 369.1 \ln(\text{Dilution})$

So Conductivity is hardly linear.

We set up to 1245 in a mature red culture. This would be 3-4 times the concentration at .1 So we expect 3-4 times as many ions.

Notice pH does not change at all. Why is this? Wine probably has buffers in it. These resist change in pH. Also, if bonds are not primarily ionic pH will not change much.

In Testing

		Culture
Wine + NaOH	→ green	Green
+ HCl	→ Nothing	Nothing
+ $CuSO_4$	→ Nothing	Nothing
$AgNO_3$	→ Nothing	Yes! White Precip
HNO_3	→ Nothing	Nothing

Positive reaction in Culture w/ $AgNO_3$
but not wine!

adding dilute nitric acid along w/ $AgNO_3$
did not change the result of the test.

but now adding Ammonia to the wine
turns it red/brown.

But to the culture it turns green.
What does this mean? olive green
yellow

With both wine and the culture
NaOH turns it green.

White precipitates form w/ $AgNO_3$ +

	Sodium Sulfide	Na_2S	Ag_2S
pale yellow	Sodium Bromide	$NaBr$	$AgBr$
white	Sodium Chloride	$NaCl$	$AgCl$
	Sodium Carbonate	Na_2CO_3	Ag_2CO_3
Pale yellow	Sodium Iodide	NaI	AgI

What forms w/ these

Silver Nitrate + ammonia → Light Tan

Pale yellow precipitate
Bromide dissolves slightly in ammonia solution

Chloride, white precipitate, dissolves in ammonia

Iodine, pale yellow, does not dissolve in ammonia solution.

It is not the silver nitrate that is making a difference. It is the ammonia.

Culture		Wine	
+		+	
HNO_3	Nothing	HNO_3	nothing
+		+	
$AgNO_3$	white precip	$AgNO_3$	white precip
+		+	
Ammonia	Light Brown	Ammonia	Dark Brown

In Reverse

Culture		Wine	
+		+	
Ammonia	Almost No Change	Ammonia	Green
+		+	
$AgNO_3$	Light Tan - Rose Still	$AgNO_3$	Dark Brown
+		+	
HNO_3	No Change	HNO_3	No Change

The tests are inconclusive. Conductivity of the cultures does increase but you do not know why.

The results are simply not stable enough. The only thing that you learn positively is that wine has Iron & Chlorides in it. You cannot tell further than that.

$Fe^{2+} + 2OH^- \rightarrow Fe(OH)_2$ Dark Green Precipitate

$Fe^{3+} + 3OH^- \rightarrow Fe(OH)_3$ Brown Precip. Lake

Planning for Baking Soda, $CuSO_4$ & Bloodroot Mix:

1 Full Teaspoon of Baking Soda = 14.25 gms

1 Level Teaspoon = 3.72 gms
1/2 Teaspoon = 7.0 gms

27 drops of the herbal bloodroot bottle
= 1 ml so
$\frac{27 \text{ drops}}{1 \text{ ml}} = \frac{1 \text{ drop}}{.037 \text{ ml}}$

We estimate we will use 4-5 drops of bloodroot.
Choose 5.
So. $5(.037) = .185$ ml per treatment.

So we are going to estimate

1 Level Teaspoon of Baking Soda $\approx$ 4.0 gms
5-6 drops of Bloodroot = 0.2 ml
$CuSO_4$ = 2 mg of Cu
= ~~10~~ mg of Cu
= 8 mg of $CuSO_4$

per session
5 times per day.

So in our culture dish estimate this is repeated for 10 days.

This leads to:

40 gms Baking Soda
2 ml Bloodroot
80 mg $CuSO_4$

In the human body. Now we equate it to: the culture dish $\tilde{=}$ 50 ml $\tilde{=}$ 50 gms of mass.

The human body is approx 80 kg
So FOR A 10 DAY Period:

Baking Soda

$\frac{40 \text{ gms}}{80E3 \text{ gms}} = \frac{X}{50 \text{ gms}}$ $X = .025 \text{ gms} = 25 \text{ mg}$ Baking Soda

$\frac{2 \text{ ml Bloodroot}}{80E3 \text{ gms}} = \frac{X}{50 \text{ gms}}$ $X = .00125$ ml Bloodroot

$\frac{80 \text{ mg } E\text{-}3 \text{ gms } CuSO_4}{80E3 \text{ gms}} = \frac{X}{50 \text{ gms}}$ $X = .050$ mg $CuSO_4$

~~10 mg Tides~~ 40 mg $CuSO_4$

$\frac{.233 \text{ mg}}{10 \text{ drops}} \tilde{=} \frac{40}{X}$ $X = 1800$

Culture Dish:

Now we know in the culture dish for a 10 day period we would like to place

25 mg Baking Soda
.05 mg $CuSO_4$
.00125 ml Bloodroot ~~(Equivalent to 1 drop from the 2oz bottle)~~

Now, how do we accomplish this, and what type of solution do we mix up?

Assume we mixed up a batch of 100 ml & made it 100 times this amt & dispensed 1 ml at a time. This means:

2500 mg Baking Soda = 2.5 gms
5 mg $CuSO_4$ =
.125 ml Bloodroot This is possible w/ ml cc pipette

.2% $CuSO_4$:
Our $CuSO_4$ solution is equivalent to $\frac{1.0 \text{ gm } CuSO_4}{500 \text{ gms } H_2O} = .002 = .2\%$

Each drop of this bottle is .069 ml
a .2% solution means

$\frac{.002 \text{ gms}}{100 \text{ gms } H_2O \text{ (ml)}} = \frac{x}{.069 \text{ ml}}$ $x = .0013$ mg per drop

The copper is a problem.
We want to get 5mg $CuSO_4$ in 1 ml of water.
How do we do this?

$\frac{5E-3\ gm\ CuSO_4}{1\ ml\ (gm)\ H_2O} = \frac{.3gms}{60ml\ of\ water}$. This is fine.

So take 100 ml of water & add
2.5 gms Baking Soda
1 ml of the $CuSO_4$ solution which is .3gms/60ml H_2O

And now calibrate the bloodroot with the small pipette:
$\frac{31\ drops\ from\ the\ micro\ pipette}{1\ ml} = \frac{1\ drop}{.03225ml}$
so we need .125 ml
$\frac{.125\ ml}{.03225} = 4\ Drops$

So to 99 ml of water (~100 OK) add

1.25 gms Baking Soda
1 ml of the $CuSO_4$ solution which has 0.3gms $CuSO_4$/60ml
& 4 drops of the Micro Pipette Bloodroot ~ H_2O

For a total of 100 ml & add only 1 ml
to the culture dish.

You could also use Capillary tubes if
you needed to.

Chloride Ion Tests - Iron Tests

Black → Red

Culture + Lye + Heat ~~→~~ + H_2O

+

HNO_3 nothing

+

$AgNO_3$ white precip

+

Ammonia → It did dissolve the precipitate & it did not turn green!

This shows it is not the wire! Since the wire turns green because of Iron It is the culture. Also you cut the culture above the wire.

Yes it did dissolve & this confirms the test for Chloride ions.

We have a source of OH^- from Lye & Ammonia & neither one of them turned it green.

H_2O + 4 drops Wire + Lye ~~→~~ = Green already. - Means Iron is present

+

Heat

+

HNO_3 nothing

+

$AgNO_3$ →

I would say this is exactly the same color as the culture test So this creates a problem an ambiguous situation remains.

Turns dark reddish brown

only a minor white precip formed

Dark reddish brown precip

This is a totally different reaction than the culture.

What is happening with this reaction is that the Lye is reacting w/ Fe^{3+} to produce a brown precipitate.
This proves iron in the wine.
The culture did not produce this reaction.
This means it shows it is not wine we are dealing with, it is the culture

The heat may have been a factor in this...???
Now do the same w/out heat.

Wine 4 drops + H_2O +
Lye = Green
+
HNO_3 = Nothing
+
$AgNO_3$ = Very Brown Precipitate (No heat needed)

This proves the wine is different than the culture.
The wine has iron, the culture does not.
Now the culture!
Culture (2 drops + H_2O) + Lye + Heat = Very Light Brown (This is dark brown from original culture
+
HNO_3 = Nothing
+
$AgNO_3$ = White Precipitate - Not Brown!
= Chloride Ion
+
Ammonia = Does dissolve the precip.
This proves the Chloride Ion in the culture.

If there was a metallic ion in the culture we would get a reaction w/ both Ammonia & NaOH. But we really dont get a white precipitate when we add lye. It turns black to brown, & heat turns it more red. So indications are that Chloride ion is within the culture growth.

Now determine if the culture growth reduces iron content.

They are already different

4 Drops Wine + H_2O (Red) + Lye (1 drop) = Green — Indicates Iron

Culture Wine 4 Drops + H_2O (Brown) + Lye (1 drop) = No real change — Indicates Less Iron

Culture: still light brown + HNO_3 (2 Drops) = No Real Change + $AgNO_3$ (2 Drops) = Very Dark Brown Precipitate (Even Reddish Brown)

4 Drops: + HNO_3 (2 Drops) = No real Change — Not Needed + $AgNO_3$ (2 Drops) = Brown Precipitate, Not as dark

What is this reaction?

Indication is indeed less iron.

4 Drops Wine + H_2O + NH_4 Ammonia = Green

Culture Wine (4 Drops) + H_2O + NH_4 Ammonia No real Change

This shows that Fe^{2+} is reduced in the Culture Wine

Test repeated for both NaOH & Ammonia Same results.

Results of all this work is:

0. Conductivity is increased.
1. Culture appears to decrease iron ion Content Fe^{2+}.

2. Culture adds Chloride ion

S. what are the effects of this?

Bacteria consumes iron.
Fatigue & immune suppression
Chloride increases Conductivity.

Iron Pills:

10 Pills = 3.80 gms

so

1 pill = .38 gms

35 pills in mortar and pestle

Each pill contains 200ms $FeSO_4$ (dried)
or 65 mg elemental iron
which is equal to .325 mg ferous sulphate (undried?)

$\frac{.38 \text{ gms (pill)}}{65E\text{-}3 \text{ gm Fe}}$ $\quad \frac{1 \text{ gm}}{X = .17 \text{ elemental iron}}$
5 gms

X =

Atomic Mass of $FeSO_4$ is: 151.91 gms/mole

	Mass (gms)	
Fe	55.85	36.76%
S	32.07	21.11%
O	64.00	42.13%

$(200 + X).3676 = 65 \quad \frac{-73.52}{.3676} =$

X = 65 -

These pills are reasonably pure $FeSO_4$.

So 1 gm of the FeSO4 pill powder $\tilde{=}$ 0.1 gm Fe

and one pill = .38 gms
so 1 pill $\tilde{=}$ .065 gms = 65 mg

Now assume a human body takes 1 pill per day for 10 days
= 65E-3 gms (10) = .65 gms Fe in 10 days.

But for us we need
50 ml (gms) / 80E3 gms (human body) in the petri dish. * (.65 gms) = .00041 gms
= .406 mg

Blood in Wine:

It appears that blood in wine (a "fining" method) is tying up the Fe+2 ion. The test on the clarified wine fails the ammonia Fe ion test.

Creation of Trial Alkal. Solution.

Base measurements: 10 day period.

25 mg baking soda
.00125 ml bloodroot
.05 mg $CuSO_4$

Now we are trying to multiply this by 100:
25 mg (100) = 2.5 gms baking soda
.05 mg $CuSO_4$ = 5 mg $CuSO_4$ ~~(double)~~
Not enough.
multiply by 1000
.05 mg (1000) = .05 gms (doable)

.00125 ml bloodroot (100) = .125 ml

1 drop of the small pipette = .03225 ml
so .125 ml = 4 drops (doable)

add all of this to 10 ml of water.
The end solution will be 100 times stronger than is needed. So dilute the 10 ml to 100 ml and it will only be 10 times as strong as we need.
Now dilute this by a factor of 5 (=500 ml) and it will only be twice as strong as we need.

Right now it is in 400 ml of water.
We needed 500 ml but not enough room in the jar.

for 10 days
100 times as much compound / 400 ml = 1 times as much / X 4 ml

X=

So this means you could use 2ml of this solution every 5 days.
This would be fine.

Preparing a 1.0M Solution of NaOH.

The 2oz bottles have roughly 60ml.
Molecular wgt = 40.0 gms/mole
1M solution: so 40gms / 1000ml = X / 60ml X= 240 gms
This is easy as you have 30gms.
So you can do this 10 times or more.

Lets make a CuSO4 solution also: CuSO4 = 159.61 gms/mole

This is wrong:
1M CuSO4
159.61gms / 1000ml = X / 60ml X= 9.58 gms
This would be strong but a standard.
You could make a 0.1M solution = .96 gms

NO!
Our solution is .2% by weight = .002 (60ml) = .12 gms (gms)
and .12gms / 9.58gms = .0125
So what we have made is ~ a .0125 M solution
Very weak

We have a .002 M $CuSO_4$ solution.
It is not a .2% solution
It is a .002 M solution

$= .002 \left(159.61 \text{ gms/mole} \right) = \frac{.319 \text{ gms}}{1 \text{ liter}}$

or $\frac{.319 \text{ gms}}{1000 \text{ ml}}$ This is what we have made.

Questions
1. Artificial Environment of HCl + Fe^{2+} ???

2. Effect of trial solution on pH of wine?

#1: 2 Drops of HCl (6.7 M) in 150 ml of water gives a pH of about 3.5

We have a case now of water + HCl to a pH of 3.5 + Iron Sulfate
A very interesting case.

HCl (6.7 M)
Also 1 drop from the micropipette in 40 ml of water also creates a pH of appx 3.5.

The pH of our trial solution is ~ 8.4.

The original wine has a pH of about 4.0
(15 ml)
add 2 ml of our solution
The pH only jumps to about 4.3
May not be clearly enough.

Bleach:
A single drop of the micro pipette in
40 ml of water changes the pH to 9.5.
Very alkaline.

Bleach LD 50 = 5800 mg/kg = 5.8 gms/kg.

Bleach + $CuSO_4$ causes a precipitate to form

But this precipitate, which is CuCl
is highly soluble in HCl, which
simulates the stomach.
alkaline or acid?

Bleach (NaOCl) + $CuSO_4$ → seems to lead to a neutral pH.
and the precipate CuCl
which will dissolve readily in hydrochloric acid.
$CuCl + HCl \rightarrow$

Looks to me like we have had a major explosion of growth with the added iron sulfate. The label says transfer + FeSO4 01/08
I can see that the filament was transferred from a mature culture. But was the lye solution also transferred? This is unclear. It is implied that it is to mature culture filaments only but this seems remarkable if that is the case

FeSO4 has a molecular wt of 151.91 gms/mole.

$$\frac{151.91 \text{ gms}}{1000 \text{ ml}} = \frac{X}{60} \qquad X = 9.11 \text{ gms}$$

We only have 30 gms. Let's use 0.5M

$$= .5(9.115) = \frac{4.56 \text{ gms}}{60 \text{ ml}} = 0.5\text{M } FeSO_4$$

01/10/10

Because of the uncertainty here you are setting up a trial 01/10/09 w/ mature transfer (very small amt) + 3 drops .5M FeSO4

1 drop = .07 ml

So

$$3(.07 \text{ ml}) \cdot \left(\frac{1}{2} \text{ M}\right) \frac{151.91 \text{ gms}}{1000 \text{ ml}} = .016 \text{ gms} = 16.0 \text{ mg}$$

in 3 drops.

The culture + lye + heat + HCl + $FeSO_4$ is looking to be very active. There is also a blue growth developing.

We also need a control of mature transfer + HCl only w/ no $FeSO_4$.
Now you have it.

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Monitor #1 on 01/17
Case: C+L+H + $FeSO_4$ (s) + HCl 01/08
Perfect case to start with. Evident Growth
pH is 3.0

add 10 drops ~~$CuSO_4$~~ 1.0 NaOH brought
it up to 5.8 pH.
A major precipitation reaction has occurred. (Brown)
Appears to destroy the growth.
One drop of $CuSO_4$ added and it turns it
dark brown. Structure has completely changed
& appears to have broken down.

Now I ran the same test on
HCl + $FeSO_4$ (no culture!)
and the result is not the same at all!
A small reaction w/ the $CuSO_4$ forms a
precipitate.
Conclusion: the culture is critical!

In the C+L+H + $FeSO_4$ + HCl

+NaOH + $CuSO_4$ the surrounding solution
is Clear. The $CuSO_4$ is binding with the
precipitate.

In this solution the solution is turning light
brown but the $CuSO_4$ is not binding
with the precipitate. The $CuSO_4$ is forming
its own blue precipitate ($CuCl_2$?)

These reactions are not the same.

Another Control:

$HCl + FeSO_4$ gives no reaction.
but then
$HCl + FeSO_4 + NaOH$ gives a green precipitate.

Now add $CuSO_4$. iron oxide (2) projected
It turns the precipitate dark green to brown.

The iron supplement form of $FeSO_4$ did not turn such a dark brown.
It looks like iron oxide (3)

It looks to me like the culture is also forming FeO (3).

After time has passed, the color of all three cases:
1. $C+L+H + HCl + FeSO_4(s) + CuSO_4$ most granular
2. $HCl + FeSO_4(s) + CuSO_4$ medium granular
3. $HCl + FeSO_4$ (pure, l) + $CuSO_4$ very fine granular

appears to be the same. But the granulation of the precipitation varies. And in the culture dish, the filaments & all structures have essentially disappeared. It is also much more granular than the liquid $FeSO_4$ form.

$FeSO_4 + NaOH \rightarrow FeOH_2$
~~$FeSO_4$~~
$FeOH_2 + CuSO_4 \rightarrow$?

01/18
HCl + $FeSO_4$ Powder Control - No Culture!

01/11 1st Control
It appears to be producing but notice no color to the growth.

Mature + HCl + $FeSO_4$ (c) no reaction!

01/15 2nd Control:
HCl + $FeSO_4$ (s) is producing. No color again.
Both a red & a blue filament is visible.
So we have the same results

01/15 3rd Control
HCl + $FeSO_4$ (s)
same results! Red & blue filament

01/12 White frost growth + HCl + $FeSO_4$ (c)
no reaction!

01/10 Mature + HCl No reaction.

01/12 C + L + H + HCl + $FeSO_4$ (c)
very little but some reaction.

$FeSO_4$ is soluble in both water & HCl

HCl

1 drop of reg. pipette in 40 ml H_2O produces pH = 3.1

1 drop of bleach in 40 ml H_2O → pH of 9.4

Taking HCl at 3.1 & adding bleach

1 drop =	2.8
2	2.8
3	2.9
4	3.0
5	3.0
6	3.2
7	3.4
8	3.7
9	5.8
10	7.0
11	7.4
12	7.5

Copper sulfate is indeed acidic. My blue solution has a pH of 4.0.

01/20

A test of the culture w/ bleach instead of lye. Culture dated 01/11/10. 1 drop of bleach makes a big difference.

Bleach is positively having the same effect as NaOH 1-2 drops is obliterating the structure. The pH is still 3.0 but we have a huge difference structurally.

Baking Soda
40ml of water, a full pinch is increasing pH to 8.5.

Bleach
Sodium hypochlorite is $NaOCl$
Sodium hydroxide is $NaOH$
MMS II Calcium hypochlorite is $Ca(ClO)_2$
MMS I Sodium Chlorite $NaClO_2$

Note:
What is the idea of this in the stomach
Calcium hypochloride reacts w/ HCl to form calcium chloride. Calcium Chloride is a common salt.

Bleach reacts strongly with peroxide (releases oxygen)
Bleach is a strong oxidizer.

What happens with bleach & HCl??
It produces Chlorine gas.

Why is bleach alkaline?
It is said it becomes "hypochlorous acid" in water ???
Chlorine is a powerful oxidizing agent.

Bleach + Peroxide + HCl is producing a gas.
Is the gas Chlorine or is it oxygen?
or both????

Bleach * $NaOCl + 2HCl \rightarrow Cl_2 + H_2O + NaCl$

Of ya have them!

Chemix Balanced MMS I $5NaClO_2 + 4HCl \rightarrow 5NaCl + 4ClO_2 + 2H_2O$

MMS II ~~$Ca(ClO)_2 + HCl \rightarrow CaCl + H_2O + Cl_2$~~
Should be?: $Ca(ClO)_2 + 4HCl \rightarrow CaCl_2 + 2H_2O + 2Cl_2$

MMS bottle is Sodium Chlorite $NaClO_2$
explosive, white, mildly hygroscopic
Water soluble powder. Used as an analytical
reagent and oxidizing agent.

Chemist Balanced ~~This~~ Right away.

When put in acid breaks down into Chlorine dioxide
(formula)? It is a form of bleach. ClO_2

$5NaClO_2 + 4HCl \rightarrow 5NaCl + 4ClO_2 + 2H_2O$

Sodium hypochlorite is: $NaOCl$.
$NaOCl$ + acid ⇒ releases Chlorine & hypochlorous acid but usually in concentrations too small to cause any significant damage.

Hydrogen peroxide is a more powerful oxidizer than Chlorine or chlorine dioxide.

Bleach + H_2O_2 → ?? releases oxygen
$NaOCl + H_2O_2 \rightarrow$?

Bleach + HCl → produces Chlorine gas.

look at this

Bleach + H_2O_2 → aqueous sodium chloride, water, and O_2 gas are produced.

$NaOCl + H_2O_2 \rightarrow O_2 + NaCl + H_2O$

So do you want Chlorine gas or oxygen gas in your stomach.

Bleach is looking a lot more effective than MMS.

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Current:

1. Alka Seltzer (Sodium Bicarbonate, Aspirin, Citric Acid)
2. Copper Sulfate Solution 300 mg / 1500 ml H_2O
3. Bloodroot
4. 1 drop bleach
5. 1 drop peroxide ??

$FeSO_4$

1. Iron Supplement
2. Vitamin D
3. ~~$FeSO_4$~~
4. Liver Cleanse
5. Enzymes

John's Test 01/24/10

Baking Soda 20 drops
Copper Sulphate ~ 10 drops
Blood Rat
} May have aggravated?
1/4 TSb soda

Thus far the most effective agent appears to be Conventional bleach. vs MMSI & MMSII

MMSI Sodium Chlorite $NaClO_2$ 31% 284 mg/kg

MMSII Calcium hypochlorite $2Ca(ClO)_2$ LD50 850mg/kg

Bleach Sodium Hypochlorite $NaOCl$ LD50 5800 mg/kg 12% solution

So the question is what happens in HCl?

bleach $NaOCl$ + Acid → releases Chlorine & hypochlorous acid but usually in concentration too small to cause any significant damage

MMSII $2Ca(ClO)_2$ + Acid → ~~Chlorine Dioxide~~ ClO_2 + $CaCl$
what is this?

MMSI $NaClO_2$ + Acid → ClO_2 Chlorine Dioxide (a bleach) 1 gm expected to produce nausea

Standard Culture 1 (SC1)
= HCl + C + L + H + $FeSO_4$ (s)

Standard Culture 2 (SC2)
= HCl + $FeSO_4$ (s)

Twice as soluble — Calcium Chloride Solubility: 74.5 gms / 100 ml

Sodium Chloride Solubility: 35.9 ~~35.6~~ gms / 100 ml @ 25° C

Bleach: Sodium Hypochlorite — $NaOCl + 2HCl \rightarrow Cl_2 + H_2O + NaCl$

MMS I Sodium Chlorite — $5NaClO_2 + 4HCl \rightarrow 5NaCl + 4ClO_2 + 2H_2O$

MMS II Calcium Hypochlorite — $Ca(ClO)_2 + 4HCl \rightarrow CaCl_2 + 2H_2O + 2Cl_2$

Conclusion: bleach & MMS produce essentially the same result.

— Why is bleach alkaline?

Found it: it is the OCl^- ion that is the only species @ pH 7 & 9.

$OCl^- + H_2O + 2e^- \rightarrow Cl^- + 2OH^-$

It would seem as though it is the OH^- ion which is reacting to the culture since NaOH also reacts. So what is it reacting with. OH or OH_2?? How would I find out?

246.68 gms/mole is $CuSO_4 \cdot 5H_2O$
but 159.61 gms/mole is actually $CuSO_4$
The H_2O is 90.08 gms/mole

What is the pH after the reaction w/ bleach?

It is still 3.0. This means there are plenty of H^+ ions. It is not neutralized at all. What does the results make it look like?

Lets look @ concentration of MMSTT vs bleach

2 Capsules weigh 1.99 gms.
Estimate capsule wt is 1.05 gms
So 2 gm Capsules weigh ~ 1.89 gms.
Therefore 1 capsule ≅ .945 gms

Now the capsule is 73% Calcium Hypochlorite
≅ .73 (.945) ≅ .690 gms.
Now Cal Hypo has a molecular formula of $Ca(ClO)_2$
& molecular mass is 142.982 gms/mole
~~Now 1 drop ≅~~
We have placed this in the large eyedropper bottle.
These are 60 ml & 1 drop ≅ .069 ml.
So

$$\frac{.690 \text{ gms}}{60 \text{ ml}} = \frac{x}{1000 \text{ ml}} \quad x \doteq 11.50 \text{ gms}$$

and $\frac{11.50 \text{ gms}}{142.982} \cong .0804$ Molar Solution $Ca(ClO)_2$

and we are adding $\frac{.069 \text{ ml}}{60 \text{ ml}} \left(.0804 \frac{M}{}\right) 142.982 \frac{\text{gms}}{\text{mole}}$

$= .0132 \text{ gm} =$
13.2 mg Check this.
$=$

We have a .0804 M solution.
We have 60 ml of solution
and 1 drop = .069 ml.

1 mole = 142.982 gm / 1000 ml

How many grams in one drop?

If it were the whole bottle it is

$$\frac{60\text{ml}}{1000\text{ml}} \cdot (.0804\text{M})\ 142.982\ \frac{\text{gms}}{\text{mole}} = .689745\text{gms}$$

but we are only adding 1 drop.

$$\frac{60}{.069} = 869.56 \text{ drops in one bottle.}$$

So $\frac{1}{869.56}$ .689745 gms = .000793 gms

= .793 mg $Ca(ClO)_2$

Not very much.

Now how about 1 drop of bleach.
Before we go, the amt in one drop is:

$$(\text{Molarity}) \cdot \left(\frac{\#\ \text{gms per}}{\text{mole}}\right) * \left(\frac{\#\ \text{ml in Bottle}}{1000\text{ml}}\right)$$

This much of a mole.

No. of grams in an arbitrary volume of a given molarity solution.

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Now, what is bleach? $NaOCl = 74.44$ gms/mole

It is 5.25%

In 100gms of bleach contains 5.25 gms/NaOCl

So

$\frac{10(5.25\text{gms})}{1000\text{ml}} = \frac{52.5\text{gms}}{1000\text{ml}}$.

$= \frac{52.5}{74.44} = .705$ Molar solution.

So with one drop we are adding.

$.705\text{M}\left(\frac{52.5\text{gms}}{\text{mole}}\right) * \frac{.069\text{ml}}{1000\text{ml}} = .0025\text{ gms}$

$= 2.55\text{ mg}$

$\frac{2.55}{.793} = 3.22$ times as much bleach as MMS II.

So I would recommend we double up the strength of $Ca(ClO)_2$ as one idea, but not right now.

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$HCl + FeSO_4$ + Bck Soda → ?

$CHNaO_3$

$NaHCO_3$

$HCl + FeSO_4 + NaHCO_3 \rightarrow FeO_2$

$+ NaCl + CO_2$

$+ H_2O$

Baking Soda + HCl → Water H_2CO_3

+ Salt + CO_2

~~Nr~~ $NaHCO_3 + HCl \rightarrow NaCl + H_2O + CO_2$

Vigaras Reaction:

$C + L + H + HCl + FeSO_4(s) + NaHCO_3$

No clear reaction yet:

$C + L + H + HCl + \cancel{FeSO_4} + NaHCO_3$

Conflicting Results:

$HCl + FeSO_4 + NaHCO_3$ (one reaction, one not)

Balanced $HCl + NaHCO_3 \rightarrow H_2O + NaCl + CO_2$

$HCl + NaHCO_3 + FeSO_4 \rightarrow \cancel{H_2O} + NaCl + CO_2 + Fe^{2+} + SO_4^-$

No! There is a precipitate!

Need to use pure $FeSO_4$ (It is maleic $Fe(OH)_3$)

$FeSO_4$ is highly soluble in water >1gm/100ml

~~Ferric sulphate $Fe_2(O_2)_3$~~

Ferric sulphate is $Fe_2(SO_4)_3$

It is yellow, but it is so soluble in water!

So it should not be that

but is it soluble in acid???

We have:

unbal $HCl + NaHCO_3 + Fe^{3+} + OH^- \rightarrow H_2O + NaCl + CO_2 + Fe(OH)_3$

bal $HCl + NaHCO_3 + Fe^{+3} + 3OH^- \rightarrow H_2O + NaCl + CO_2 + Fe(OH)_3$

(?)

Now we have:

$HCl + NaHCO_3 + Fe^{+3} + SO_4^{-} + Na + 3OH^-$

$\rightarrow H_2O + NaCl + CO_2 + Fe(OH)_3 + Na^{+1} + SO_4^{-1}$

This is our reaction.

So now the only question is do

~~Fe~~

But this is not really true since we are putty in $Fe^{+2}SO_4$ which then dissolves into Fe^{+2} and SO_4^{-2}, not Fe^{3+}.

$Fe(OH)_2 + OH^- \rightarrow Fe(OH)_3 + e^-$

OK, So now we have:

$HCl + NaHCO_3 + Fe(OH)_2 + OH^- \rightarrow NaCl + CO_2 + Fe(OH)_3 + e^-$

So now the questions are

Where does $Fe(OH)_2$ come from?

Where does OH^- come from?

$NaOH \rightarrow Na^- + OH^-$

~~Fe~~ $FeSO_4 + H_2O \rightarrow Fe(OH)_2 + SO_4^-$

Guess what:

$FeSO_4 + 2H_2O \rightarrow Fe(OH)_2 + H_2SO_4$

this does not seem possible

This is amazing. It is true! I measured it with pH meter & it was 3.5

Now I understand why Lee said $CuSO_4$ was acid! I measured it and indeed it was also acidic. Why?

$CuSO_4 + H_2O \rightarrow CuO_2 + H_2SO_4$!!!

and Cu also comes in Cu^{+2} & Cu^{+3} flavors & they are entirely different!

So now we see our reactions are:

(1) $NaOH + Culture \rightarrow Na^+ + OH^- + Culture$

(2) $FeSO_4 + H_2O \rightarrow Fe(OH)_2 + H_2SO_4$

(3) $HCl + NaHCO_3 + Fe(OH)_2 + OH^- \rightarrow NaCl + CO_2 + Fe(OH)_3 + e^-$

so what is happening is:

$(Na^+) + OH^- + Culture + Fe(OH)_2 + (H_2)SO_4 + HCl$

$+ NaHCO_3 \rightarrow Na^+ + (Na)Cl + CO_2 + Fe(OH)_3 + e^-$

$+ (H_2O)$

We now have in Chemex

+ Culture

$HCl + Fe(OH)_2 + 3OH^- + NaHCO_3 + H_2SO_4 \rightarrow$

$3H_2O + NaCl + CO_2 + Fe(OH)_3 + 3e^- + SO_4^-$ + Culture (react?)

This is our Chemistry !!!

In Words:

Hydrochloric Acid + Ferrous Hydroxide + Hydroxide ions + Baking Soda + Sulfuric Acid → produces Water + Salt + CO_2 + Ferric Hydroxide + Sulfate ions + free electrons.

This is pretty amazing Chemistry

Culture + HCl + $Fe(OH)_2$ + $3OH^-$ + $NaHCO_3$ + H_2SO_4 →

$3H_2O$ + $NaCl$ + CO_2 + $Fe(OH)_3$ + $3e^-$ + SO_4^- + Culture Effects?

It did reach equilibrium.

Therefore the culture now has available to it:

1. Water
2. Salt (& acid?) Acids are not too Complete.
3. Carbon Dioxide
4. Ferric Hydroxide
5. Sulfate Ions
6. Free electrons.

When we add $FeSO_4$ in pure form I do not think it is the same as adding it as a $Fe(OH)_2 + H_2SO_4$ form.

So now we investigate

$$HCl + FeSO_4 + NaHCO_3 + OH^- \overset{??}{\rightarrow} H_2O + NaCl + CO_2 + Fe^{+2} + SO_4^- + OH^-$$

It appears there are some Fe^{3+} ions on the right side, but not many. We suspect it leads to

$$HCl + FeSO_4 + NaHCO_3 + OH^- \rightarrow H_2O + NaCl + CO_2 + Fe(OH)_2 + SO_4^-$$

Something is different here.

Now, back up to wine:

1. Water
2. Alcohol
3. Acids
4. Sugars
5. Salts (potassium, calcium-magnesium)

Now we notice when we add $FeSO_4$ directly, (not dissolved in water beforehand) we notice the precipitate is green w/ lye from the culture. This means $Fe(OH)_2$ is being produced.

$$FeSO_4 + HCl + NaHCO_3 \rightarrow Fe(OH)_2$$
$$+ NaCl + CO_2 + H_2O + SO_4^-$$

balanced Chemx

When we add the $FeSO_4$ directly we have

$$Fe^{+2} + 2OH^- + HCl + NaHCO_3 \rightarrow$$
$$Fe(OH)_2 + NaCl + CO_2 + H_2O$$

and the Fe^{+2} comes from dissolving the $FeSO_4$ in the HCl. The $2OH^-$ comes from the lye of the culture.

~~This means we should have~~
~~$FeSO_4$ +~~

This should summarize what is happening. It is iron hydroxides that are forming not iron oxides. These are insoluble.

Correct. The iron hydroxides being formed are INSOLUBLE and therefore can not be a source of food.

So this is no good. When you add lye to the solution from the culture, it precipitates the iron ions and causes them to be insoluble. So they are useless as food.
Questions how would you make them soluble again?

Maybe you need to neutralize the lye culture before you add it!!!
Right at the time of adding it.

Iron hydroxide is very poorly soluble in water and is insoluble in acid.
Iron sulphate is highly soluble in water.

So $FeSO_4 + H_2O \rightarrow Fe^{+2} + SO_4^{-} + H_2O$
Is n't this what happens when something dissolves??
How does it turn to acid?
My solution looks like it dissolved.
It is indeed an electrolyte. You tube video.

So why would it become acidic??? It is, I measure. Could it be water is dissociating to H^+ to form H_2SO_4 Found a reference on google that confirms it But why?

$H_2O + H_2O \rightarrow H_3O^{+1} + OH^-$

I do not know why it is acidic.

We see now that the lye w/ the precipitates out when we add acid back in. What precipitates?

Well we learn that

$HCl + NaOH \rightarrow NaCl + H_2O$

How about that?
It is possible to neutralize. It is very sensitive near pH 7.0. It does not produce a solid salt. It must be in solution.
Our culture w/ the precipitate is highly acidic.

So how can we test for Na or Cl ions?

We test for Cl^- or ~~SO_4^{--}~~ in with dilute Nitric acid 1st, then silver nitrate. It forms a white precipitate.
Our test passes.
It could however also be a ~~sulphate~~ sulphate ion. Which is tested w/ Barium. How?

$BaCl_2$ has a molecular weight of 208.232 gms/mol.
H_2O has a mw of 36.03
$BaCl_2 \cdot 2H_2O$ has a mw of 208.23
+36.03
244.26 gms/mole

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So to make a true 1 M solution of $BaCl_2$ you would dissolve

$\frac{208.23}{}$ gms in 1 liter of water =

$\left(\frac{208.23}{244.26}\right)$ = 244.26 gms/mole.

We have 15 gms total and 120 ml of water. Assume we want to use no more than 5 gms of $BaCl_2 \cdot 2H_2O$

$\frac{5 \text{ gms}}{120 \text{ ml}} = x\left(\frac{244.26 \text{ gms}}{1000 \text{ ml}}\right)$

$x = .17M$ let use .1M.

$\frac{x}{120 \text{ ml}} = .1\left(\frac{244.26}{1000 \text{ ml}}\right)$ $x = 2.934$ gms.

This is what we will use & we will make a .1M solution of $BaCl_2 \cdot 2H_2O$

Now we need to test for SO_4 ions instead of Cl^- This is done w/ $BaCl_2$. The test failed. No white precipitate. So no sulphate. Therefore we have proven that the culture solution w/ acid added HCl has the Chloride ion. What about w/out HCl added??

It has been proven big time. The culture, even in the lye solution, has definite Chloride ions in it. What does this mean & how do you use it. Bleach reaction?

We know now that the culture, both in the lye former & the wine itself have significant Cl- Chloride ions. What about wine in itself?

Wine by itself shows the Chloride ion also. So you know nothing about whether the culture is affected by this or not. Somehow you would have to measure the Chloride ion or separate it from the wine. I think you separated the culture from the problem earlier. It may be the culture is absorbing the Chloride ion?

See Chloride ion - Iron tests about 20 days back
These tests showed the Chloride was in the culture, not the wine. You must review this work to confirm this. Because if you continue you are assuming the culture has the Chloride ion.

What happens when you add HCl?
Something precipitates out. What & why?

Iron is not showing up in the culture. Fe^{2+}

Bleach gives no reaction to culture in lye

"Making Wine" pH of our wine is 4.2

Our container is 1500 ml.

So.
82.5% water. → 1237.5 ml water.

alcohol use 12% means .12(1500) = 180 ml alcohol.

We only have ~ 100 ml.
So we are short here.

Acid → We will use a ph of appox 4 to 3.5 whatever the wine is
also we will use acetic acid for ½ & ½ HCl
use 2%

Now we will add 1% sugar by (weight)
.01 (1200 ml / 1500 gms) = 12 gms fructose / 15

and then salt:
.3% = .003 (1200 ml / 1500) = 4.5 gms salt

We only have 800 ml or 2 batches of 400 ml.

	400 ml HCl Type:	400 ml Acetic Acid Type
Water	330 ml	330 ml
Alcohol	48 ml	48 ml
Acid:	1 drop Use pH to 3.5-4 (Burette)	25 drops pH to 3.5 to 4 Burette
Sugar	8 ¼ gms (2 level teaspoon)	8 ¼ gms
Salt	1.2 gms (3/4 of 1/4 teaspoon level)	1.2 gms

plan B 13 dishes
30 ml

The solution before acid is added has a pH of 7.2
Use standard pipette disposable

TWC ~~FeS~~ = Transferred Wire Culture (No filaments)

~~TWC~~ LLC = Liquid Lye Culture

Now we need to test for iron & sulfate ions & difference in iron & sulfate ions,

Sulfate: ~~$Fe^{+2}SO_4$~~ Fe^{+2}

Dilute HCl + $BaCl_2$ NaOH or Ammonia

Sulfate Test:
Culture Medium:
White Wine
$FeSO_4$ added
Filaments added
} Tests positive for sulfate SO_4 which it should

Wine by itself, fails test for sulfate ion.

It is the Chloride ion test that uses silver nitrate, not the Fe ion.

Iron Test:

White Wine does not test positive for Fe^{+2} or Fe^{+3} ion, either with NaOH or Ammonia

Red Wine did test positive for Fe^{+2} with NaOH

Repeating the test for white wine. White wine does have some Fe^{+2} in it but not very much. It is definitely less than red wine.

Conclusions:

1. Red wine has more iron than white wine.
2. White wine fails test for SO_4 ion
3. Wine w/ filament culture + $FeSO_4$ tests positive for SO_4 - which it should!

Now go to red wine for SO_4:

4. Red wine does not test positive so for SO_4 ion.

5. pH of the culture is 3.9
   pH of the white wine is 4.1

6. Conductivity of white wine is "1" - ie either nothing or overflow. (I believe overflow)
7. Conductivity of red wine is also 1 of overflow

New diluted Conductivity

Red

1. ~~White~~ Wire 10 drops = 124 uS
   30 ml of H_2O

2. ~~Red~~ W
   White Wire 10 drops 124 uS
   30 ml H_2O

identical

3. 30 ml H_2O
   The White Wire w/ the successful culture = 180
   (remember it has $FeSO_4$ in it)
   but this is expected because a source of ions has been introduced.

4. The test for iron ~~ions~~ ions Fe^{+2} or Fe^{+3} comes out NEGATIVE for the successful white wire culture.
   This is a huge finding if verified. It means the culture is metabolizing the iron ion! Since sulfate ions do remain!

5. Trying the test again under highly concentrated conditions there is just ever so slight detection of iron ions.

So now we have some questions:

1. Is the iron actually being used or was it all converted to $Fe(OH_2)$ when it was added to the wine.

We need controls with white wine & $FeSO_4$ added.

We know white wine fails

1. White wine ~~fails test~~ for SO_4 ion ~~but passes~~
2. White wine fails test for Fe^{+2} & Fe^{+3} (Red wine does test positive for Fe^{+2})

$FeSO_4$

Now we add 5 drops ~~$FeSO_4$~~ (.5M) to 10 ml white wine:

1. We expect a precipitate to form over time. Will it??

2. In the meantime, test the white wine w/ $FeSO_4$ added. We get a positive test for Fe^{+2} but only w/ a fairly high concentration of the wine + $FeSO_4$ solution, ie approx 25 drops.

3. Now test the wine + $FeSO_4$ for sulphates: Not true
The test comes out ~~negative~~. ~~Why~~??
It does come out positive.

4. The culture IS coming out positive for sulphates. ~~Today~~ ~~What does this mean~~?
with $FeSO_4$ added.

5. The culture & the wine appears to test identically positive (same color / concentration) for SO_4 ion.

The same

Now we are focusing on the iron ~~ion~~ ion.

1. While wine fails to test for Fe^{+2} and Fe^{+3}, white wine also fails test for SO_4 ion.
2. When we add $FeSO_4$ to wine we do get a positive result for BOTH Fe^{+2} and SO_4^{-} but we need to keep the concentrations up to find it. Ie, we should not be diluting the wine.

3. Now, what is happening w/ iron in the culture?

Straight culture (highly concentrated) fails the test for Fe^{+2} or Fe^{+3}.

- Use .1M NaOH straight in, there is a reaction but there is no precipitate.

I wonder what this reaction is?

This says the culture has metabolized the iron ion.

But if we add enough NaOH we eventually get a brown precipitate this means we are getting a Fe^{3+} ion. in the culture.

When we add $FeSO_4$ to white wine & test for Iron we first get green (Fe^{+2}) but it quickly turns to brown (Fe^{+3})

So in wine, Fe^{+2} is being oxidized and it turns to Fe^{+3}.

In our "acetic acid wine" w/ $FeSO_4$ added, the test comes out green Fe^{+2}.
So white wine is doing something that our acetic acid is not doing. Somehow it is oxidizing.

Same thing in our "hydrochloric wine" + $FeSO_4$ added. It turns green.
So to simulate white wine, it looks to me like we need to add an oxidizer, H_2O_2?

There is a difference between HCl & acetic when $FeSO_4$ is added. One produces green (Fe^{+2}) and brown for Fe^{+3} and the other produces only brown, not sure which does what yet.

With Acetic Acid Wine + $FeSO_4$ & tested for Fe w/ NaOH it produces a definite green precipitate. When you add one drop of H_2O_2 to this, it turns orange brown, which for now I assume is Fe^{+3} being formed. So an oxidizer may be important to the culture.

Identical results with the "HCl" wine.

Therefore it appears as though a source of oxidation is important within the culture.
This means we try a set of cultures with:

1. Wine (White & Pseudo)
2. The Filaments (or the lyeform)
3. $FeSO_4$ (10 drops)
4. H_2O_2 (2 drops)

Clearly we have a case where we know that White wine + $FeSO_4$ presents a favorable growth medium.

We believe it is the Fe^{+3} ion that is what is causing the growth or that there is a conversion from Fe^{+2} to Fe^{+3} in the growth process.
We are still not sure of the chemistry that is taking place.

This suggests that as it is feeding off the iron in our bodies.