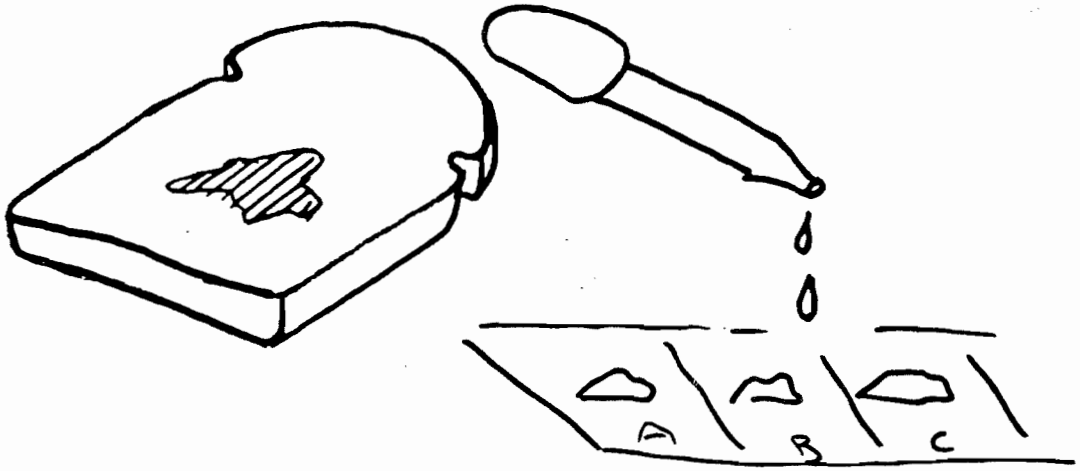

qualatative analaysis

powder puzzle

Find a way to tell one powder from another. How are they different?

What makes up the unknown powder for experiment six?

grambo -
& the louis armstrong middle school

Powder Puzzle

Chemistry Experiments in Qualitative Analysis
Gregory Grambo

In this set of experiments students will need to experiment to find a way to tell five white powders apart from each other. You will be using chemicals we call reagents. These are chemicals we use to testing with. We will use water, tincture of iodine, acetic acid and silver nitrate. We will also heat the powders to see if any of them give a special reaction.

Experiment 1 – Adding water to see if the powder dissolves

The student's job is to find a way to tell the powders apart from each other. Water is a solute for some chemicals. This means that water will make some chemicals dissolve. When a chemical dissolves, it breaks into small microscopic pieces and mixes into the other chemical that you added to it. If the chemical dissolves, you will not be able to see it any more. If one put sugar into water it will dissolve. We know it is still there, because if you tasted it, it would taste sweet.

Experiment 2 – Heating the Powders

In this experiment, students are going to heat the powders. Students will try their best to burn them. The powders start out white, but some of the powders will change and become new chemicals after they are heated. The first thing they will need to do is to make some desiccating spoons from aluminum foil.

Experiment 3 – Adding Iodine – Testing for Starch

In this experiment, students are going to test all of the powders with tincture of Iodine. The chemical reagent Iodine is used to test for starch. Starch is present in many food items such a wheat, potatoes and rice. When Iodine comes in contact with starch products an blue/black chemical amalgam is formed. It is a new chemical with that color (blue/black). Iodine is a brown color to begin with. When you place Iodine on something it will become brown due to the brown color of the Iodine. Do not confuse this with the blue/black color. The blue/black color is the positive test result you are looking for.
You are going to test other materials for the presence of starch. You will be testing metal (aluminum), lettuce, plastic, paper, glue (white school glue) and a piece of wood.

Experiment 4 – Adding Acid

In this experiment, students will add acid to your powders to see if any of them react to the acid reagent. Acid can cause a chemical to break up and liberate, or give off, a gas. As the gas is released the chemical will bubble. The bubbles are the gas being released. The chemical left in your dish will not be the same as the chemical you started with. A new chemical will be formed.

Experiment 5 – Adding Silver Nitrate – Testing for Chlorine

In this experiment, students are going to add Silver Nitrate to a solution of one of powders mixed with water. Silver Nitrate is a chemical use in developing photographs and it is being used as a reagent to test for the presence of chlorine. Salt is a chemical called sodium chloride (NaCl). Chlorine is found in salt. When chlorine mixes with silver (from the silver nitrate AgNo3) an chemical called silver chloride will form. This chemical does not dissolve. It is more
dense than water, so it will sink to the bottom of the test tube or plastic cup.

By the end of experiment 5, you should have found that the reagents cause some of the powders to do special things. Some powders become hard with the addition of water. Some powders dissolve in water, others do not. Some powders turn into carbon when heated. When you add iodine to some chemicals they turn black. Silver nitrate causes a precipitate (non soluble chemical) when added to certain substances. Vinegar causes some chemicals to bubble up because carbon dioxide or
oxygen is leaving the original chemical.

Experiment 6 – The Unknown Powder

In experiment 6 students will be given a mixture of two chemicals. It will be their job to tell what two chemicals they have. Perform all tests on the unknown mixture. Compare the results from the unknown sample to the results received in experiments 1-5. Each student needs to have a write up of each days activity in their lab notebook. Students also need a scientific method write up for each experiment.

Vocabulary

Acid - A chemical substance whose pH is between 1 and 6.9. Acids have chemical formulas that begin with H (hydrogen).

Chemical Equation - The addition of chemical formulas that show chemical reactions. These are sentences written in the chemical language of formulas telling what happens when chemicals are mixed together and give you the outcome.

Contains - To be part of.

Control - Something you set up, where you know the outcome, so that you can compare other things to it.

Devise - to manufacture or make by yourself.

Desiccating spoon - a spoon used in chemistry to burn chemicals beyond recognition removing all water.

Dissipate - to spread out or apart

Dissolve - When two things mix together and one chemical breaks into small microscopic pieces. The pieces then blend into the other chemical.

Experiment - To find out something using a trial and error method.

Identify - To find out what something is.

Insoluble -not able to dissolve

Measure - A small spoon used to give a specified amount of chemical

Positive - Yields the result you are looking for.

Precipitate - An insoluble substance that forms as chemicals are mixed. This new chemical usually sings to the bottom.

Presence - Something that is included in the material you are examining.

Reagents - Substances used to test for or identify other chemicals.

Solute - A chemical that dissolves, resulting in a solution.

Solution - The result that is formed when one chemical dissolves in another.

Solvent - A chemical that causes something to dissolve.

Substances - Chemical compounds

Qualitative Analysis - A type or branch of chemistry that finds ways to identify different chemicals.

Tincture - Something dissolved in alcohol

Unknown – undefined

Our Powders are: Salt, Sugar, Flour (or Corn Starch), Baking Soda, Plaster

Powder Puzzle

Qualitative Analysis

Name _____

Class ____ Group No ____ (table)

parents signature _____

Seat No ____

How can you use water to test for something?

Experiment

1) What happens to sugar when you put it into **HOT** coffee?

2) Define (look in a dictionary)

Dissolve –

Some things dissolve fast. Some things dissolve slow and some things do not dissolve at all.

3) put one measure of each powder into seperate cups. Add water, drop by drop, into each cup <u>until the powder dissolves</u> or until the cup gets full. (this chart shows results)

Powder	How many drops of water were needed to make it dissolve?	Comments
A		
B		
C		
D		
E		

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4) Which dissolved fastest	5) Which dissolved slowest?	6) Which did not dissolv

Mix one measure of each powder with a little water so that it is as thick as tooth paste. let them sit on a piece of paper until morning

(this chart shows results)

7) Describe what happens.				
A	B	C	D	E

Homework-

1- How can you tell the powders apart so far?

2- How can the water test help identify one of the powders. (this is a conclusion)

3- Try to identify the powders?

Powder Puzzle

Qualatative Analysis

Name _____

Class ____ Group No ____ (table)

parent's signature _____

Seat No ____

How can you use heat to test for something

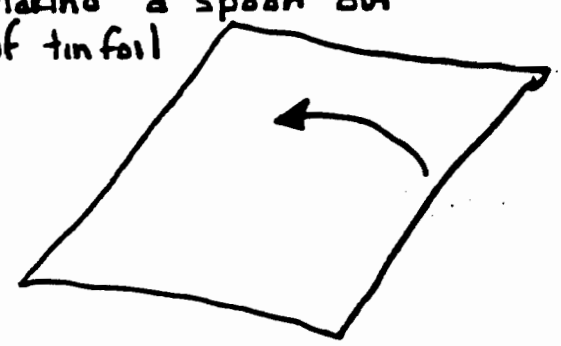
Experiment 2

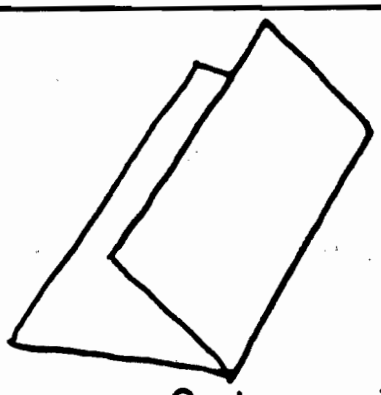
1 How is food changed when you heat it?

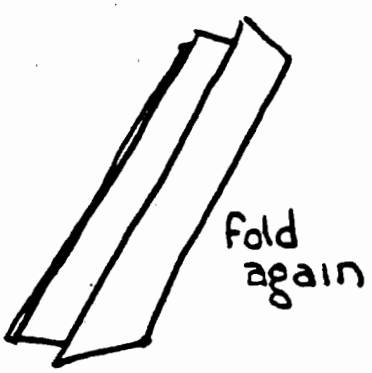
2 How does burning change food?

in this experiment you are going to heat each powder over a candle. You will check the smell, color, and appearance of each powder before and after you heat them.

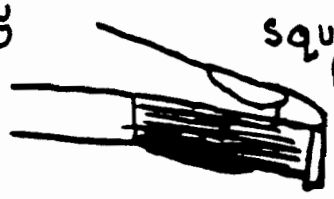
3 Making a spoon out of tinfoil

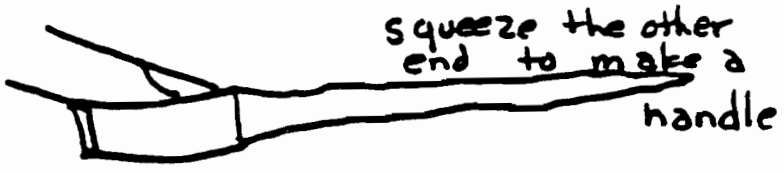






dessicating spoon





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4 Heat each powder. Fill in this chart.

this chart shows Results

powder	What Changes did you see?	What did you Smell?	How did it Look when it cooled?
A			
B			
C			
D			
E			

Homework -

1- How can the heat test help identify one of the powders? (this answer is a conclusion)

2- Where any new chemicals formed after heating? How can you tell?

Powder Puzzle
Qualitative Analysis

Name _____
Class ___ Group No ___
Seat No ___

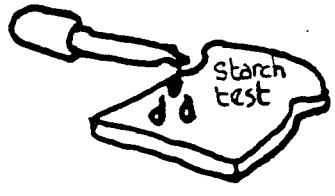
parent's signature _____

How can you use Iodine to test for something?

Experiment 3

Iodine does not dissolve well in water. Solutions can be made by putting iodine in alcohol. We call this type of solution Tincture of Alcohol. Tincture of iodine or Lugol's Solution (they are the same thing) can be used to test for starch. When it is put on starch it will turn a blue-black color.

1) In order to see the blue-black color you will have to set up a CONTROL. Bread contains starch. Put a few drops of iodine on the bread



How was the bread affected?

2) You are going to test each powder for the presence of starch.

How will the powder be affected if it does have starch in it?

3) How will a powder be affected if it does not contain starch?

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4) How can you find out how other substances are affected by iodine?

5) Test things like:

Affect Iodine has on it

Metal _____

lettuce _____

plastic _____

paper _____

glue _____

wood _____

these are results

6) Let's test our samples. Put one measure of powder on a plastic tray. Put 3 drops of iodine on it. Test all powders

powder	what happened	Color it turns.
A		
B		
C		
D		
E		

this chart shows results

Homework-

(this is a conclusion)

1- How can this test tell one powder from another?

2- Why did you set up a control?

3- Define- substances, contains, presence.

Powder Puzzle

Qualatative Analysis

Name _____

Class ____ Group No ____

Seat No ____

parents signature _____

How can you use acid to test for something?

Experiment 4

When acid is added to some chemicals they begin to change. As they change, they give off CO_2 gas or Carbon Dioxide. The chemicals will bubble as they give off this gas. Vinegar is Acetic Acid.

1) Why should you set up a control for this experiment?

2) How would you set up the control.

Do It

3) Test each powder with Vinegar or Acid

(this chart shows Results)

powder	Describe What Happened
A	
B	
C	
D	
E	

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4 Which chemical gives us a positive test result? (what we are looking for) Results

5 Which powders dissolve in vinegar? (this is results)

6 Devise an experiment to see which powder will dissolve with the least amount of vinegar?

problem

equipment

results

hypothesis

procedure

conclusions

materials

variables

Homework -

1- Define - Positive, devise, substances.

2- How can you use vinegar to test for substances.
(this answer is a conclusion)

Powder Puzzle
Qualitative Analysis

Name _____
Class ____ Group (table) No ____
Seat No ___

parent's signature

How can you use Silver Nitrate ($AgNO_3$) to test for something?

Experiment 5

Silver Nitrate ($AgNO_3$) is a chemical used in photography. When Silver Nitrate meets chlorine it forms Silver chloride which does not dissolve in water. It is insoluable.

Define – Insoluable

If salt is in water and we add $AgNO_3$ to it the water will get white and cloudy. This is a precipitate of Silver Chloride ($AgCl$) that has formed.

Ag = Silver
Cl = Chlorin

Define – precipitate

1) How could you tell if salt were one of your chemicals?

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chemical formula

$AgNO_3 + NaCl$ (in solution) $\rightarrow AgCl + NaNO_3$

Silver Nitrate + Salt (sodium chloride) gives us Silver chloride + Sodium Nitrate

2

Lets test our chemicals with $AgNO_3$

Testing for Chlorine

Powder	What happened after adding $AgNO_3$? (results)

Homework -

1- How can you test for chlorine?

2- What is $AgNO_3$? What can it do?

3- What does a precipitate look like?

Powder Puzzle

Qualatative Analysis

Name _____

Class ____ Group No ____ (table)

seat No ____

parent's signature _____

quiz

Lets test an Unknown powder

number on unknown sample

Experiment 6

You will be given a new white powder. The teacher has mixed together some of the ones you have been testing. Your job is to figure out what chemicals the teacher gave you.

1) How would you test for powder A? (What reagent would you use?)

2) How would you test for powder B? (What would you do?)

3) How would you test for powder C? (What reagent would you use?)

4) How would you test for powder D? (What reagent would you use?)

5) How would you test for powder E? (What reagent would you use?)

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6

test your unknown sample. with acid, $AgNO_3$, Iodine water, and heat

Results or answers for unknown	Results Describe What Happens
Observation Which has crystals? Which is a soft powder?	
Heating Which one smells?	
Water Which dissolves fastest?	
Iodine Turns blue black	
Acid Bubbles	
$AgNO_3$ Forms a white precipitate	

What powders do you have? [ ]

Homework -

1- $AgNO_3 + NaCl \longrightarrow$ Finish This Chemical Formula and equation

2- Iodine will turn starch _____ .

3- Unknown means: