24cm x 30cm

Name: Joy Marie Marach

Subject: Chemistry

Grade: Senior

School: St. Marys

Date: 1942-1943

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Okla.
City

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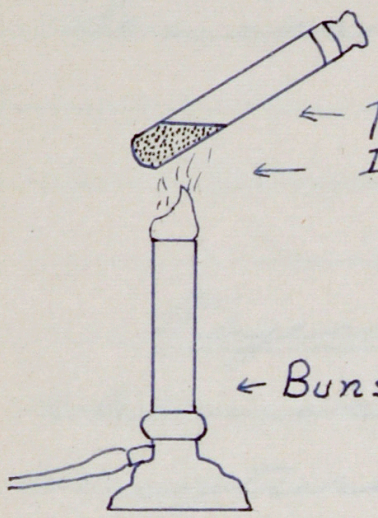
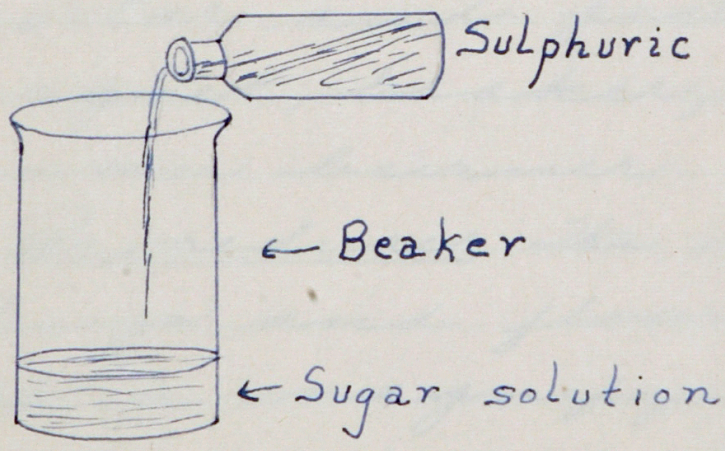
24cm x 30cm

Heating iron and sulphur



Action of sulphuric acid on sugar



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Joy Marie Marach — St. Mary's
Senior — Sept. 10, 1942

Experiment 1

Object: To study physical and chemical changes, and mixtures and compounds.

Material and Apparatus: iron filings, flowers of sulphur, carbon disulphide, sugar, concentrated sulphuric acid, mortar and pestle, test tube, magnet, beaker, watch glass, Bunsen burner.

Procedure: We mixed iron filings and flowers of sulphur. With a magnifying glass we distinguished between particles of iron and sulphur. With a magnet we removed iron filings from the mixture. Then we added carbon disulphide to a portion of our mixture. Next we placed some of our mixture in a test

Again we used a magnet
and carbon disulphide
on the black solid.

tube and heated it over a Bunsen flame until it began to glow. Incomplete

To a strong sugar solution we added concentrated sulphuric acid.

Results: Carbon disulphide added to our mixture dissolved sulphur leaving the iron free - a physical change. The result of heating our mixture was a black solid. This was a chemical change. Neither magnet nor carbon disulphide could attract the iron or sulphur because a new kind of matter was formed. This reaction was a chemical change. By adding sulphuric acid to our strong sugar solution our sugar was decomposed and the mixture heated the beaker. This was a chemical reaction. All that remained was a black porous mess containing carbon.

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Conclusion: By this experiment we understand that a chemical change is one in which the composition of the subject is changed while it is not changed in a physical change.

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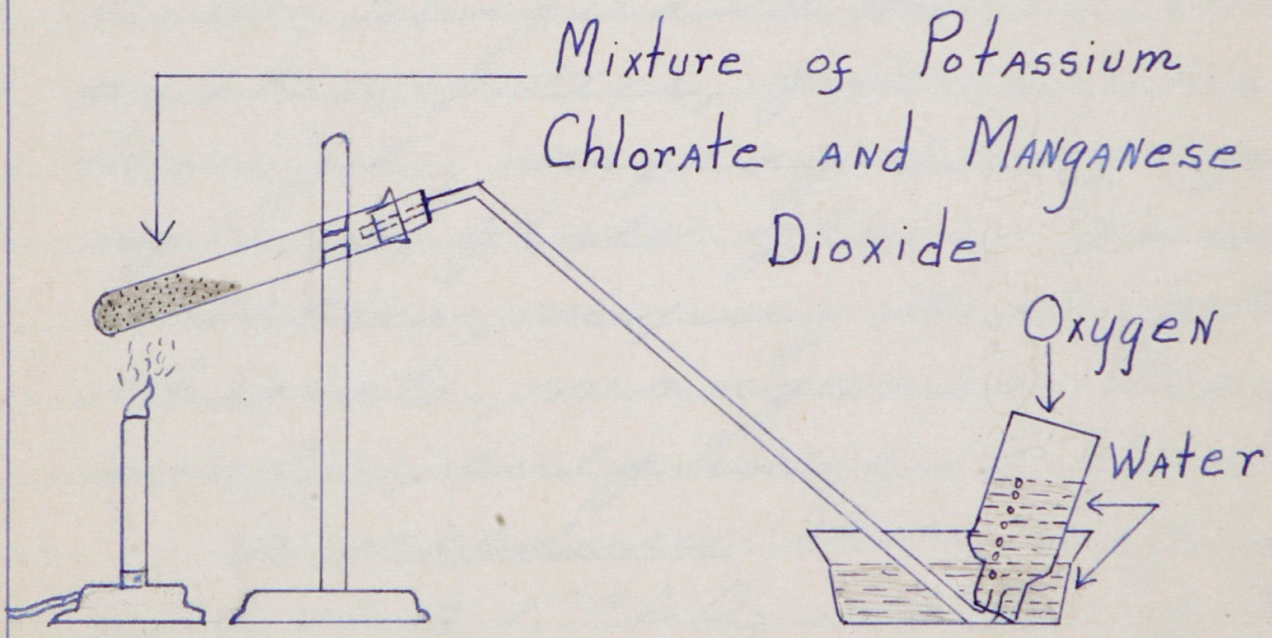
Laboratory Preparation of Oxygen



Joy Marie Marach — St. Mary's
Senior — Sept. 18, 1942

Experiment 2

Object: To prepare oxygen and study its properties.

Materials and Apparatus: test tube, stopper, rubber tube, ringstand, Bunsen burner, scales, filter, pneumatic trough, deflagrating spoon, splint, plate glass, four bottles, mixing dish, potassium chlorate, manganese dioxide, water, sulphur, and steel wool.

Procedure: We weighed out 10 g $KClO_3$ and 8 g MnO_2. After thoroughly mixing these two together, we placed the mixture in a test tube. We filled four bottles with water and without letting any air in we inverted them in the pneumatic trough. Thru the stopper in the (bottle) we

Through the stopper in the tube we ran a rubber tube down into the pneumatic trough and into the neck of the bottle of water.

soluble soluble soluble

ran a rubber tube down into the pneumatic trough and into the neck of the bottle of water. Then we lighted the Bunsen burner under the test tube. Next, we placed some sulphur in a deflagrating spoon over the flame until it began to burn then we held it in a bottle of oxygen. We breathed a bottle of oxygen, placed a burning splint in the same and also some burning steel wool.

Results: When this mixture began to heat, the potassium chlorate decomposed liberating oxygen that passed down the rubber tube into the bottle. Since oxygen is only slightly soluable in water, it forced the water out into the pneumatic trough and filled the jar with itself. Then we placed the burning

sp.

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soluble soluble soluble
Oxygen supports combustion
but is not combustible.

24cm x 30cm

sulphur in the bottle of oxygen, it began to glow very brightly. The same reaction took place when we did the same with the burning splint and steel wool. This proves that oxygen supports combustion.

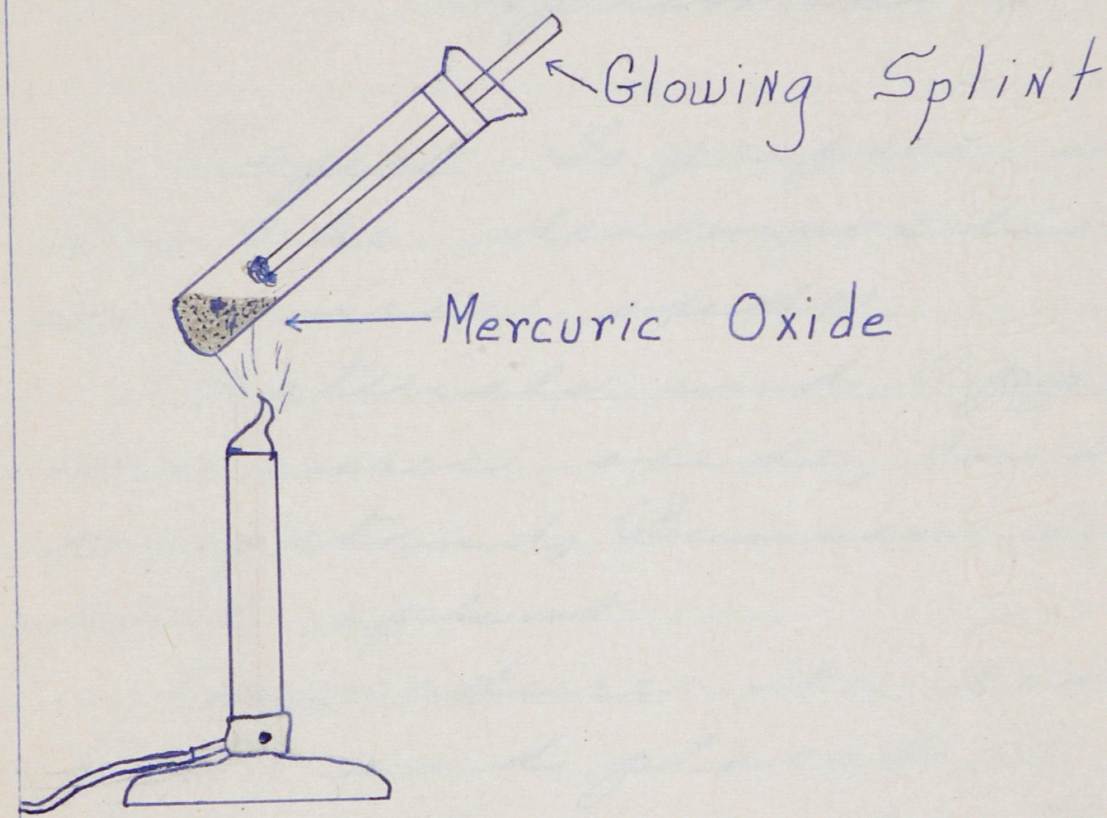
Conclusion: By this experiment we found out that oxygen is a gas which is colorless, odorless, tasteless, slightly heavier than air, and only slightly soluable in water. Supporter of combustion!

a

good!

24cm x 30cm

Heating Mercuric Oxide



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Joy Marie Marach — St. Mary's
Senior — Sept. 18, 1942

Experiment 3

Object: To prepare oxygen by the decomposition of mercuric oxide.

Materials and Apparatus: mercuric oxide, test tube, ringstand, Bunsen burner, and splint.

Procedure: We took 2 g HgO and placed it in a test tube over the Bunsen burner. Then we put a glowing splint into the heating test tube.

Results: When the mercuric oxide started heating the glowing splint burst into flame. This was because oxygen was being liberated. Small particles of mercury could be seen in the tube because mercury can also

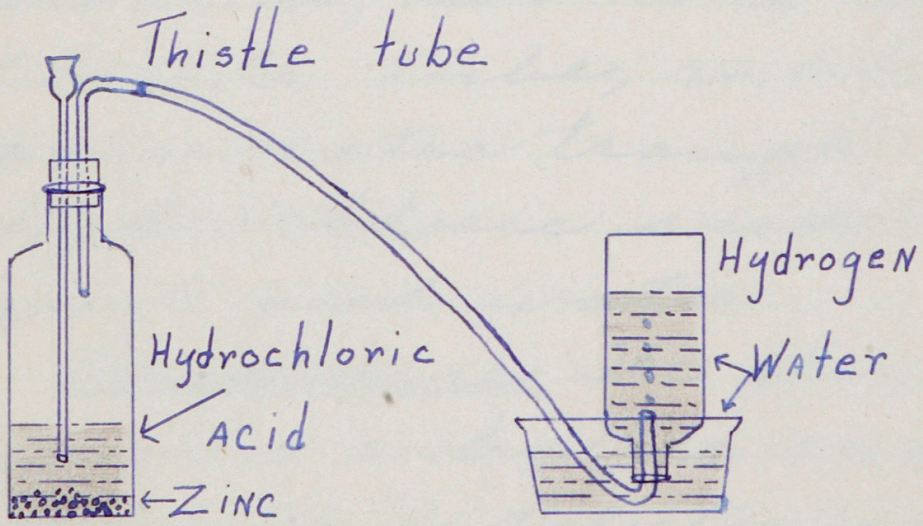
be formed by the decomposition of mercuric oxide.

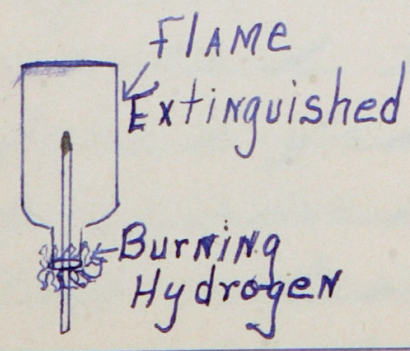
Conclusions: Results: That mercuric oxide when heated undergoes a chemical change. That oxygen can be prepared by heating mercuric oxide. Oxygen supports combustion.

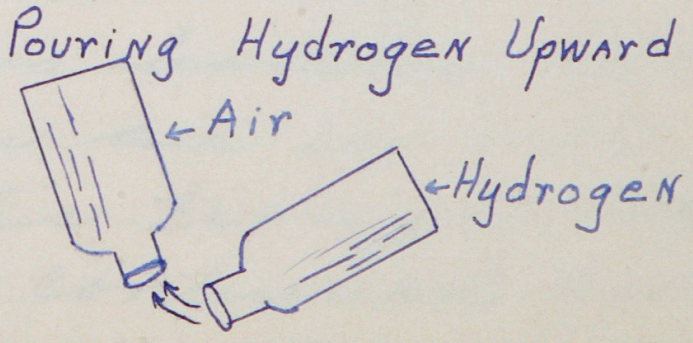
A

Good

Laboratory Preparation of Hydrogen







Joy Marie Marach St. Mary's
Senior Sept. 23, 1942

Experiment 4

Object: To prepare hydrogen by the action of metals on acids.

Materials and Apparatus: test tubes, Bunsen burner, bottles, two hole stopper, thistle tube, rubber tube, pneumatic trough, splint, hydrochloric acid (diluted), zinc and water.

Procedure: We placed some zinc in a bottle and covered it with a dilute solution of hydrochloric acid. We inverted two bottles of water freed from air in our pneumatic trough. When the action continued long enough to displace the air from the apparatus, we started collecting bottles of

hydrogen. However, before we collected the hydrogen in our bottles we filled test tubes with hydrogen. In one bottle of hydrogen we inserted a burning splint. We poured a bottle of the same into a bottle of air and again we inserted a burning splint. One of our bottles we had filled only one half full of water and then filled it with hydrogen. To this bottle of hydrogen we put in a burning splint.

Results: We collected hydrogen in test tubes and touched a flame to the hydrogen. If it exploded it wasn't pure hydrogen. Then we put the burning splint into the bottle of pure hydrogen the hydrogen ignited but snuffed out the splint. This was because hydrogen is combustile but does not support combustion.

When we poured the bottle of hydrogen up into the empty bottle, it proved that hydrogen is lighter than air.

Hydrogen is combustible but it does not support combustion.

W.W. When the poured the bottle of hydrogen up into the empty bottle, it proved that hydrogen is lighter than air. A little explosion was the result of sticking the burning splint into this bottle because there was some air in it. He got the same result with the other bottle that had some air combined with hydrogen.

Conclusion: From this experiment we learned that hydrogen is a gas, colorless, odorless, tasteless, nearly insoluble in water, and lighter than air, and also that hydrogen is combustible.

Does it support combustion?

a

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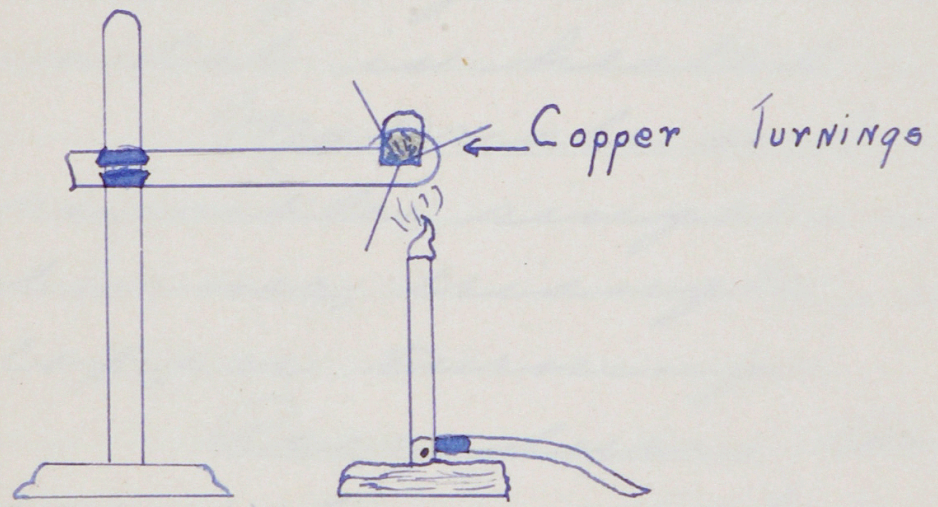
Heating Copper Turnings



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Joy Marie Marach
Senior

St. Marys
Sept. 30, 1942

Experiment 5

Object: To observe the change in weight and in other properties when a metal is heated in air.

Materials and Apparatus: crucible, ringstand, Bunsen burner, triangle, scales, and copper turnings.

Procedure: We set up apparatus as shown in the diagram. We weighed the copper turnings, tested them for flexibility, noticed the copper color, and then placed them in a crucible over the Bunsen flame. We heated the copper turnings for about twenty minutes. After cooling them we again tested their weight, flexibility, and color.

24cm x 30cm

Results: When the copper began to heat it turned black because of oxidation. We found that it weighed more and was flexible after heating. This was because the oxygen united with the copper.

Conclusion: By this experiment we proved that heating copper turnings with the oxygen in the air made a copper oxide. Also, that after being heated the turnings were a different color, flexible and had more weight.

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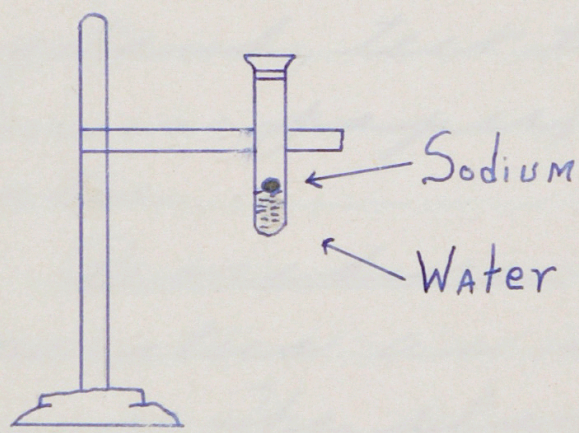
The Action of Sodium in Water



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Joy Marie Marach St. Mary's
Senior Oct. 1, 1942

Experiment 6

Object: To study reaction between sodium and water, and to study products formed.

Materials and Apparatus: ringstand, test tube, splint, litmus paper, sodium, and water.

Procedure: We set up apparatus as shown in diagram. We placed a small piece of sodium in the water and then held a burning splint over the test tube. When the reaction had finished, we placed a piece of litmus paper in the test tube.

Results: When the sodium hit the water, it spun around and around with a hissing sound, decomposing the water and liberating hydrogen. The

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Into this we put the litmus paper and it turned blue because of the presence of sodium hydroxide.

✓

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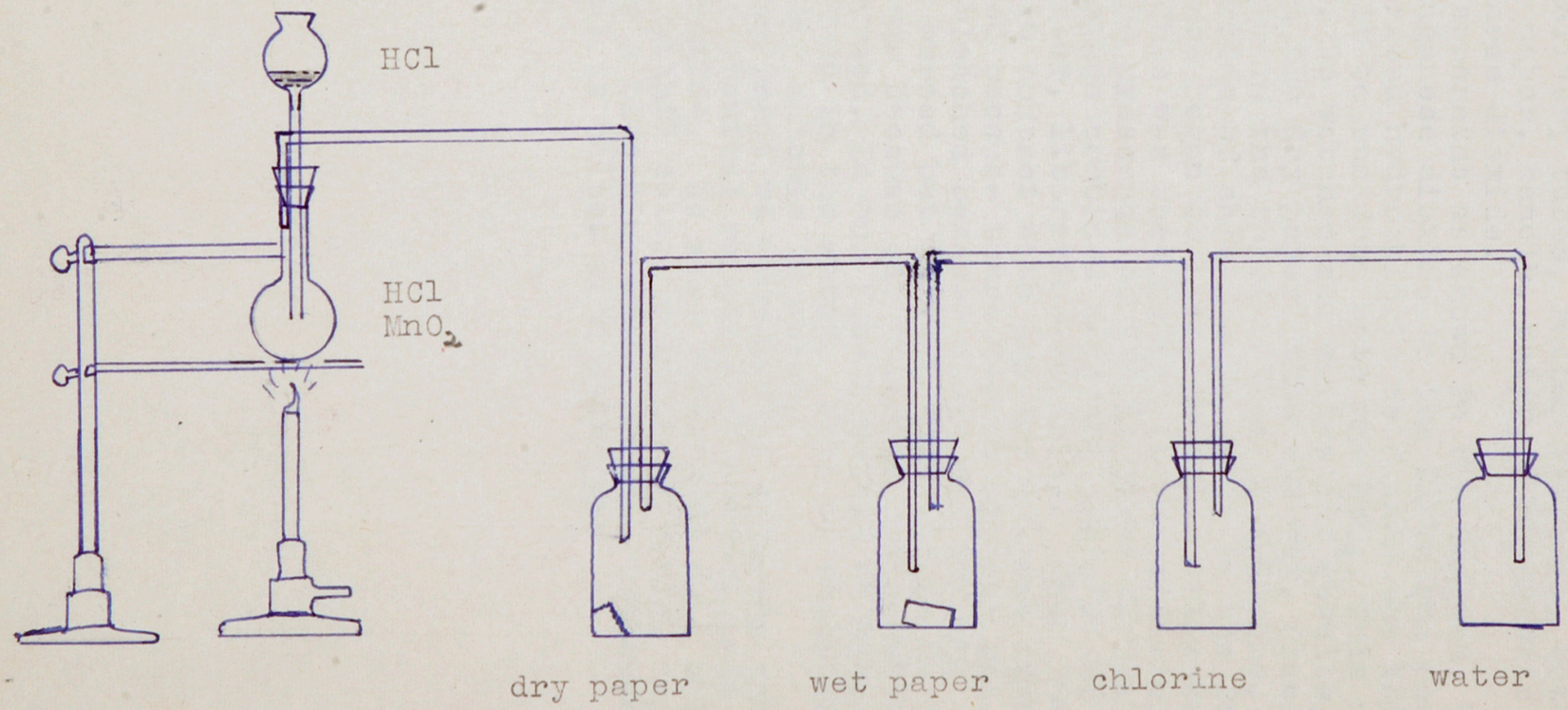
gas rose in the tube and the burning splint ignited it and burned with a slight explosion. The oxygen of the air supported the combustion. Only half of the hydrogen was freed. The other half, together with the oxygen of the water, combined with the sodium and formed a compound called sodium hydroxide. Into this we put the litmus paper and it turned blue because of the presence of sodium.

Conclusion: We found that hydrogen was liberated by the action of sodium on water, That a compound called sodium hydroxide remained, and that hydrogen is a gas which is odorless, colorless, tasteless, lighter than air and it was combustible but did not support combustion.

LABORARATORY PREPARATION OF CHLORINE



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Joy Marie Marach
Senior

St. Marys
October 27,

Chemistry

Object: To make chlorine by the chemical reaction of hydrochloric acid on manganese dioxide.

Materials and apparatus: ringstand, Bunsen burner, thistle-tube, flask, delivery tubes, rubber stoppers, bottles, dry paper, wet paper, candle, water, hydrochloric acid, and manganese dioxide.

Procedure: We set the apparatus as shown in the diagram. We placed some manganese dioxide in the flask and poured the concentrated hydrochloric acid into the thistle tube allowing it to run down onto the MnO_2. This mixture we heated. We watched and waited for results. Next, we tested the dry paper, then the wet, placed a burning candle in the third bottle of chlorine, and observed the action of chlorine in water in the fourth.

Results: When our mixture began to heat, chlorine collected in our bottles. This was because MnO_2 is an oxidizing agent and in the prescence of HCl it gives up its oxygen, and the oxygen combined with the hydrogen of the acid to form water, liberating chlorine. Whem the chlorine came in contact with the dry colored paper nothing happened because there was no oxygen; but, the wet paper was bleached because there was oxygen. Our lighted candle burned but it left some carbon on the bottle. This was because our chlorine united with the hydrogen and burned. In our fourth bottle of water the chlorine dissolved in the water. This is explained by chlorine being soluble in water.

Conclusion: By this experiment we proved that chlorine can be prepared by the chemical reaction of hydrochloric acid on manganese dioxide. We also discovered that chlorine is a gas, yellowishin color, soluble in water, unpleasant odor, it is a bleaching agent in the prescence of oxygen, and that it unites with hydrogen.

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presence presence presence

when when when

yellowish yellowish yellowish

presence presence presence

✓

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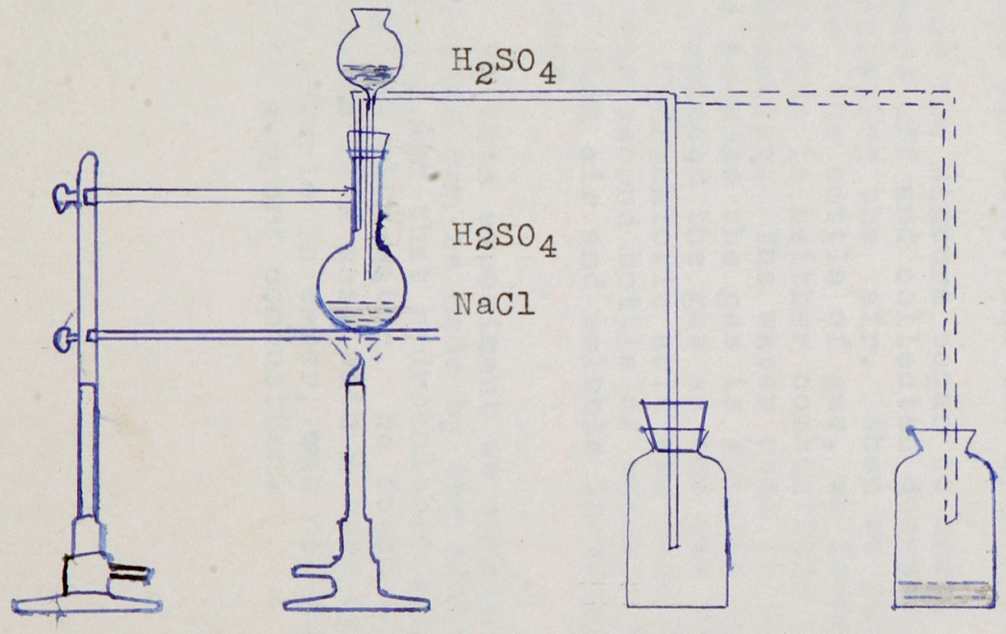
LABORATORY PREPARATION OF HYDROGEN CHLORIDE AND HYDROCHLORIC ACID



24cm x 30cm

Joy Marie Marach
Senior

St. Marys
October 28, 1942

Chemistry

Object: To prepare hydrogen chloride and hydrochloric acid.

Materials and apparatus: ringstand, Bunsen burner, flask, thistle tube, bottles, delivery tube, test tube, litmus paper, glass slide, burning splint, sodium chloride, concentrated sulphuric acid, and water.

Procedure: We set up our apparatus as shown in the diagram. We placed some NaCl in the flask and allowed some H_2SO_4 to run down on it through the thistle tube. We slowly heated this mixture. When the reaction began to take place, we collected a bottle of hydrogen chloride, filled a test tube of the gas, removed the delivery tube from the bottle containing the gas into the bottle containing water. Into the bottle of gas we inserted a burning splint, inverted the test tube of gas in a pneumatic trough, observed the reaction between the water and the hydrochloric acid.

Results: When the mixture began to heat, hydrogen chloride passed off and collected downwards in the bottle displacing the air. When we put the burning splint into the bottle of gas, we found out that hydrogen chloride is neither combustible nor does it support combustion. The water rose in the test tube. This was because the gas is soluble in water and the water replaced the gas as the gas dissolved in the water. Hydrochloric acid was made by the gas in water. in our second bottle of water. The gas, being heavier than air and soluble in water, settled and dissolved. How did you know it was the acid?

Conclusion: By this experiment we concluded that hydrogen chloride can be made by the mixture of NaCl and H_2SO_4, and that hydrochloric acid can be made by this gas with water. We found out that hydrogen chloride is a gas, with a very unpleasant odor, very soluble in water, was not combustible; neither did it support combustion.

a-

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He put Zinc in and the hydrogen passed off. He put litmus paper in and it turned red. Both of these proved that the solution was hydrochloric acid.

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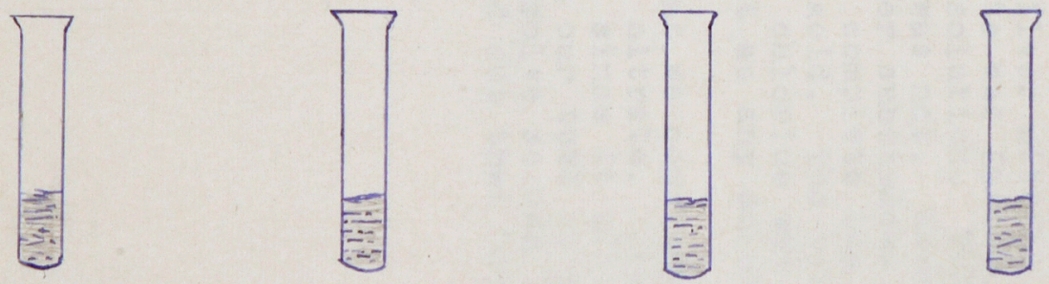
LABORATORY TESTS FOR CHLORIDES AND HYDROCHLORIC ACID



HCl NaCl No. 1 No. 2

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Joy Marie Marach
Senior

St. Mary's School
November 3, 1942

Chemistry

Object: To test for Chlorides and hydrochloric acid.

Materials and apparatus: test tubes, sodium chloride, hydrochloric acid, two unknown solutions, silver nitrate, and nitric acid.

Procedure: Into four test tubes we poured - hydrochloric acid, sodium chloride, and two unknown solutions, #1 and #2. To each of these we added a little silver nitrate and let it settle for a while. We ~~poured~~ decanted off the ~~decant~~ liquid leaving the precipitate. To this precipitate we then added nitric acid.

Results: When we added the silver nitrate to the hydrochloric acid, a white precipitate was formed. So, too with the sodium chloride and #2 solution. This ~~proved~~ indicated that they were chlorides. No. 1 was not. However since silver nitrate reacts with other substances as well as chlorides, we added nitric acid to complete the test. Silver ~~nitrate~~ chloride is insoluble in nitric acid. The precipitate did not dissolve so our test for a chloride was complete. Hydrochloric acid gives the same test as any soluble chloride.

Conclusion: By this experiment we concluded that chlorides can can be tested by silver nitrate. That silver nitrate causes a white precipitate but since it also reacts with other substances we concluded our test by adding nitric acid. Our precipitant of did not dissolve so our test for chlorides was complete. We also found out that hydrochloric acid was tested the same way.

A-

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24cm x 30cm

the decanted off the liquid leaving the precipitate.

This intimated they were chlorides.

Silver chloride is insoluble in nitric acid.

precipitate precipitate precipitate

✓

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LABORATORY TEST OF ACIDS AND BASES



Sulfuric acid



hydrochloric acid



nitric acid



lime water



lie water



amonium hydroxide

Joy Marach
Senior

St. Marys
Nov. 5/42

Object: To test acids and bases
Materials and Apparatus: evaporating dishes, litmus paper, sulfuric acid, hydrochloric acid, nitric acid, lime water, and water. lie water, amonium hydroxide.
Procedure: We filled our evaporating dishes three fourths full of water. Into #1 we put lime water; #2, lie water; #3, amonium hydroxide. Then we put red litmus paper into each solution. Into three more evaporating dishes we put sulfuric acid, hydrochloric acid, and nitric acid. Into each solution we put blue litmus paper. Next we tested all six solutions for taste and touch.
Results: When we put the red blue litmus paper in our first

24cm x 30cm

limewater
lye water lye water lye water

lye water lye water lye water

ammonium ammonium ammonium

lye water lye water lye water
ammonium ammonium ammonium

When we put the blue litmus in
our first solutions it turned
red.

✓

24cm x 30cm

solutions it turned ~~blue~~ red. When we tasted the solutions they were sour therefore, these solutions were acids. In the last three solutions our ~~blue~~ red litmus turned ~~red~~ blue and by taste they were a little bitter. These solutions were ~~bases~~ Feeling.

Conclusion: By this experiment we concluded that many acids and bases may be easily deptected by their taste and their actions on litmus. Whatever these reactions:

B+

In the last three solutions our red litmus turned blue and by taste they were a little bitter; By touch a little soapy.

Conclusion:

That acids turn blue litmus red and taste sour. Bases turn red litmus blue, taste bitter, and feel soapy.

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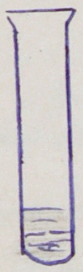
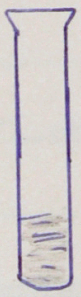
THE STUDY OF NEUTRALIZATION



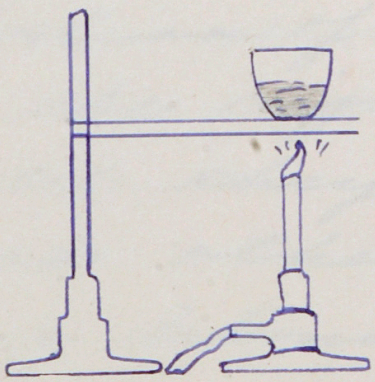
NaOH



H_2SO_4



Neutralized solution of NaOH and H_2SO_4



Evaporating the water from the solution

24cm x 30cm

Joy Marach
Senior

St. Mary's
November 10/42

Experiment

Object: To study neutralization

Materials and Apparatus: test tubes, Bunsen burner, ringstand, evaporating dish, blue litmus, red litmus, sodium hydroxide, and sulfuric acid.

Procedure: We mixed a solution of $NaOH$ and H_2SO_4 in the right proportions until they reacted with each other. We used red and blue litmus as an indicator to determine the process of neutralization. When the solution changed neither the red nor the blue our action was complete. Next we put this solution over a flame and evaporated the water.

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Results: When solutions of an acid and a base are mixed in the right proportions they react with each other forming water and a salt. We used blue and red litmus as an indicator because if any acid had been present the blue would have turned red, or if any base had been present the red litmus would have turned blue. The salt ~~formed~~ was left when we evaporated the water from the solution. By taste the salt was stronger than ordinary table salt.

Conclusion: We conclude that salts are formed when acids neutralize bases. In this experiment our $NaOH$ was neutralized by H_2SO_4. That the salt formed was stronger than ordinary table salt.

a

$$2\,NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$$

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24cm x 30cm

Jay Marach
Senior

St. Mary's
Nov. 16/1942

Experiment

Object: To study the allotropic forms of sulphur.

Materials and Apparatus: test tubes, watch glass, funnel, filter paper, carbon disulphide, rolled sulphur, Bunsen burner, beaker, and water.

Procedure: (1) We dissolved a very small particle of rolled sulphur in about 2 cc. of carbon disulphide. We poured the solution onto a watch glass and observed it. (2) We melted some rolled sulpur in a test tube. When it was liquid, we poured it into a filter paper that we had fitted into the top of our funnel. After the crystals formed, we poured off the molten sulphur. (3) We heated some rolled sulphur until it had thickened and gotten thin again. Then we

24cm x 30cm

poured it into a beaker of water.

Results: When our solution of roll sulphur and carbon disulphide stood for awhile, the carbon disulphide evaporated leaving crystals of a regular octahedral shape called rhombic crystals. (2) When our melted sulphur began to cool in the filter paper, it crystallized in long, fine, needle-like crystals called prismatic crystals. These crystals were projecting from the sides toward the center. (3) When our sulphur began to melt, it formed a yellow liquid. A few degrees above the boiling point it turned a deep red. As it got hotter it changed from red to dark brown and from dark brown to black. The f sulfur got so thick that it would not run from the test tube. On further heating it became a ~~yellow~~ liquid giving off a yellow vapor. When we poured it into cold water it made a

plastic sulphur.

Conclusion: By this experiment we concluded that rhombic sulfur is the stable form of sulfur since, after a few days, both prismatic and plastic sulfur returned to rhombic form. We found out that rhombic sulfur can be made by evaporating the carbon disulphide from a solution of carbon disulphide. We learned that we could form prismatic crystals by heating some roll sulphur and that plastic sulphur can be made by constant heating until it has thickend and then thinned again. We also learned that plastic sulphur is very rubber like and dark brown in color.

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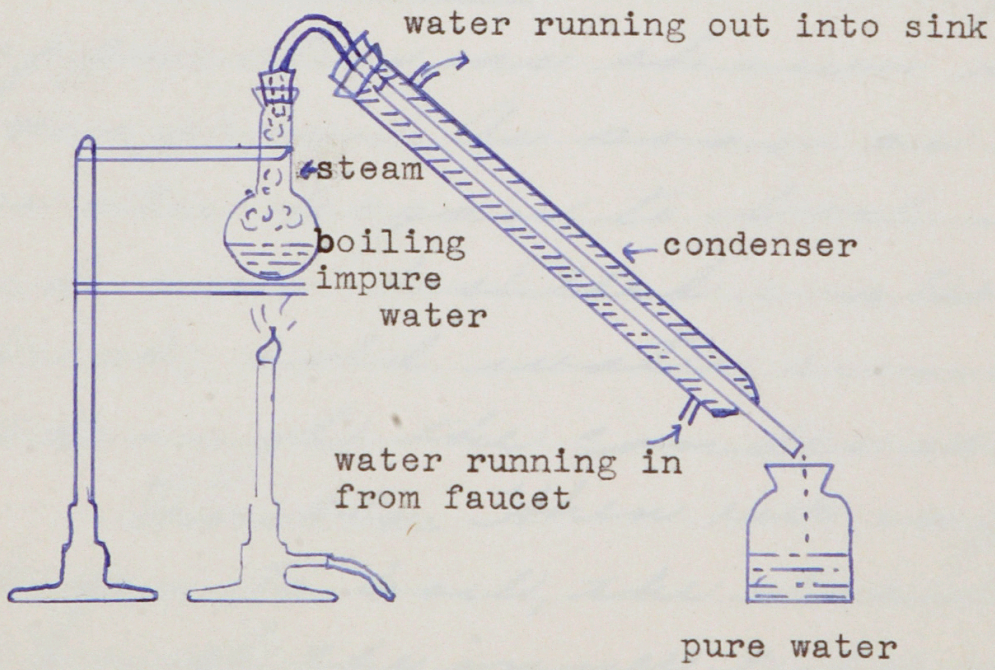
LABORATORY DISTILLATION OF WATER



24cm x 30cm

Joy Marach
Senior

St. Mary's
Nov. 18/1942

Experiment

Object: To distill water

Materials and Apparatus: impure water, ringstand, Bunsen burner, distilling flask, condenser, and water.

Procedure: We set up the apparatus as shown in the diagram. As soon as the impure water began to boil we collected our distilled water. We kept fresh, cold water running through the condenser.

Results: When our impure water began to boil, the steam passed through the inner tube of the condenser. The cold water circulating around the inner tube condensed the steam to a liquid which collected in our receiving flask.

Conclusion: We learned that

24cm x 30cm

water can be distilled by vaporizing it by boiling and then condensing the vapor to a liquid again. We found out that distilled water has a very flat taste and absolutely colorless.

24cm x 30cm

Joy Marie Marach — St. Mary's
Senior — November

The Use of Colloids in Industry

From our study of Chemistry we have learned the importance of colloids. Practically all substances we meet with in our present life are colloids. There are many, many practical applications of Colloid Chemical principles. Among them the most important in industry are: shower proofing fabrics, dyeing, explosives, paints and varnishes, soaps, rubber, tanning, photography, coal and plastics.

The most interesting to me is the importance of colloids in the medicine field. Especially so Psychiatry, the Nervous System, Consciousness and Mentality.

Not very many people know

that the first paper maker was the hornet or wasp, who, by chewing up wood in the presence of his colloidal salivary secretion, imitated on a small scale the action of the "colloid mill."

Since rubber is so precious now, I found it interesting to learn the relation of colloids to rubber. The milky juice of several kinds of plants yields on coagulation the colloidal gel called rubber. Celluloid is a transparent gel formed when nitro-cellulose is kneaded with alcohol and camphor. When it is sheeted, pressed, and molded it undergoes a slow syneresis due to the loss of alcohol and some of the camphor.

Colloid-chemical factors enter largely into the action of antiseptics, germicides and disinfectants. Before any such

24cm x 30cm

agent can be effective against an organism, it must reach and be adsorbed by the organism. Flocculation of the bacteria may then follow. The antiseptic may enter a germ and temporarily or permanently inhibit its internal catalysts.

Colloids are very small in proportion to their importance.

Colloid Chemistry
Principles and Applications
By
Jerome Alexander

d-

24cm x 30cm

Jay Marach
Chemistry

St. Mary's
Nov. 24/1942

1. Give 4 properties of all gases.
   (1) Gases are made up of minute particles called molecules
   (2) The distance between the molecules is greater than the molecules themselves
   (3) These molecules are in constant motion.
   (4) When heat is applied the molecules of gas expands; contracts when cooled
   (5) When pressure is applied the molecules of the gas are pressed together making the gas contract; expand when the pressure is released.

2. The volume of a certain gas is 100 cc. at 23° C and 770 mm. pressure. What will be its volume at standard temperature and pressure.

8

$23^\circ C = 273 + 23^\circ C = 296^\circ A$

$0^\circ C = 273 + 0^\circ C = 273^\circ A$

$100 \times \frac{273}{296} \times \frac{760}{770} = \frac{2074800}{22792} = 91.03^+$ volume

3. ~~In the reaction between NaCl and~~ H_2SO_4, ~~how many grams of NaCl will be required to prepare 50 g.~~ of Na_2SO_4

~~$NaCl + H_2SO_4 \rightarrow Na_2SO_4$~~

↑

Omit this one and count the last one.

4. (a) Name 4 properties of acids.

(1) turns blue litmus red

(2) sour taste

(3) neutralizes bases forming water and a salt

(4) contains hydrogen which may be replaced by action on metal

(b) Name 5 properties of bases

(1) turns red litmus blue

(2) soapy feeling

(3) bitter taste

(4) contain one or more hydroxyl radicals

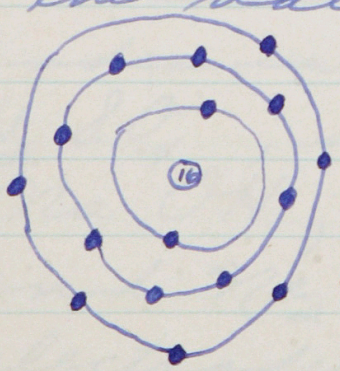
(5)

/2

Jay Marie

5. Name the three allotropic forms of sulphur.
(1) rhombic (stable form)
(2) prismatic
(3) plastic
Name 4 uses of H_2SO_4 in industry.
(1) nitroglycerine and nitrocellulose
(2) petroleum industry
(3) fertilizer
(4) dehydration

6. Draw a diagram of an atom which has an atomic number 16. Label the planetary electrons, nucleus, and protons. What would be the valence of such an atom?



Valence = −2
• = planetary electrons
⑯ = nucleus and 16 protons

Corrections:

#2 $100 \times \frac{273}{296} \times \frac{770}{760} = \frac{2102100}{22496} = 93.4^{+}_{-}$ cc.

#4 (5) neutralizes acids

24cm x 30cm

Joy Marach
Senior

St. Mary's
Dec. 7, 1942

Experiment

Object: To test the electrical conductivity of several substances.

Materials and apparatus: an electric current, two small platinum electrodes, an incandescent lamp connected in series in the circuit, bottles containing solutions of HCl; H_2SO_4; NH_4OH; $NaCl$; $CaCl_2$; Na_2SO_3; and sugar solution, water, alcohol, and glycerine.

Procedure: We put the electrodes in our acids - HCl and H_2SO_4; in our bases - NH_4OH and $NaOH$; our salts - $NaCl$, $CaCl_2$ and Na_2SO_3; we also put the electrodes in sugar solution, water, alcohol and glycerine.

Results: The acids, bases, and salts named above caused the lamp to burn because they

completed the current and conducted electricity. Therefore these solutions are electrolytes. The sugar solution, water, alcohol, and glycerine failed to make the lamp burn so they were non-electrolytes.

Conclusion: We concluded that acids - HCl, H_2SO_4; bases - NH_4OH, $NaOH$; salts - $NaCl$, $CaCl_2$, and Na_2SO_3 all conduct electricity and are electrolytes. Sugar solution, water, alcohol, and glycerine did not conduct electricity and were non-electrolytes. We also learned that a liquid or solution which conducts electricity and is decomposed by the current is called an electrolyte. Solutions or liquids that do not conduct an electric current are called non-electrolytes.

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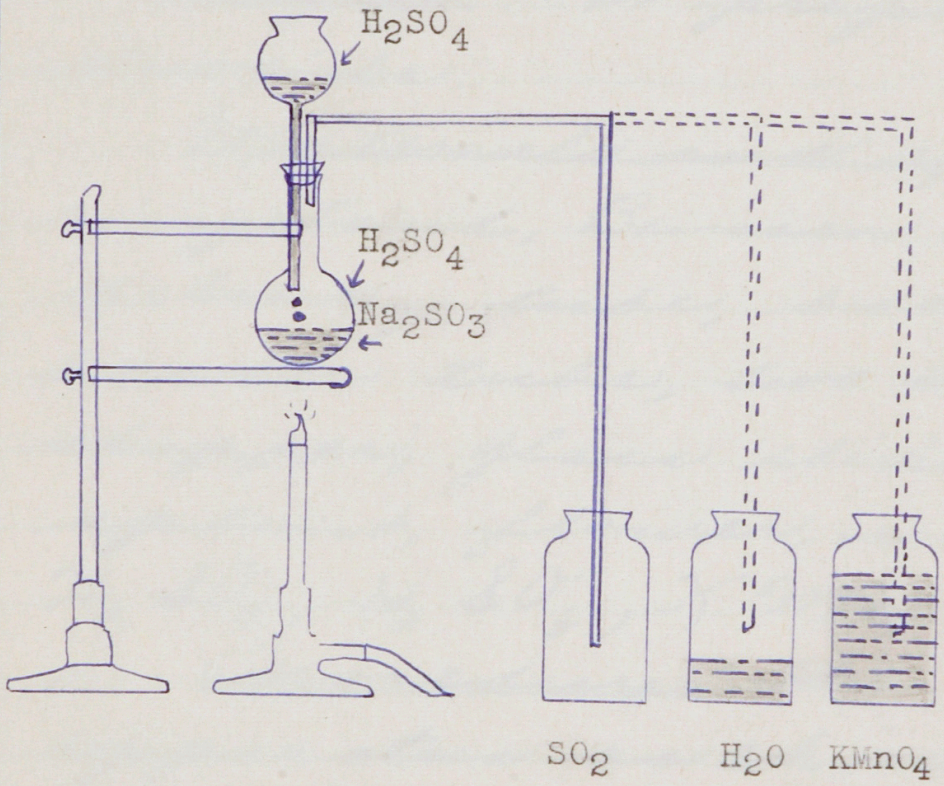
LABORATORY PREPARATION OF SULPHUR DIOXIDE



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Senior

St. Mary's
Dec. 10, 1942

Experiment XVI

Object: To prepare sulphur dioxide.

Materials and apparatus: ringstand, Bunsen burner, delivery tube, bottles, flask, thistle tube, two hole rubber stopper, glass slide, blue litmus, splint, flower, water, Na_2SO_3, H_2SO_4, H_2SO_3, $KMnO_4$.

Procedure: We set up the apparatus as shown in the diagram. To Na_2SO_3 in the bottom of the flask we added some dilute H_2SO_4; this we slowly heated over a Bunsen flame. When the reaction began we collected a bottle of sulphur dioxide. We put the delivery tube into a bottle containing water and then into a bottle of $KMnO_4$. We inserted a burning splint

into the bottle of sulphur dioxide, then we put a red flower petal into it.

Results: We made sulphurous acid with $H_2O + SO_2$. That it was an acid was proved by blue litmus turning red. The burning splint when inserted in the bottle of SO_2 was extinguished thus proving that SO_2 neither supports combustion nor is combustible. We found that $SO_2 + KMnO_4$ took away the purple color from $KMnO_4$. This was because SO_2 removed the oxygen from the coloring matter, thus reducing it to a colorless ~~substance~~ solution. This too, explains why SO_2 removed the color from the red flower petal.

Conclusion: We learned that $Na_2SO_3 + H_2SO_4 \rightarrow H_2SO_3 + Na_2SO_4$ ~~or and~~ $Na_2SO_3 + H_2SO_4 \rightarrow Na_2SO_4 + H_2O + SO_2\uparrow$ We learned that sulfur dioxide is a colorless gas with a strong

suffocating odor, heavier than air and very soluble in water, neither burns nor supports combustion and in solution forms a very weak acid called sulphurous acid. This acid turns blue litmus red and tastes sour. It found that SO_2 in the presence of moisture forms a bleaching agent.

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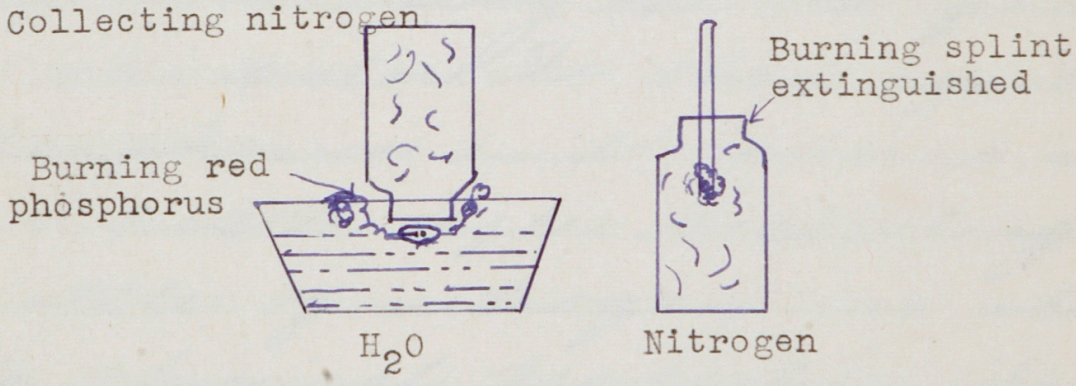
LABORATORY PREPARATION OF NITROGEN



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Joy Marie
Senior

St. Marys
Dec. 15, 1942

Experiment XVII

Object: To prepare nitrogen.

Materials and Apparatus: water, red phosphorus, burning splint, pneumatic trough, bottle, glass slide, bottle cap.

Procedure: We placed the bottle cap containing the red phosphorus on the water. We then ignited the phosphorus and covered it with our bottle. After collecting a bottle of nitrogen we observed its physical properties. We extended a burning splint into our bottle of nitrogen.

Results: Our phosphorus combined with the oxygen to form P_2O_5 which dissolved in the water. The gas remaining in the bottle is largely nitrogen. We found nitrogen to be colorless, odorless, tasteless, slightly sol-

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uble in water, and a little lighter than air. Our burning splint was extinguished thus proving that nitrogen neither burns nor supports combustion.

Conclusion: We concluded that nitrogen can be made by burning red phosphorus. We found nitrogen to be a colorless, odorless, tasteless gas. It is only a little lighter than air and slightly soluble in water. It neither burns nor supports combustion.

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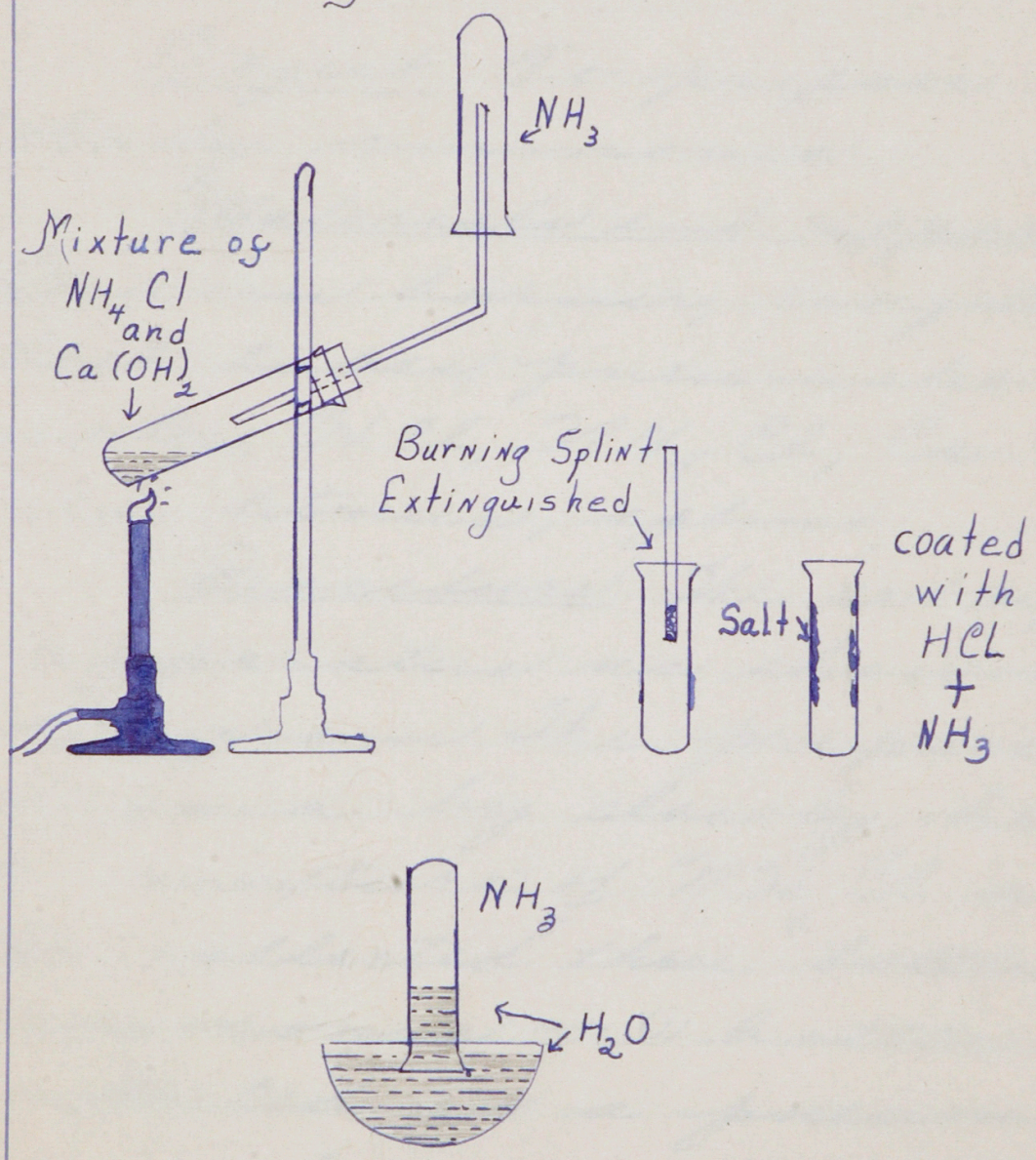
Laboratory Preparation of Ammonia



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Joy Mparach
Senior

St. Mary's
Dec. 16, 1942

Experiment XVIII

Object: To prepare and study ammonia.

Materials and apparatus: Bunsen burner, ringstand, test tubes, pneumatic trough, water, HCl, NH_4Cl, $Ca(OH)_2$, red litmus, splint,

Procedure: We set up the apparatus as shown in the diagram. We prepared ammonia by slowly heating a mixture of NH_4Cl and $Ca(OH)_2$. We collected three bottles of ammonia — (1) bottle was inverted in a pneumatic trough of water; (2) bottle was inserted a burning splint; and (3) bottle was slightly coated with HCl.

Results: We collected our bottles of ammonia; their

was done by displacing the air in the test tubes. The test tube of ammonia that we inverted in water proved that ammonia is very soluble in water because, in no time at all, the ammonia dissolved in the water and ammonium hydroxide came up in the test tube. Ammonium hydroxide is a base because it turned red litmus blue, had a bitter taste, and slippery feeling. Our burning splint was extinguished in the second test tube of ammonia. This proved that ammonia is not combustible nor does it ~~burn~~ support combustion. Our test tube that had been coated with HCl and filled with ammonia left salt on the sides of the test tube. $NH_3 + HCl \rightarrow NH_4Cl$.

Conclusion: $2NH_4Cl + Ca(OH)_2 \rightarrow 2NH_3 \uparrow 2H_2O + CaCl_2$. We found ammonia to be a colorless gas with a pungent odor,

lighter than air, and very soluble in water. Ammonia does not support combustion nor does it burn in air. $NH_3 + HCl \rightarrow NH_4Cl$. Ammonium hydroxide may be made by dissolving ammonia in water.
$NH_3 + H_2O \leftrightarrows NH_4OH$

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