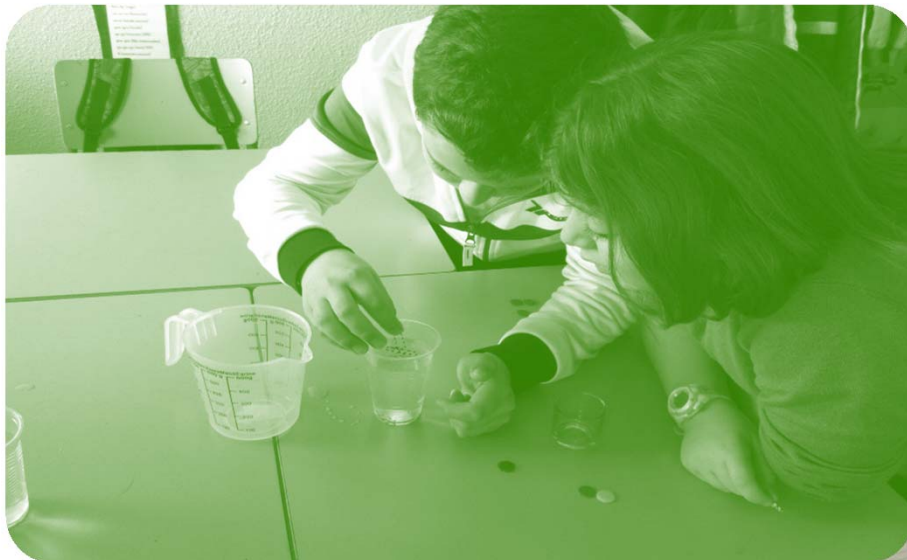
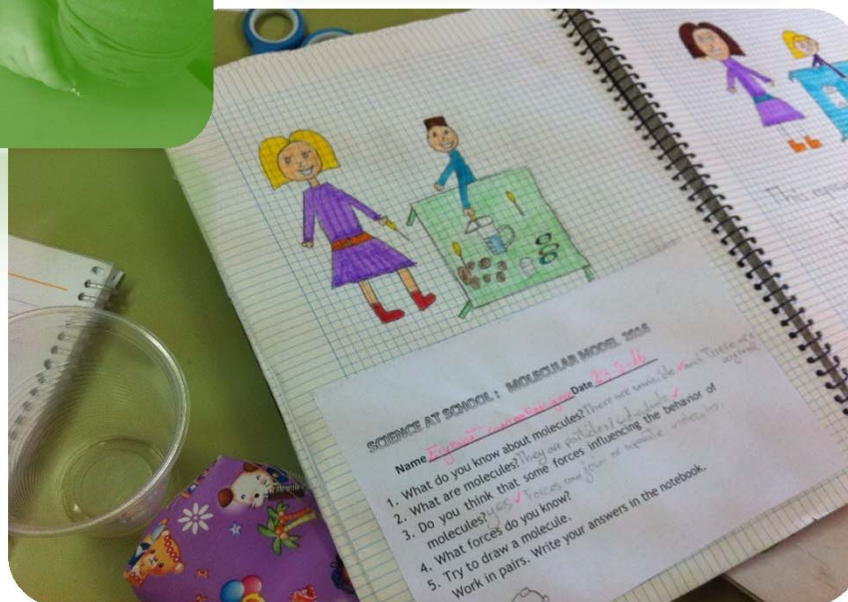
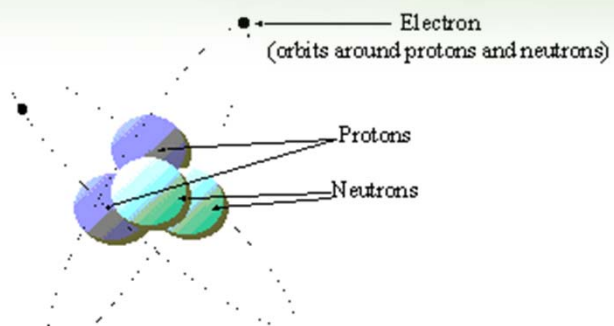


WHAT IS THE WORLD MADE OF?



Helium Atom



WHAT IS THE WORLD MADE OF?

WHAT DO YOU KNOW ABOUT MOLECULES? _____

WHAT ARE MOLECULES? _____

DO YOU THINK THAT SOME FORCES INFLUENCE THE BEHAVIOUR OF MOLECULES ? _____

WHAT FORCES DO YOU KNOW? _____

TRY TO DRAW A MOLECULE _____

WORK IN PAIRS AND WRITE YOUR ANSWERS IN YOUR NOTEBOOKS



FIRST SESSION

WHAT DO YOU KNOW ABOUT MOLECULES?



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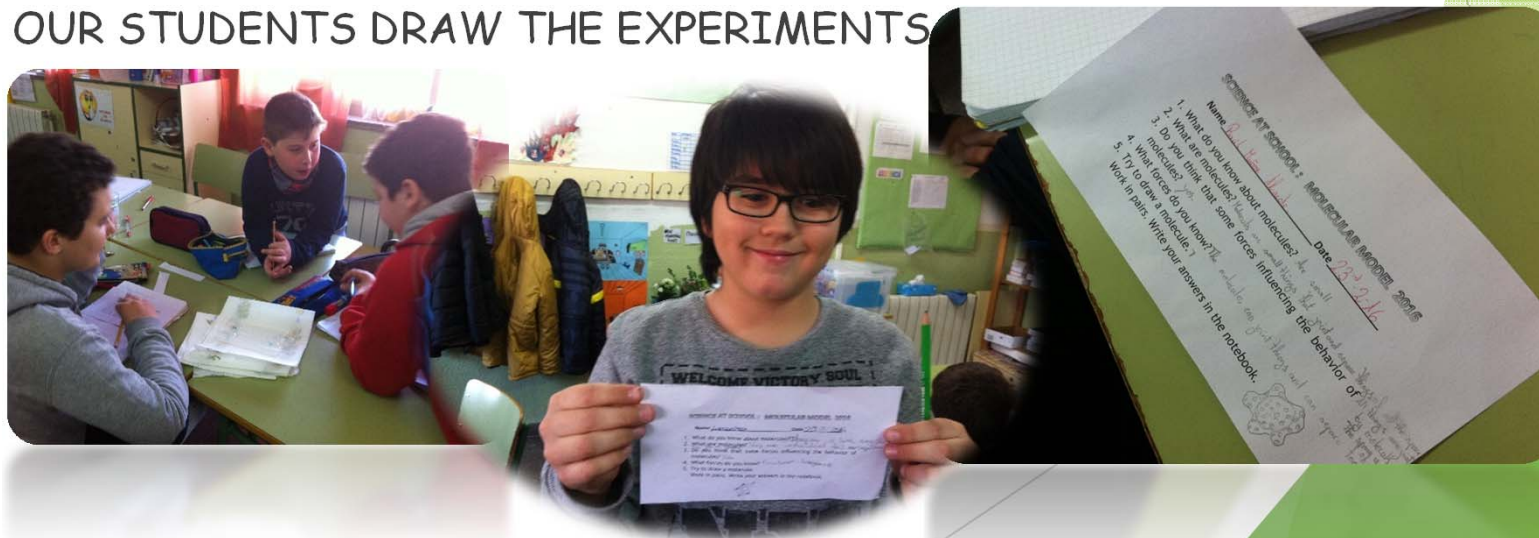
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First Session Planning

- ▶ First experiment: Condensation. Everything is made of something we can not see: Where does the water on the surface come from?
- ▶ We are going to start with the website: www.apod.nasa.gov:
<http://htwins.net/scale2/>
- ▶ "The Scale of the Universe". With the help of this resource, we will show the students the size of things we cannot see with the naked eye: cells, molecules, atoms...
- ▶ Brainstorming: We will prepare some questions to check the previous knowledge of our students and how much they remember about molecules (*).
- ▶ If we've got time we will start with the experiments
- ▶ OUR STUDENTS DRAW THE EXPERIMENTS



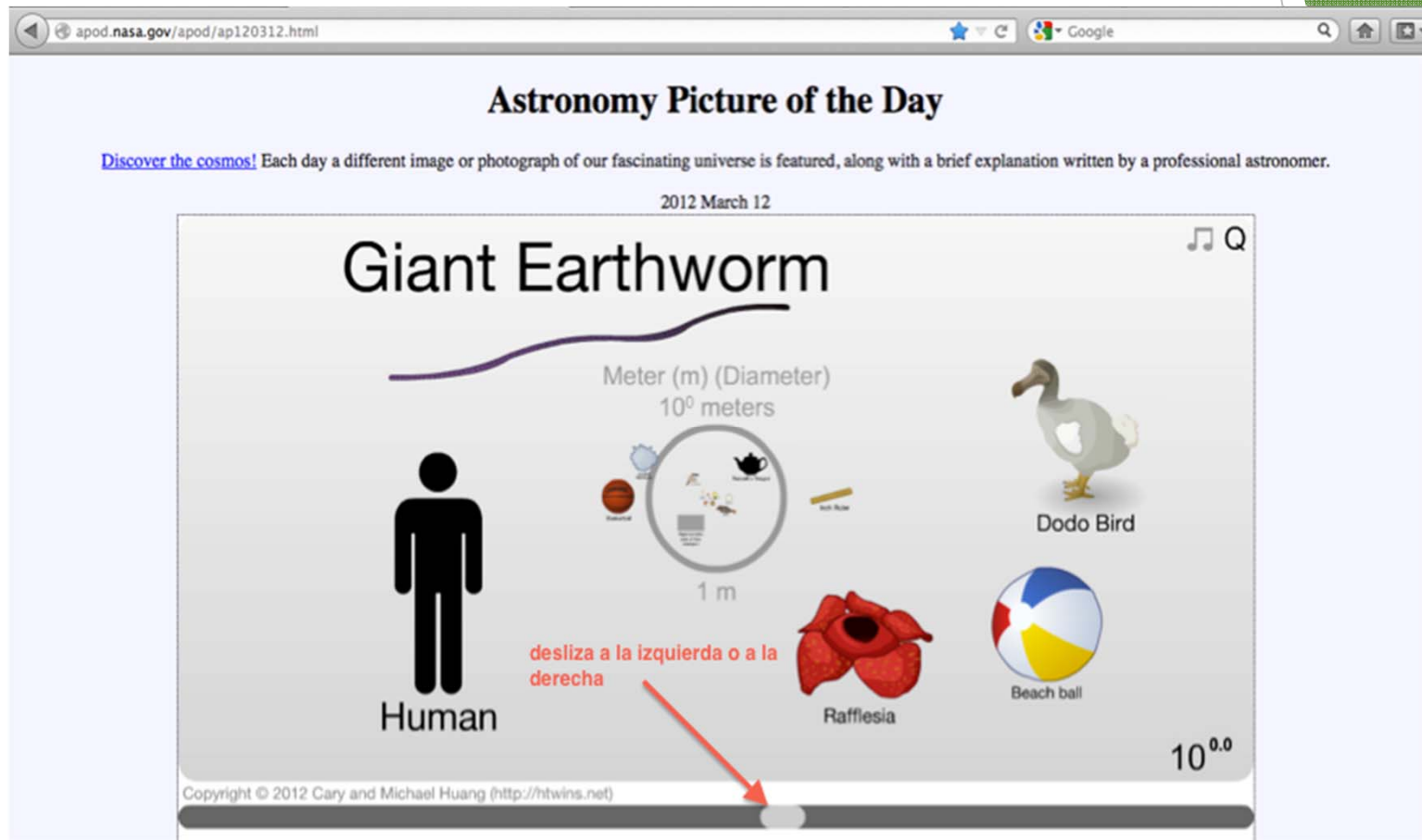
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www.apod.nasa.gov:
<http://htwins.net/scale2/>





First Session Conclusions

- ▶ The experiments have shown us that MATTER is made of particles that cannot be seen with the naked eye.
- ▶ For the experiment: Metal cup. Ice. Water
- ▶ Condensation Experiment:
- ▶ Put the ice in the metal cup with some water 15 minutes before starting the lesson. This way they can see the condensation: water vapour becomes liquid water.
- ▶ Material: Internet. Notebooks. Metal cup. Ice. Water



SECOND SESSION ATOMS AND MOLECULES



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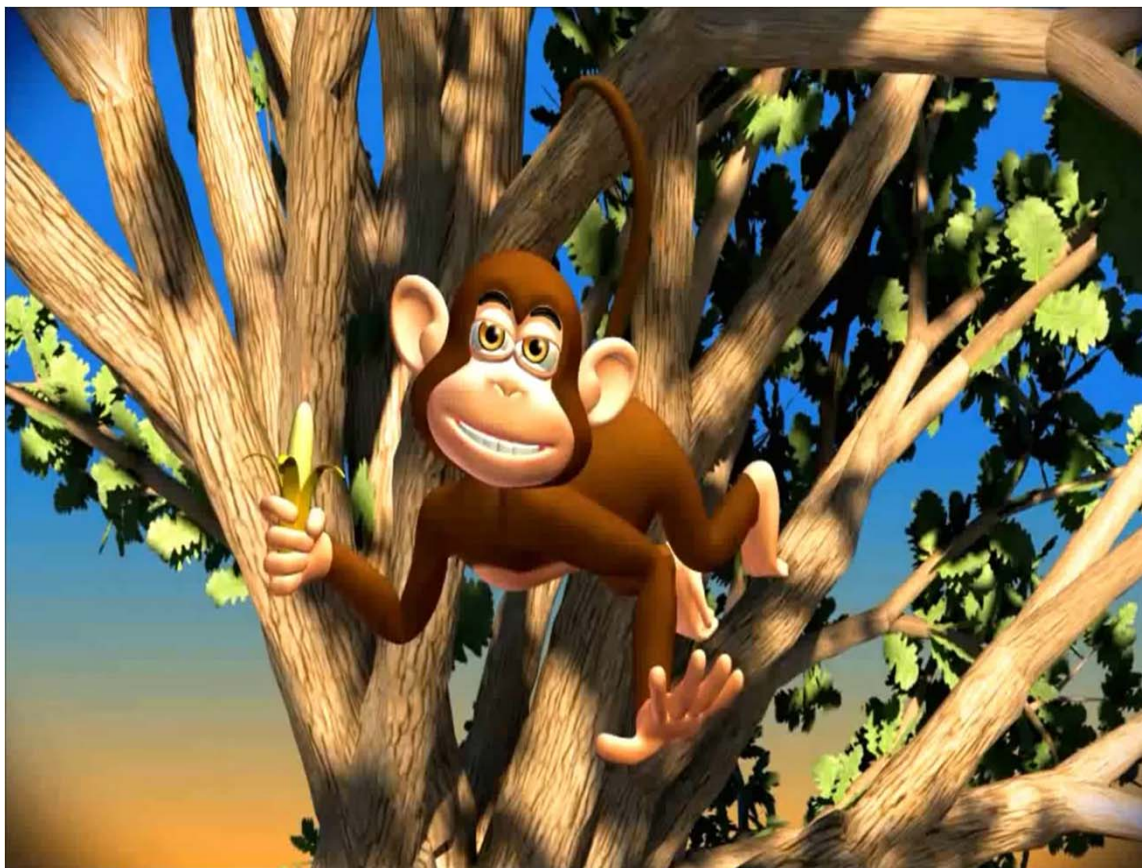


Second session planning

- ▶ We start the lesson by watching the video "Atoms and Molecules" from the website www.makemegenius.com
- ▶ Hypothesis: What do you think is going to happen if we put water with this dropper on the coin...
- ▶ Experiments:
- ▶ Take some water between your fingers. Try to separate them without breaking the column.
- ▶ Put some drops of water on the coin. You can see that water doesn't leak.
- ▶ In a glass full of water add more water with dropper
- ▶ In a glass full with water add a clip/counter
- ▶ In a glass full with water add coins and see what happens in the surface.
- ▶ The last experiment: two plastic cups: put water in one and some food colouring in the other. Between each plastic, add paper towels. Students will see how the water "climbs up" the paper.



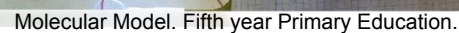
www.makemegenius.com





Second Session Conclusions

- ▶ In this second session our students have learned that there are forces that have influence in the behavior of water molecules: introducing cohesion and adhesive forces.
- ▶ Material: Internet. Notebook. Coins. Glasses. Droppers. Tokens /counters. Clips



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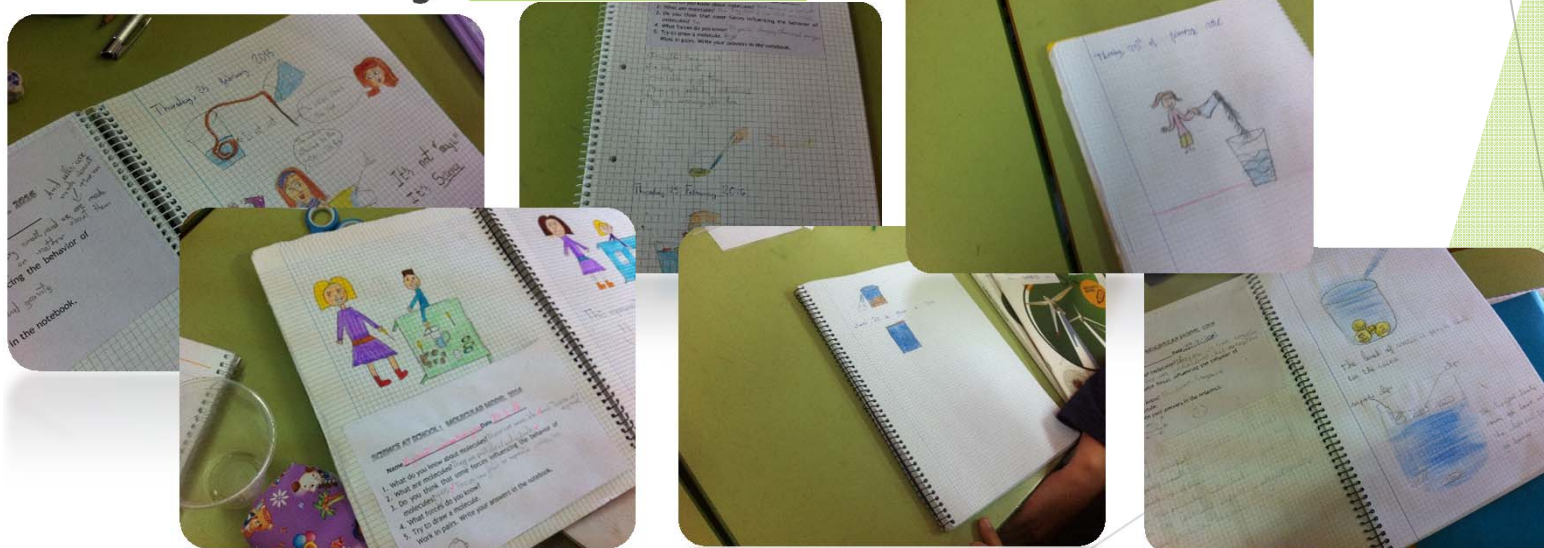
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Third session planning

- ▶ We are studying the intermolecular forces. There is no chemical change. Cohesion and Adhesion (Adhesive) Forces. Capillarity and Surface tension
- ▶ Recap about the experiments carried out the last day.
- ▶ Dramatise the cohesion forces. Surface tension concept (**mosquito).
- ▶ **Ppp FAMOUS MOLECULES SCIENTIST** : Biologist/Computer Scientist/Physics/Genetics'
- ▶ Spanish: Antonio Garcia Bellido/Francisco José Ayala
- ▶ American: James Watson/Elyzabet Blackburn. Italian: Napoleone Ferrara. African: Chetsanga www.ranker.com





Third Session Conclusions

- ▶ Experiments:
- ▶ a) Put a plastic card on the table. First without water and then with some drops of water.
- ▶ b) Use two plastic cups to pass some water to the other using a woolen cord. The water uses the woolen cord to pass from one plastic cup to the other.
- ▶ c) We use a big glass full of water. Put a plastic card on the surface. We begin to put coins on the far side of the other edge, until the weight of the coins overcomes the adhesion force.
- ▶ d) On the surface of the glass of water we put two tokens and try to bring them closer. This has to do with cohesion forces and surface tension too.
- ▶ Material: Plastic cards. Digital Board. PPP. Glasses. Wool. Coins. Tokens. Paper towels. Food coloring.

FOURTH SESSION



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Fourth session planning

- ▶ We start the lesson by reviewing what we have learned:
- ▶ The next step is to show the relationship between these forces and positive and negatives charges.
- ▶ Experiments:
 - ▶ a) We rub a straw with paper towels and we bring it towards the pieces of paper. We'll see how the straw attracts paper.
 - ▶ b) We take two balloons (****). Rub one with your hand. We will bring it towards the other balloon and see how they repel each other. However, if we bring our hand close to the balloon, the balloon will be attracted by it.
 - ▶ c) We make a balance with two straws. In the middle, we tie rope and we tie scissors at the end of the rope. Rub one end and bring a straw to this end that also have previously rubbed. We'll see how they repel: Same charge: repel, different charge: attract.
 - ▶ d) We make a ball of foil. We rub a balloon and bring them together. We will see how they attract.



Atoms and molecules have fun...

<https://www.youtube.com/watch?v=HDw4gk5pYl8>



Fourth Session Conclusions

- ▶ First our students have to explain the process in order to detect if they have understood the concepts of atoms, molecules, adhesion forces, cohesion forces, attract, repeal, positive, negative, polar etc...
- ▶ After that They are going to experiment with the material. Finally they will draw the experiment they have done.
- ▶ Material:
- ▶ Straws. Paper. Cord. Scissors. Balloons. Kitchen paper. Foil

FIFTH SESSION



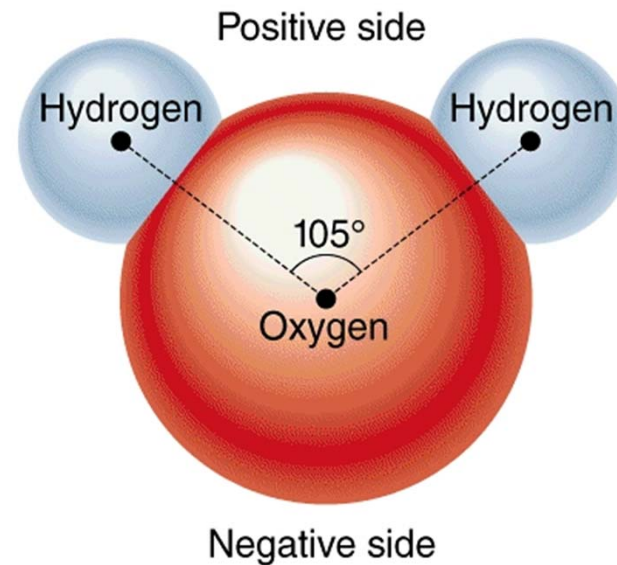
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WATER MOLECULE

A **water molecule**, because of its shape, is a **polar molecule**. That is, it has one side that is positively charged and one side that is negatively charged.

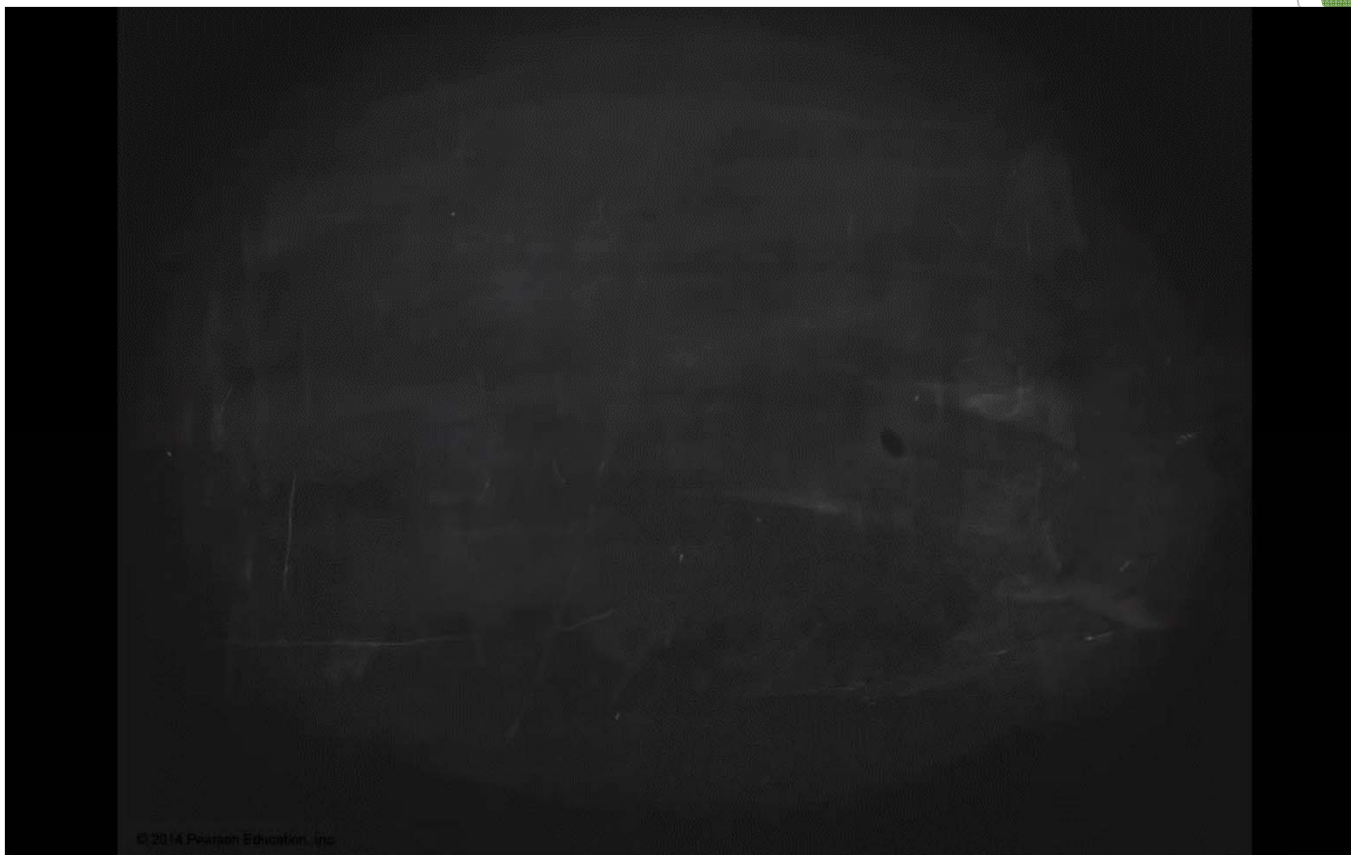


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WHAT CAUSES SURFACE TENSION?



<https://www.youtube.com/watch?v=-jftkF5e6jY>

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Fifth session planning

- ▶ Recap: Today we are going to start with the experiment of oil and ice. We are going to show our students the different densities and how forces of adhesion and cohesion act. They must recognize these forces on the experiment we carried out last session.
- ▶ Then we will start with the experiments that help us to understand conductivity:
- ▶ An atom is the basic building block for all matter in the universe. Atoms are made up of a few even smaller particles: Neutrons, Protons and Electrons. You will find Neutrons and Protons in the nucleus of the atom. Electrons spin in orbits around the outside of the nucleus.
- ▶ In the first experiment, we are going to use a rubber tube. We will rub the tube to positively charge it. We tie a ring of a can of cola to a straw and bring it towards the rubber tube. On the other side, we will put a foil bar. We'll see how the ring of the can effects the bell.
- ▶ We put a clip on a straw. We hang a strip of aluminum foil on the clip. We rub another straw and bringing it towards aluminum, we'll see how it opens.
- ▶ c) We put a wire on a straw. We hang a strip of aluminum foil on the clip. We take another straw and rub. Bring it closer to the other end and see how the other side of the foil reacts. When we rub the straw, we trespass negative charges (electrons) and these polarise the foil strip, making it tremble at both ends.



ATOMS ELEMENTS. THE BUILDING BLOCKS OF LIFE.

NEUTRONS
Don't have any charge. The number of neutrons affects the mass and the radioactivity of the atom.

PROTONS
Are positively charged particles that are located at the centre of the atom in the nucleus

ELECTRONS
Are negatively charged particles that spin so fast around the outside of the nucleus. Scientists can never be 100% sure where they are located but they can estimate of where electrons should be.

Summarising: Atoms are the building blocks of life.



Fifth Session Conclusions

Material: Glass. Sunflower oil. Coloured ice. Foil. Rubber tube. Can of cola. Cord. Straws

SUMMARISING: after the experiments children have to explain how the forces act on the different liquids. Concept of density.

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SIXTH SESSION.....



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Sixth session planning

In this last session we are going to make water a conductor.

a) Experiment: in a glass of water we are going to prove if water is a conductor or not. We are going to build a circuit. First of all, we will put the two ends of the wire inside the glass. The light bulb does not work. Then we will put some salt on the water and we will stir the mixture. Children will see how the light bulb is on!!!

b) If we've got time we will carry out the experiment of chromatography: Another phenomenon that is a process of assimilation of the forces of adhesion and cohesion.

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CONCLUSIONS

- ▶ After doing these last experiments we review all we have learnt.
- ▶ Material: Circuit : battery, wire, light bulb.
- ▶ Glass of water
- ▶ Salt
- ▶ Filter paper
- ▶ Pens of different colours.
- ▶ Alcohol



RECAP

- ▶ MATTER is everywhere. Matter is made up of atoms and molecules. Molecules and atoms are influenced by forces that make them behave specially. These forces are electrical in nature.
- ▶ The cohesive forces, as said before, are the *intermolecular* forces that occur between like molecules.
- ▶ Adhesive forces, however, occur between different molecules. In all experiments we have conducted, two forces have been involved: cohesion and adhesion. In the capillary phenomenon these two types of forces are involved in addition to the surface tension. Photosynthesis is closely related to this phenomenon.
- ▶ These forces have relationships with negative and positive charges that atoms' elements have: electrons have a negative charge and protons have a positive charge.



FINALLY

- ▶ We answer all the questions that we got at the beginning of the project.



WHAT IS THE WORLD MADE OF?

WHAT DO YOU KNOW ABOUT MOLECULES? _____

WHAT ARE MOLECULES? _____

DO YOU THINK THAT SOME FORCES INFLUENCE THE BEHAVIOUR OF MOLECULES ? _____

WHAT FORCES DO YOU KNOW? _____

TRY TO DRAW A MOLECULE _____

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