

NAME _____

CLASS _____ Table _____

CHEMISTRY C5

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A- Hands-On Guide To The Use And Understanding Of chemistry

B- This is a hands-on chemistry unit is intended for use in the middle school. It can, however, be modified for use in lower or upper grades.

C- Students will work cooperatively to conduct scientific investigations that will help them solve a scientific problem using a variety of inquiry skills including observing, predicting and testing solutions. Students will communicate their experiences through their student worksheets and in class presentations

D- Materials- Each cooperative work group will need test tubes and a graduate cylinder. Other items are listed on each experiment sheet.

E- Each experiment in this unit will require one to two class periods (approx 45 min) to complete. The entire unit requires at least two weeks.

F -This unit includes ten hands-on experiments that introduce students to the world of chemistry. Scientific vocabulary is introduced throughout the unit.

G- Teachers should send a note home to parents explaining the upcoming unit. It is important to explain that the children will be sharing equipment and that the children are working in cooperative learning groups whereby they

learn from each other. Each student is responsible to do their share of the required work.

H- Questions for students are on the worksheets.

I- Assessment- After collection and review, the student worksheets should be graded from one to ten, ten being the highest grade. During lab time, question the students to see if they understand the material being presented to them. See if the students are engaged in the activity and if they are working cooperatively. Finally, after students finish with the unit test, have the students write in their lab notebooks their ideas and comments about this chemistry unit.

Experiment 1 - Chemistry

Name _____

Class _____ Box No. _____

Problem - How can we use the tools of chemistry?

Materials- Measuring cylinder, measuring cup, measuring spoon.

Procedure- ①

1

Q-How is a pint different from a quart?

Q-Which would you rather have, a 1 liter or a 2 liter bottle of soda?

Q-Why would you rather have this one?

Q-How do you think a scientist can tell when he or she has a liter?

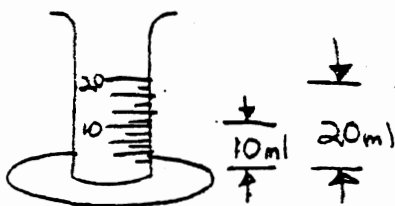
Q-How can we measure smaller amounts than one liter?

Q-Why do scientists need smaller measurements than one liter?

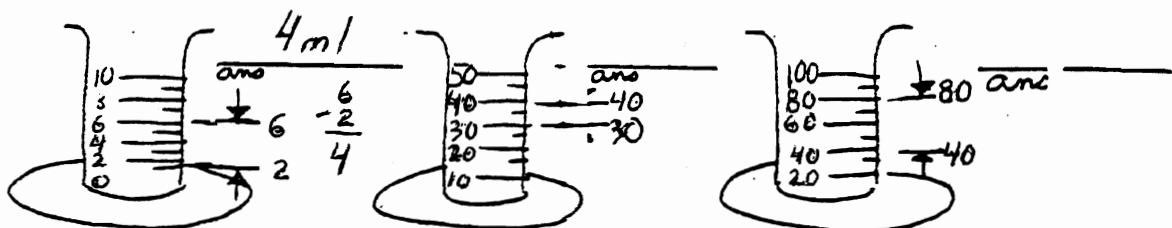
1) pick up a graduated cylinder and examine it.

Q-Why are there markings on the sides of it?

THESE MARKINGS ARE IN MILLILITERS. THERE ARE 1,000 MILLILITERS IN ONE LITER.



Q-How many mL. are in the following pictures?



Q-Why do your parents use measuring cups?

A GRADUATED CYLINDER IS A MEASURING CUP.

Experiment 2 - Chemistry

Name _____

Class _____ Box No _____

2

Problem- What happens to powders when you add water to them?

Materials- Test tube rack, eyedropper, plastic cup, measuring spoon, three test tubes, test tube holder, measuring cylinder, plastic beaker.

Hypothesis

Q-What do you think happens to sugar when you put it into coffee?

Q-Why does sea water taste salty?

Q-You can't see the salt, how do you know it is there?

WHEN THINGS DISAPPEAR INTO ANOTHER THING, LIKE WATER, IT DISSOLVES.

Dictionary Definition of DISSOLVES-

- Procedure-1) Place a small amount of A into a test tube. How does it look?
Write this into your observations.
2) Place a small amount of each powder into a different test tube
3) Add 5 ml of water.

<u>Observations</u>	<u>Powder</u>	<u>Observation</u>
	A	
	B	
	C	
	D	
	E	

Conclusions-

Q Which ones Dissolve?

Q What do you think you call something that does not dissolve?

Q Why can't you see small pieces (called particles) of the things that dissolved?

Q Where did these things go?

WHEN ONE THING DISSOLVES INTO ANOTHER WE HAVE A SOLUTION.

Dictionary Definition of Solution-

Experiment 3 - Chemistry

Name _____

Class _____ Box No. _____

Problem- How are powders affected when you mix them together?

Materials- White paper, Black paper, test tube rack, test tubes, funnel, filter paper, magnet

Hypothesis-

Q-What do you think will happen when you mix the powders?

Q-Why?

Dictionary definition of Mixture-

- Procedure 1) Look at A. Look at E
2) mix them and look at them. Describe how they look in your observations.
3) Mix A and D together in a test tube of water.
4) Mix C and D together in a test tube.

<u>Observations-</u>	<u>Powders</u>	<u>How do they look</u>
	A	
	E	
	A and E	
	c	
	D	
	C and D	
	A and D	

Q-How can you separate A and E from each other?

Q-How Do you think a magnet will affect a mixture of C and D? TRY IT

Q-How did a magnet affect a mixture of C and D?

Q-How ~~did~~ can we use a magnet to separate C from D?

Q-How does your parents get spaghetti out of the water they boil it in?

Q-How can we use this idea of a strainer to separate A from D?

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Name _____

Class _____ Box No _____

Experiment 4 - Chemistry

4

Problem - What happens to a mixture when you heat it?

Materials - Candle, Test tubes, rack, matches (from teacher), measuring cup, measuring spoon, plastic beaker, test tube holder.

Hypothesis

Q-How do you think the mixtures will be affected by heat?

Q-Why?

* Dictionary Definition of Compound -

Procedure and observations - Do this at BLACK tables - Tell teacher first

Mix C and D together

Q-How Can you separate C from D?

Heat the mixture of C and D in a foil spoon over a candle. Make sure the teacher is watching you.

Q-How has the mixture been changed?

Q-How is the mixture affected by the magnet?

Q-Do you still have your original two chemicals?

Q-How do you know this?

Q-How have the chemicals been affected by the heating?

Q-How are mixtures different from compounds?

Chemicals	Before Heating	After Heating
How do they look smell, feel, and how are they affect- ed by the magnet.		

Conclusions

What is a compound?

How can we make one?

How are chemicals affected when mixtures are turned into compounds?

Experiment 5 - Chemistry

①

Name _____

Class _____ Roll No _____

Problem - Can you separate a mixture?

Materials - Test tube rack, test tubes, funnel, filter paper, plastic cup

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Hypothesis-

- Q-How can you get salt from sea water?
- Q-Has salt been chemically changed by adding water to it?
- Q-Why do you say this?
- Q-Is sea water a mixture or a compound?

* Dictionary Definitions

Mixture-

Compound

Solution-

Procedure- Mix together D and B

- Q-How can we use a filter to separate D and B?
- Q-Why do we use a filter in a coffee maker?
- Q-How can we use a filter to separate D from B?
- Q-If we can easily separate D from B, do we have a mixture or a compound?
- Q-In making coffee, why doesn't the filter take the taste and color out of the coffee?

Filter D and B through the filter paper

- Q-What happened?
- Q-How can we separate D from the water?
- Q-How can we tell if B came out of the water and got stuck in the filter paper?
- Q-If B went through the paper, why did it go through?
- Q-How can we get B out of the water?

Experiment 6 - Chemistry

Name _____

Class _____ Box No _____

Problem- How can we clean muddy or oily water?

Materials - Dirty water in a flask(Get from teacher), test tube, test tube rack, funnel, filter paper

Hypothesis No. 1

Q-How can we get the mud out of the water?

Procedure- Answer questions first.

Q-Why doesn't sea water get filled with dirt and sand?

Q- A river has dirt at it's bottom. Why doesn't the water get, filled with dirt?

Q-How does a river get dirt out of itself?

Q-How can we clean this water in the flask?

Hypothesis No. 2

Q- How will the muddy water be affected if we let it stand in a test tube?

Q-How will the muddy water be affected by a filter?

TRY BOTH FILTERING AND LETTING IT STAND FOR TEN MINUTES.

1)Half fill a test tube with muddy water and let stand. Mark this A

2)Filter muddy water through filter paper. Mark this B.

Q-How did the filter paper affect the muddy water?

Q- How was it able to clean the water?

3)Drop two rocks in a test tube $\frac{1}{2}$ filled with water. Mark this C.

Q- Why did they fall to the bottom?

Q-How is this like letting the muddy water stand?

Q-Why does the mud fall to the bottom?

Conclusions-

Q- Name two ways to clean muddy water and describe how they work?

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Experiment 7 - Chemistry

Name _____

Class _____ Box No _____

Problem- How are chemicals changed when we make a compound?

Materials- milk (get from teacher), vinegar, test tube rack, test tube, a small piece of cheese cloth

Hypothesis

Q-What happens to milk when it spoils?

Procedure- 1) Place 10 ml. of b milk into a test tube

2) Add 10 drops of vinegar.

3) let stand for three minutes.

Q-How has the vinegar affected the milk?

Q-Why did it do this?

4) Pour off the liquid and discard it. This liquid is called whey

* Dictionary Definition of Whey-

Q-Describe how the rest of the stuff in the test tube looks.

5) Pour this stuff into a piece of cheese cloth. Use a stick to help you. Let it drip over a beaker. This solid stuff is called curds.

* Dictionary Definition of Curds-

6) When it stops dripping, open the cloth .

Q-Describe the contents of the cloth.

Q-How is this different from the milk? List as many differences as you can.

A CHEMICAL CHANGE HAS TAKEN PLACE.

* Dictionary Definition of Chemical Change-

Milk HAS BEEN CHANGED INTO COTTAGE CHEESE.

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Experiment 8 - Chemistry

Name _____

Class _____ Box No _____

Problem- How can we make Vinegar?

Hypothesis * What happens to apples or apple juice when you let them sit for a long time?

Materials- apple, jar, grater, Vinegar samples, toothpicks

Procedure- 1) Taste samples of vinegars.

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Q-How do they taste?

Q-How are their tastes different?

2) Grate apples into a jar. Let the juice and skin also go into the jar.

3) Put some in a cool place and some in a warm place. Separate liquid into two jars and put your box number on each jar.

4) Let them sit for a few days.

Q-How do they look?

Q-Why are they bubbling?

Q-How do they smell?

5) Let the jars sit for a few more days.

Q-How do they smell now?

Q-How do they look now?

Q-How has it changed since the last time you looked at it?

Note: After the first few days, the yeast on the skin of the apple fermented the juice and turned it into _____. Then bacteria in the juice turned this into _____.

Conclusions

Q-Define: Fermented-
Yeast-

Q-How has the apple juice been changed?

Q-Is this a chemical reaction? Why?

Experiment 9 - Chemistry

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Problem- Why is yeast used in bread making?

Hypothesis- Yeast affected the apple juice.

How do you think it will affect flour?

Materials- Two plastic cups, yeast, flour, sugar

- Procedure-
- 1) In one jar mix lukewarm water with yeast and sugar. Add flour until it turns into dough.
 - 2) In another jar mix lukewarm water with sugar. Add flour until it turns into dough.
 - 3) Mark them with your box number. Also mark Number one with an A and mark number two with a B.
 - 4) let them sit for $\frac{1}{2}$ an hour.

Q-How are the two jars different?

Q-How do they look after $\frac{1}{2}$ hour?

5) let them sit over night.

Q-How do they look today?

Q-Why do they look different?

Q-How has yeast affected our experiment?

Q-Why is yeast used in breadmaking?

Q In the experiment with the apples, bubbles formed in the jar. Sugar was changed into alcohol and gave off carbon dioxide gas (CO_2).

Q-Explain how the dough could have risen?

Conclusion-

Q Is the action of yeast on sugar a chemical reaction? Why?

Q-Why is yeast used in pizza dough and bread dough?

* Yeast turns sugar into _____.

Experiment 10 - Chemistry

Name _____

Class _____ Box No _____

Problem- Why do we paint iron objects?

Hypothesis- What will happen to a metal fence or metal toy if you leave it out in the rain?

Materials- Steel wool, iron nails, metal can cloth rags, plastic bag

Procedure-

- 1) Take the coating off of portions of the nail and can by rubbing them with the steel wool.
- 2) Wet the rags and wrap them around the can and nails.
- 3) place the whole thing into the plastic bag.
- 4) let it sit for a few days.

10

Q-How were the nails and can affected?

Q-Why did they only rust in certain places?

Q-Did a chemical reaction take place?

Q-How do you know this?

Q-What role did water play in this experiment?

Q-How can we prevent these objects from rusting?
(list one next to each number and give a reason)

List 4 ways {
1-
2-
3-
4-

5) Examine the can.

Q-How did the factory make sure the can didn't rust?

Conclusion-

Q-Water contains oxygen, which causes oxygen to _____.

Iron changes into iron oxide. $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$

Q-How can we keep oxygen from hitting the iron?

Q-Why is this a chemical reaction?