



H

Name _____
Period _____

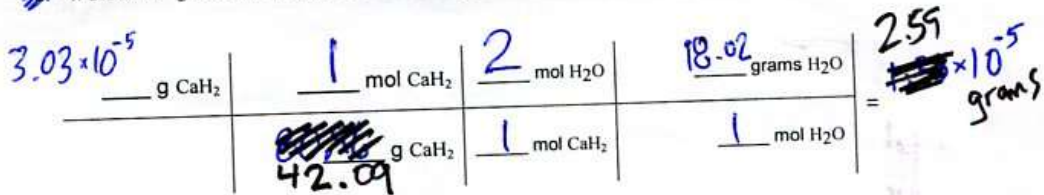
1. Which of the following is the most acidic?
 a. pH = 10 b. pH = 11 c. pH = 12 **d. pH = 2** e. pH = 4
2. Which of the following solutions is the most basic?
 a. $[H^+] = 1 \times 10^{-4}$ c. $[H^+] = 1 \times 10^{-9}$
 b. $[OH^-] = 1 \times 10^{-4}$ d. $[OH^-] = 1 \times 10^{-9}$
STRATEGY, DON'T COMPARE APPLIES TO GRANGES, MAKE THEM ALL $[H^+]$
ANSWER: B IS THE MOST BASIC b/c it has the least H^+
 $\rightarrow H^+ = 1 \times 10^{-10}$ $\rightarrow [H^+] = 1 \times 10^{-5}$
3. When tested, a solution turns red litmus to blue. This indicates that the solution contains more **SO, IT'S BASIC**
 a. more H^+ ions than OH^- ions
 b. more H_3O^+ ions than OH^- ions
c. more OH^- ions than H_3O^+ ions
 d. more H^+ and OH^- ions than H_2O molecules
4. If an aqueous solution turns blue litmus red, which relationship exists between the hydronium ion and hydroxide ion? **SO IT'S ACIDIC**
 a. $[H_3O^+] < [OH^-]$
 b. $[H_3O^+] = [OH^-]$
c. $[H_3O^+] > [OH^-]$
 d. Neither ion is present

2.
3.

FROM HERE DOWN IS SORT OF A REVIEW OF UNIT 8 (MARCH 9 TO MARCH 27)

5. For this balanced reaction, calculate the following
 $CaH_2 + 2 H_2O \rightarrow Ca(OH)_2 + 2 H_2$

~~5.~~ If 3.03×10^{-5} grams of CaH_2 react, how many grams of water react?



~~5.~~ If 0.746 moles of water react, how many moles of CaH_2 will react?

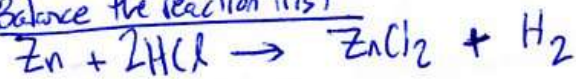
$$0.746 \text{ mol } H_2O \times \left(\frac{1 \text{ mol } CaH_2}{2 \text{ mol } H_2O} \right) = 0.373 \text{ mol } CaH_2$$

✓ **theoretical yield** (also called calculated yield) this is how much product you expected to get, based on your calculations
 ✓ **actual yield** This is measured by you in a laboratory, usually by weighing the product

$$\% \text{yield} = \frac{\text{actual yield}}{\text{theoretical yield}} \times 100$$

8. Suppose 4.61 g of zinc was allowed to react with excess hydrochloric acid to produce zinc chloride and hydrogen gas.
- a. How much zinc chloride should you get?

Balance the reaction first



$$4.61 \text{ g Zn} \times \left(\frac{1 \text{ mol Zn}}{65.38 \text{ g Zn}} \right) \left(\frac{1 \text{ mol ZnCl}_2}{1 \text{ mol Zn}} \right) \times \left(\frac{136.30 \text{ grams ZnCl}_2}{1 \text{ mol ZnCl}_2} \right) = 9.61 \text{ g ZnCl}_2$$

- b. Suppose that you actually recovered 8.56 g of zinc chloride. What is your percent yield?

$$\% \text{ yield} = \frac{\text{your lab result}}{\text{your pen and paper calculation}} \times 100$$

$$\% = \frac{8.56 \text{ g}}{9.61 \text{ g}} \times 100 = 89.1\%$$

↑ don't forget the 100

Reaction Terminology

Theoretical yield is _____

Actual yield is _____

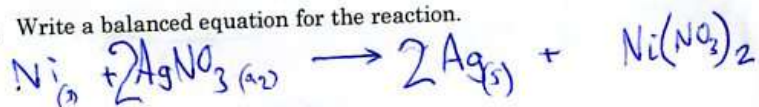
Percent yield is _____ divided by _____ times one hundred

Lab Data Use this to answer the next four questions

A student placed a piece of nickel in silver nitrate solution. Silver metal precipitated and aqueous nickel(II) nitrate was produced. The student collected the following data:

Mass of beaker	102.05 g
Mass of beaker with silver	103.13 g
Mass of nickel before	5.00 g
Mass of nickel after	4.69 g

9. Write a balanced equation for the reaction.



10. From the mass of Ni reacted, determine the theoretical yield of silver

$$0.31\text{g of Ni Reacted} \times \left(\frac{1 \text{ mol Ni}}{58.71 \text{ grams Ni}} \right) \times \left(\frac{2 \text{ mol Ag}}{1 \text{ mol Ni}} \right) \times \left(\frac{107.87 \text{ grams Ag}}{1 \text{ mol Ag}} \right) = 1.14\text{g Ag}$$

11. Determine the actual yield of silver

$$\text{Beaker with silver} \text{ minus } \text{beaker empty} = \text{silver}$$

~~1.08g~~

$$(103.13\text{g}) - (102.05\text{g}) = 1.08 \text{ grams silver}$$

12. Determine the percent yield of silver.

$$\% \text{ yield} = \frac{\text{actual}}{\text{theory}} \times 100$$

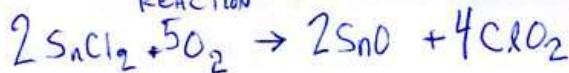
$$\% \text{ yield} = \frac{1.08\text{g}}{1.14\text{g}} \times 100$$

$$\% \text{ yield} = 94.7\%$$

13. Tin (II) chloride, SnCl_2 , reacts with oxygen gas to produce tin (II) oxide and chlorine dioxide. If 0.750 moles of O_2 and 0.750 moles of SnCl_2 were put in a test tube for this chemical reaction, find the following:

a. Which reactant is the limiting reactant?

FIRST WRITE A BALANCED REACTION



b. what mass of tin (II) oxide would be produced?

You must use the limiting reactant.

$$0.750 \text{ mol SnCl}_2 \times \left(\frac{2 \text{ mol SnO}}{2 \text{ mol SnCl}_2} \right) \times \left(\frac{118.69 \text{ grams SnO}}{1 \text{ mol SnO}} \right) = 89.0 \text{ grams SnO}$$

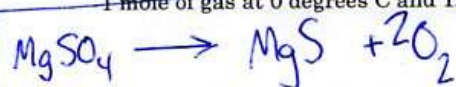
Then convert both. The smaller result tells LIMITING REACTANT

$$0.750 \text{ mol O}_2 \times \left(\frac{2 \text{ mol SnO}}{5 \text{ mol O}_2} \right) = 0.300 \text{ mol SnO}$$

$$0.750 \text{ mol SnCl}_2 \times \left(\frac{2 \text{ mol SnO}}{2 \text{ mol SnCl}_2} \right) = 0.750 \text{ mol SnO}$$

so, O_2 is limiting

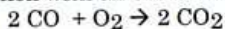
14. Magnesium sulfate, MgSO_4 , decomposes when heated to produce magnesium sulfide and oxygen gas. If 6.32 grams of MgSO_4 were heated in a test tube, what volume, in liters, of oxygen gas at STP should be released? (recall that 22.4 liters of ANY gas is 1 mole of gas at 0 degrees C and 1.00 atm)



$$6.32 \text{ grams MgSO}_4 \times \left(\frac{1 \text{ mol MgSO}_4}{120.37 \text{ g MgSO}_4} \right) \times \left(\frac{2 \text{ mol O}_2}{1 \text{ mol MgSO}_4} \right) \times \left(\frac{22.4 \text{ L O}_2}{1 \text{ mol O}_2} \right)$$

Answer: 2.35 liters O_2 at S.T.P.

15. What mass of CO was used up in the reaction with an excess of oxygen gas if 24.7 g of carbon dioxide is formed?



$$24.7 \text{ g CO}_2 \times \left(\frac{1 \text{ mol CO}_2}{44.01 \text{ g CO}_2} \right) \times \left(\frac{2 \text{ mol CO}}{2 \text{ mol CO}_2} \right) \times \left(\frac{28.0 \text{ grams CO}}{1 \text{ mol CO}} \right) = 15.7 \text{ grams CO}$$

Purpose: How do we do titration calculations?

If you got this data

$$[\text{HCl}] = 0.109 \text{ M}$$

$$[\text{NaOH}] = ?$$

the lonely number

$$\rightarrow \text{HCl volume} = 35.0 \text{ mL}$$

$$\text{NaOH volume} = 19.5 \text{ mL}$$

In a titration, the lonely number is ~~the~~ the volume of the substance of known concentration.

$$0.0350 \text{ L HCl} \times \left(\frac{0.109 \text{ mol HCl}}{1 \text{ L HCl}} \right) = 3.815 \times 10^{-3} \text{ mol HCl}$$

$$.003815 \text{ mol HCl} \times \left(\frac{1 \text{ mol NaOH}}{1 \text{ mol HCl}} \right) = 0.003815 \text{ mol NaOH}$$



$$[\text{NaOH}] = \frac{\text{moles NaOH}}{\text{liters NaOH}}$$

$$[\text{NaOH}] = \frac{.003815 \text{ NaOH}}{0.0195 \text{ L}}$$

$$[\text{NaOH}] = \frac{\cancel{.003815}}{0.0195 \text{ L}}$$

Answer: the titration of unknown NaOH showed us that the concentration was

$$[\text{NaOH}] = 0.196 \frac{\text{mol}}{\text{L}}$$