JANUARY 2015 STUDY GUIDE FOR LAB EXAM SECTION (20% of 2nd term lab grade)

The ST Lab Exam Covers 5 Labs:

1) **Metals, Metalloids, Non Metals**
2) **Electrolysis of Water**
3) **Preparation and dilution of a Kool Aid solution**
4) **The Reduction of Copper Oxide With Charcoal**
5) **Neutralization of Acid With Base**

1) Metals, Metalloids, Non Metals

Purpose: To use characteristic tests to distinguish between metals, metalloids and non metals.

Key Results and Observations From Experiment:

- Only non metals fail to produce a lit or flashing bulb in the conductivity test. Powders cannot be used in the conductivity test
- Only metals are malleable
- Metal strips and chunks of many metalloids are lustrous
- Some non metals can sparkle but are not lustrous
- Only acids react with metals(in powdered form) to produce hydrogen gas

Sample questions:

1) An unknown powder causes an acid to bubble. Can it be a metalloid? A non metal?
2) An unknown powder does not cause an acid to bubble. Can you be sure it's a non metal? Is another test needed?
3) Why can a powder lead you to an incorrect conclusion about conductivity?

2) Electrolysis of Water

Purpose: To use electricity to split up water into its constituent elements; to identify those elements and to find the ratio of their volumes.

Key Results and Observations From Experiment:

- At the (-) electrode, bubbles streamed faster than at the (+) electrode, causing more water to be pushed out of the (-) test tube.
- The gas measured at the (-) tube was approximately twice the volume of the gas collected at the other tube. Impurities, especially chloride, can increase that ratio.
- The ratio is because of the equation on the right hand side: $2H_2O \rightarrow 2H2 + 1\ O_2$

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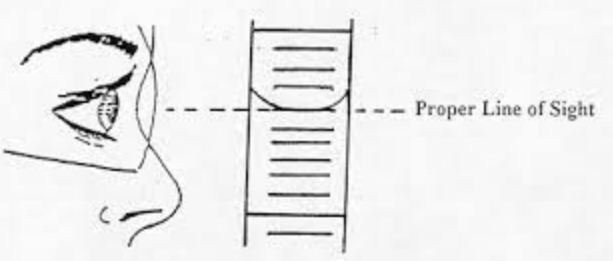
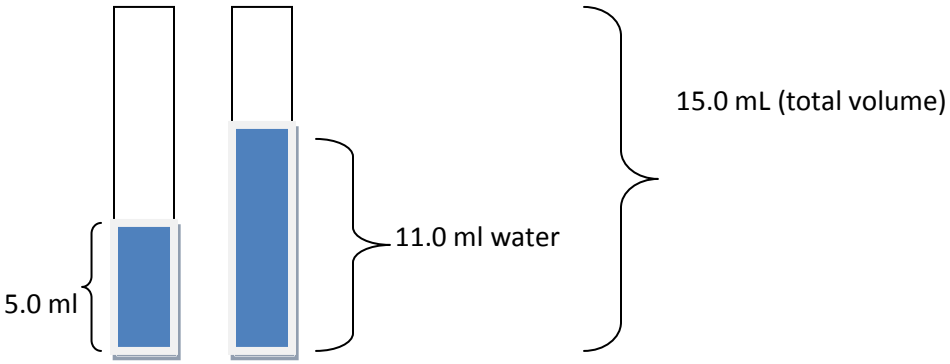
- Holding the (-) test tube upside down and testing it with a lit splint causes a pop, identifying it as hydrogen. The other tube causes a glowing splint to burst in to flames, identifying it as oxygen.
- The volumes have to be read at eye level.



Sample questions:

1) What do you have to do before inserting the electrode in the test tube?
2) What is the volume of hydrogen collected if the following is seen?



3) Which gas collects at the positive electrode and in lower quantities when water is electrolyzed?

3) Preparation and Dilution of a Kool Aid Solution

Purpose: to figure out how much Kool Aid is needed to prepare a certain volume of a given concentration , to actually prepare the solution accurately and to dilute it.

Key Results and Observations From Experiment:

- The way to figure out how much Kool Aid to use was to multiply g/L by L needed (m = CV)
- We dissolved that amount in a beaker in less than the desired volume
- We then transferred to a volumetric flask of the desired volume, added what we rinsed from the beaker to the flask, and we
- Added water to the white line on the flask and mixed.
- To dilute, we pipette a given amount and transferred to another volumetric flask
- We then again added water to the white line on the flask and mixed.

Sample questions:

1. How much Kool Aid should you weigh if you need 500.0 ml of a 2.0 g/L solution?
2. Why is the beaker good for dissolving solutes but bad for measuring volume?
3. How did the concentration change when we only took part of the first solution and added water?

4. The Reduction of Copper Oxide With Charcoal

Purpose: to heat copper oxide so the compound reacts with carbon and converts it into an element and a gas, which we could identify.

Key Results From Experiment:

- We saw evidence of chemical change when the black powder changed color, even after it stopped glowing red.
- The limewater attached to the reaction tube turned cloudy, indicating that carbon dioxide was produced.
- A copper-colored substance was formed.
- The mass of the remaining solids was less than that of the reactants because we lost the gas.

Sample questions:

1. Would we have concluded that mass was conserved if the limewater was also weighed? Why?
2. Why did the mass of the solids decrease?
3. What was the purpose of the charcoal?

5. Neutralization of Acid With Base

Purpose: To use a NaOH of known concentration and phenolphthalein indicator to neutralize an acid of unknown concentration, and to calculate its concentration from the volume of base used in the neutralization.

Key Results and Observations From Experiment:

- We add to add base slowly not to overshoot the endpoint when phenolphtalein turned a light pink. The pink had to be stable for at least a couple of minutes.
- The volume of base(NaOH) needed was key to calculating the acid's concentration
- Air bubbles at the tip could have exaggerated the volume of NaOH recorded

Sample questions:

1. What is the color of a solution with phenolphthalein if the acid is not neutralized yet?
2. Is a neutral solution sour, salty or bitter?
3. Why is mixing important throughout the titration?