ST Lab Pretest

A- Metals, Metalloids, Non Metals

1. **Complete the table.**

SUBSTANCE	Appearance	Conductivity test result	Acid test result
METAL	Lustrous, malleable	Light blinks	constant stream of bubbles
METALLOID	Lustrous, brittle	Light blinks	One bubble and then no more
NONMETAL	Sparkly, not lustrous, brittle	Light is off	One or two bubbles and then no more

2. Two different substances both seem shiny:
   Substance A sparkles like ice in bright sunlight.
   Substance B is more reflective and looks almost all white in the sun.

   a) Which one is lustrous?
      B
   b) Is substance B necessarily a metal? Why or why not?
      No. it could also be a metalloid. Need more tests before jumping to conclusions. Remember, "Lab men can't jump."

3. a) When testing for conductivity, should you **not** use a powdery version of a solid?
No.
Why or why not? The air spaces in between break contact between the (+) and (-) electrodes.
b)
c) Is a substance that makes the light blink on necessarily a metal? No. metalloids also conduct.

4. a) If a few bubbles slowly appear after adding a powder to acid, is there necessarily a reaction? No.
b) Why or why not? Could be air bubbles.
c) What is the advantage of using a powdered substance for the acid test?
Powders react faster.

B- Reduction of Copper Oxide Lab

5. Why is it important to mix the two powders (carbon and copper oxide)?
C atoms have to be in contact with CuO.
6. What color of flame from the Bunsen burner makes the reaction go faster?
Blue

7. a) What's the purpose of the limewater?
To test for carbon dioxide, one of the products of the reaction.
b) Think of something that would prevent the limewater from going cloudy.

(1) Not waiting long enough
(2) Old limewater.
(3) Not having used both powders in the reaction-test tube.

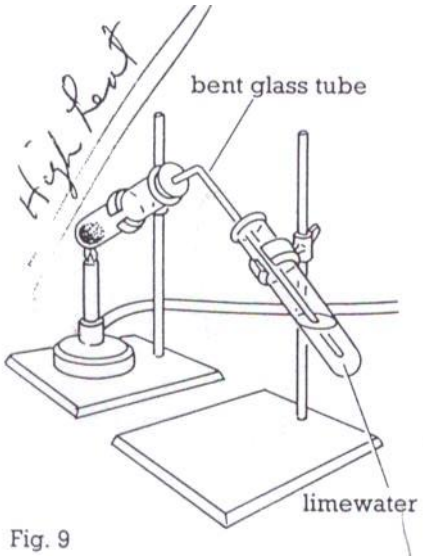


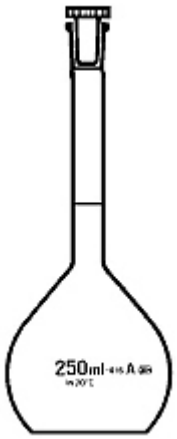
Fig. 9

8. In the reduction of copper oxide lab, why did the mass decrease?
The carbon dioxide was no longer in the test tube being weighed, which had only copper and unreacted black powders.
9. a) If you had weighed the limewater before and after and subtracted the two masses, what would the answer represent?
Aside from experimental errors, it would be the amount of carbon dioxide that escaped.
b) If this difference in mass was still smaller than the difference between the masses of the black powder mixture before and after the reaction, what would it signify?
Perhaps the limewater did not capture all of the CO_2 produced by the reaction.

10. Where did the brown product of this reaction come from?

It came from the reduction of CuO(the oxygen was removed by charcoal.

C- Preparation and Dilution of a Solution



Pipette

11. Before preparing a solution of a known concentration, what calculation has to be performed? (just mention the formula)
m = CV
12. Why do we go through the trouble of using a volumetric flask? Why not measure the volume in a graduated cylinder? Why is the former more accurate?
The volumetric flask is more accurate because it's thinner at the point where you find the the line designating the volume
13. Why don't we add the solid directly to the volumetric flask?
You can easily get powder stuck where the stopper is inserted and then it won't dissolve properly.

14. a) To accurately dilute a solution of known concentration we remove a precise volume from the volumetric flask. What piece of glassware do we use?

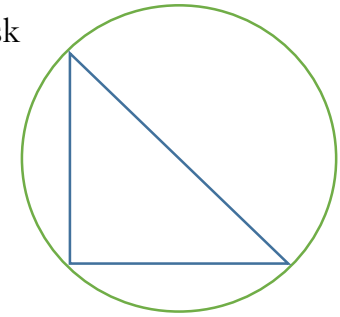
The pipette. See picture.

b) Why is this piece of glassware even more precise than the volumetric flask?

It's even thinner than the neck of the volumetric flask.

STE Lab Pretest

A- The Thickness of Copper Lab



1. A student wanted to estimate the thickness of a thin circular disk of 18K gold.

a) What physical property of 18 K gold would (s)he have to look up in a handbook or on Google?
density

b) A student drew a right triangle inside the disk. What did (s)he then measure with a ruler and why?
The diameter because the radius is needed for the area.

c) What other measurement would (s)he need in order to later calculate the disk's thickness?
The mass has to be measured to at least two decimal places with a balance.

d) Which of these formulas will yield the thickness= h ? (d = density; r = radius of disk; m = mass of disk ; π = 3.1415….)

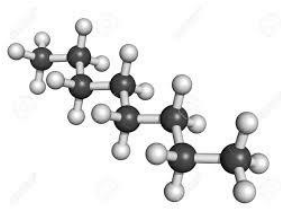
(A) $h = \frac{d\pi r^2}{m}$ (B) $h = \frac{m}{d\pi r^2}$ (C) $h = \frac{d}{m\pi r^2}$ (D) $h = \frac{m\pi r^2}{d}$

$$\pi r^2 h = V = \frac{m}{d}$$

(B)) $h = \frac{m}{d\pi r^2}$

e)How many decimal places are recorded with a typical ruler and how many places are estimated ?
2 and 1

B- Molecular Model Building

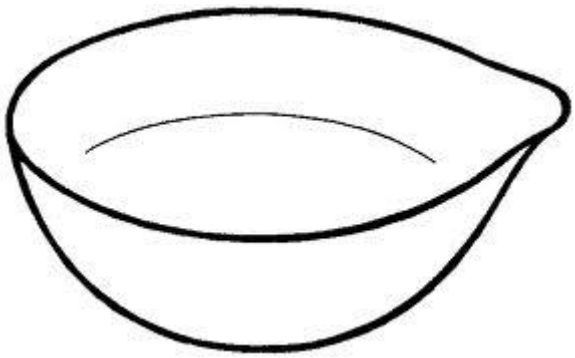


2. Match the sphere from the molecular models with the number of holes that it had.

SPHERE	NUMBER OF HOLES
a)Black (carbon) __4__	1
b)White (hydrogen)__1__	2
c)Red(oxygen)__2__	3
d) Green(fluorine)___1_	4

e) How many electrons are represented by each spring connecting any two spheres? 2

STOICHIOMETRY LAB



3. a) What evidence did we gather for the fact that not all HCl reacted with $NaHCO_3$?
   The vapors made the pH paper above the dish turn red.
   b) Why was excess HCl used?
   Excess makes the reaction go faster and ensures that all the baking soda reacted.
   c) Where did the water that we evaporated away come from? Give two sources.
   Some was mixed with $HCl_{(aq)}$
   Water is also a product of the reaction.
   d) How did we predict the amount of NaCl that should have formed according to stoichiometry theory? Mention what was measured in the lab and then the calculation-step used.
   Weigh the baking soda($NaHCO_3$)
   Convert to moles.
   Apply the ratio of moles from the equation to the above to find moles of salt.
   Convert to grams of salt.

4. Which of the following statements concerning % yield are true. BTW:

$$\%\ \text{yield} = \frac{actual\ mass\ of\ NaCl}{mass\ predicted\ by\ calculation} X100\%$$

   1. If salt spattered while heating too quickly, the yield would have been <100%. TRUE
   2. If the sample of salt was still slightly humid then the yield would have been >100%. TRUE
   3. If impurities from the acid stained the salt yellow, and if everything else was perfect, then the yield would have been <100%. False
   4. If salt spattered while heating too quickly and if the sample of salt was still slightly humid, the two errors could have offset each other. TRUE