Topic: Mixtures and solutions
Purifying water 1
(Mixtures, sediments and suspensions)

What you will need:
Glass jars
Some dirt
A strainer
Some filter paper

What to do
1. Mix the dirt with water in a jar. Now you have a *mixture*!
2. Mix thoroughly with a spoon.
3. Let is stand for a few minutes.
4. Now try to purify the water.

a) You can skim off any floating particles using a strainer.
b) You can pour off the water into another jar, leaving behind the particles that have sunk to the bottom. The particles at the bottom make a *sediment*.
c) Note whether the water you have poured off is clear or muddy looking. When there are particles floating in the water, (not just on top), it is called a *suspension*.

Record you results
What did see?
Why do you think this happened?

Topic: Mixtures and solutions
Purifying water 2
(Solutions)

What you will need:
Some sugar
Some hot water from a kettle
Glass jars
A spoon
A saucepan and a hotplate

See how many teaspoons of sugar will dissolve in hot water.
Note: Due to hot water involved, this experiment is for teacher demonstration only.

What to do
1. Place a spoonful of sugar in the hot water and stir. The sugar melts. This is a *solution*.
2. Take another jar and place 4 teaspoons in hot water and stir.
3. Take another jar and place 6 teaspoons in hot water and stir.
4. Keep adding more and more sugar until it won't dissolve anymore. When this happens, the solution in *saturated*.
5. Now heat the sugar solution in a saucepan on the stove until boiling. Using oven gloves, place a large plate over the saucepan and collect some steam. Get someone to taste the water collected on the plate. Does it taste like sugar?

Record the experiment:
What did you do?
What did you see?
Why did this happen?

Topic: Mixtures and solutions
The Floating Egg

Find out which liquids an egg will float in.

MATERIALS

- 4 glasses of water
- Salt
- Sugar
- Flour
- Fresh egg

STEPS

1. Fill each glass three-quarters full with water.
2. Stir a few tablespoons of salt into one glass of water, until it dissolves.
3. Stir the same amount of sugar into the second glass of water.
4. Stir the same amount of flour into the third glass of water. Leave the fourth glass of water plain.
5. Guess which glass of liquid the egg will float in. Now try them all!

DID YOU KNOW?
Density is how tightly the matter of a mixture is packed together. For example, an egg is denser than plain water, so the egg sinks. Salt water, however, is denser than an egg, and so the egg floats! Are you more or less dense than sea water? Note: If the egg is stale it will float in water because gas forms inside the egg when the egg is going bad. You can use this trick to check the freshness of an egg.

Topic: Mixtures and Solutions
Acid base reaction

Introduction: There are different types of liquids. Based on its PH (amount of hydrogen) we can classify them into 3 types. Liquids that have a PH 7 are called Neutral liquids. (Example water and milk) Liquids that have >7 PH are called alkaline or basic liquids.(example soap, bleach, dishwashing liquid) Liquids that have <7 PH are called acidic liquids.(vinegar and lemon juice)

Aim: to test the reaction between and acid and a base.

Materials: Fresh Lemons, a knife, a small measuring cup & measuring spoon, Baking Soda, Liquid dish soap and a clear cup for the reaction

Procedure:

2. Roll the lemons on the counter like dough. This releases the juice inside the lemon.
3. Cut the lemon in half (adults only, please) and carefully squeeze out the juice into a small measuring cup. Note how much juice was created from each lemon and put the juice aside.
4. Into the empty glass place 1 Tablespoon of baking soda.
5. Add 1 teaspoon of liquid dish soap to the baking soda. Stir these up a bit.
6. Pour the lemon juice into the cup and stir. Now watch the lemon suds erupt!

Observation: record your observations:

How does it work? This is a classic example of an acid-base reaction. This is often done with vinegar and baking soda. The baking soda (a base) and the lemon juice (an acid) combine to release Carbon Dioxide gas. The liquid soap turns the bubbles into foam that often erupts right out of the glass.

Topic: mixtures and solutions
Lava in a cup

What you will need
* A clear drinking glass
* 1/4 cup vegetable oil
* 1 teaspoon salt
* Water
* Food coloring (optional)

What to do
1. Fill the glass about 3/4 full of water.
2. Add about 5 drops of food coloring - red gives a lava look.
3. Slowly pour the vegetable oil into the glass. See how the oil floats on top.
4. Now the fun part: Sprinkle the salt on top of the oil.
5. Watch blobs of lava move up and down in your glass!
6. If you liked that, add another teaspoon of salt to keep the effect going.

How does it work?
So what's going on? Of course, it's not real lava but it does look a bit like a lava lamp your parents may have had. First of all, the oil floats on top of the water because it is lighter than the water. Since the salt is heavier than oil, it sinks down into the water and takes some oil with it, but then the salt dissolves and back up goes the oil!

Make it an experiment
The project above is a DEMONSTRATION. To make it a true experiment, you can try to answer these questions:

1. How long will the effect go on if you keep adding salt?

2. Do different kinds of food oil give different effects?

3. Will other substances (sand, sugar. etc.) work the same as salt?

4. Does the height or shape of the glass affect the experiment?

Topic: Mixtures and solutions
Mixing Oil and Water

http://www.sciencekids.co.nz/experiments/oilandwater.html

Some things just don't get along well with each other. Take oil and water as an example, you can mix them together and shake as hard as you like but they'll never become friends.....or will they? Take this fun experiment a step further and find out how bringing oil and water together can help you do your dishes.

What you'll need:

•Small soft drink bottle
•Water
•Food colouring
•2 tablespoons of cooking oil
•Dish washing liquid or detergent

Instructions:

1. Add a few drops of food colouring to the water.
2. Pour about 2 tablespoons of the coloured water along with the 2 tablespoons of cooking oil into the small soft drink bottle.
3. Screw the lid on tight and shake the bottle as hard as you can.
4. Put the bottle back down and have a look, it may have seemed as though the liquids were mixing together but the oil will float back to the top.

What's happening?

While water often mixes with other liquids to form solutions, oil and water does not. Water molecules are strongly attracted to each other, this is the same for oil, because they are more attracted to their own molecules they just don't mix together. They separate and the oil floats above the water because it has a lower density.

If you really think oil and water belong together then try adding some dish washing liquid or detergent. Detergent is attracted to both water and oil helping them all join together and form something called an emulsion. This is extra handy when washing greasy dishes. The detergent takes the oil and grime off the plates and into the water!

Topic: Mixtures and solutions
Make an Easy Lava Lamp
http://www.sciencekids.co.nz/experiments/easylavalamp.html

Learn how to make an easy lava lamp with this fun science experiment for kids. Use simple household items such as vegetable oil, food coloring, Alka-Seltzer and a bottle to create chemical reactions and funky balls of color that move around like a real lava lamp.

What you'll need:
• Water
• A clear plastic bottle
• Vegetable oil
• Food coloring
• Alka-Seltzer (or other tablets that fizz)

Instructions:
1. Pour water into the plastic bottle until it is around one quarter full (you might want to use a funnel when filling the bottle so you don't spill anything).
2. Pour in vegetable oil until the bottle is nearly full.
3. Wait until the oil and water have separated.
4. Add around a dozen drops of food coloring to the bottle (choose any color you like).
5. Watch as the food coloring falls through the oil and mixes with the water.
6. Cut an Alka-Seltzer tablet into smaller pieces (around 5 or 6) and drop one of them into the bottle, things should start getting a little crazy, just like a real lava lamp!
7. When the bubbling stops, add another piece of Alka-Seltzer and enjoy the show!

What's happening?
If you've tried our oil and water experiment you'll know that the two don't mix very well. The oil and water you added to the bottle separate from each other, with oil on top because it has a lower density than water. The food coloring falls through the oil and mixes with the water at the bottom. The piece of Alka-Seltzer tablet you drop in after releases small bubbles of carbon dioxide gas that rise to the top and take some of the colored water along for the ride. The gas escapes when it reaches the top and the colored water falls back down. The reason Alka-Seltzer fizzes in such a way is because it contains citric acid and baking soda (sodium bicarbonate), the two react with water to form sodium citrate and carbon dioxide gas (those are the bubbles that carry the colored water to the top of the bottle).

Adding more Alka-Seltzer to the bottle keeps the reaction going so you can enjoy your funky lava lamp for longer. If you want to show someone later you can simply screw on a bottle cap and add more Alka-Seltzer when you need to. When you've finished all your Alka-Seltzer, you can take the experiment a step further by tightly screwing on a bottle cap and tipping the bottle back and forth, what happens then?

Topic: Mixtures and solutions
Dissolving Sugar at Different Heats

http://www.sciencekids.co.nz/experiments/dissolvingsugar.html

Learn about solutions as you add more and more sugar cubes to different temperature water. This easy experiment shows that you can only dissolve a certain amount and that this changes as the water gets hotter.

What you'll need:

•Sugar cubes
•Cold water in a clear glass
•Hot water in a clear glass (be careful with the hot water)
•Spoon for stirring

Instructions:

1. Make sure the glasses have an equal amount of water.
2. Put a sugar cube into the cold water and stir with the spoon until the sugar disappears. Repeat this process (remembering to count the amount of sugar cubes you put into the water) until the sugar stops dissolving, you are at this point when sugar starts to gather on the bottom of the glass rather than dissolving.
3. Write down how many sugar cubes you could dissolve in the cold water.
4. Repeat the same process for the hot water, compare the number of sugar cubes dissolved in each liquid, which dissolved more?

What's happening?

The cold water isn't able to dissolve as much sugar as the hot water, but why? Another name for the liquids inside the cups is a 'solution', when this solution can no longer dissolve sugar it becomes a 'saturated solution'. This means that sugar starts forming on the bottom of the cup.

The reason the hot water dissolves more is because it has faster moving molecules which are spread further apart than the molecules in the cold water. With bigger gaps between the molecules in the hot water, more sugar molecules can fit in between.

Topic: Mixtures and solutions
Crazy Putty

http://www.sciencekids.co.nz/experiments/crazyputty.html

Using some everyday household items such as borax, water, PVA glue and food coloring, make some crazy putty that you can squish in your hands, mould into shapes or even bounce on the ground.

What you'll need:

•2 containers (1 smaller than the other, preferably a film canister)
•Water
•Food colouring
•PVA glue
•Borax solution (ratio of about 1 Tbsp of borax to a cup of water)

Instructions:

1. Fill the bottom of the larger container with PVA glue.
2. Add a few squirts of water and stir.
3. Add 2 or 3 drops of food colouring and stir.
4. Add a squirt of borax (possibly a bit more depending on how much PVA glue you used).
5. Stir the mixture up and put it into the smaller container. By now the mixture should be joining together, acting like putty, crazy putty!

What's happening?

The PVA glue you use is a type of polymer called polyvinyl acetate (PVA for short), while the borax is made of a chemical called sodium borate. When you combine the two in a water solution, the borax reacts with the glue molecules, joining them together into one giant molecule. This new compound is able to absorb large amounts of water, producing a putty-like substance which you can squish in your hands or even bounce.