



SCIENCE PROGRAM AT SCHOOL "MOLECULAR MODEL"

CEIP "Nuestra Señora de los Ángeles" El Esparragal (Murcia) What is the world made of?

<p><u>First Session</u></p> <ol style="list-style-type: none"> 1) First experiment: Condensation. Everything is made of something we can't see: Where does the water on the surface come from? 2) 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... 3) Brainstorming: We will prepare some questions to check the previous knowledge of our students and how much they remember about molecules (*). 4) If we've got time we will start with the experiments 	<p><u>Material:</u></p> <p>Internet Notebooks For the experiment: Metal cup Ice Water 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.</p>
<p><u>Second Session</u></p> <ol style="list-style-type: none"> 1) We start the lesson by watching the video "Atoms and Molecules" from the website www.makemegenius.com 2) Hypothesis: What do you think is going to happen if we put water with this dropper on the coin?... 3) Experiments: <ol style="list-style-type: none"> a) Take some water between your fingers. Try to separate them without breaking the column. b) Put some drops of water on the coin. You can see that water doesn't leak. c) In a glass full of water add more water with a dropper d) In a glass full of water, add a clip/counter e) In a glass full of water, add coins and see what happens at the surface. f) The last experiment: two plastic cups: put water in one and some food colouring in the other. Between each paper cup, add paper towels. Students will see how the water "climbs up" the paper. 	<p><u>Material</u></p> <p>Internet Notebook Coins Glasses Droppers Tokens /counters Clips</p>
<p><u>Third Session</u></p> <p>We are studying the intermolecular forces. There is no chemical change. Cohesion and Adhesion (Adhesive) Forces. Capillarity and Surface tension (***)</p>	<p><u>Material</u></p> <p>Plastic cards Digital Board PPP</p>



<ol style="list-style-type: none"> 1) Recap about the experiments carried out the last day. 2) Dramatise the cohesion forces. Surface tension concept (**mosquito). 3) 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: Chetsangawww.ranker.com 4) Experiments: <ol style="list-style-type: none"> 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. 	<p>Glasses Wool Coins Tokens Paper towels Food colouring</p>
<p>Fourth Session</p> <p>We are studying the intermolecular forces. There is no chemical change. Cohesion and Adhesion (Adhesive) Forces. Capillarity and Surface tension. The next step is to show the relationship between these forces and positive and negatives charges. Experiments:</p> <ol style="list-style-type: none"> 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. 	<p><u>Material</u></p> <p>Straws Paper Cord Scissors Balloons Kitchen paper Foil</p>
<p>Fifth Session</p> <p>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</p>	<p><u>Material</u></p> <p>Glass Sunflower oil Coloured ice</p>



<p>cohesion act. They must recognize these forces on the experiment we carried out last session.</p> <p>Then we will start with the experiments that help us to understand conductivity:</p> <p>a) 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.</p> <p>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.</p> <p>b) 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.</p> <p>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.</p>	<p>Foil Rubber tube Can of cola Cord Straws</p>
<p>Sixth Session</p> <p>In this last session we are going to make water a conductor.</p> <p>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!!!</p> <p>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.</p>	<p><u>Material</u></p> <p>Circuit : battery, wire, light bulb. Alcohol Filter paper Pens of different colours.</p>

(*)

1. What do you know about molecules?
2. What are molecules?
3. Do you think that some forces influence the behaviour of molecules?
4. What forces do you know?
5. Try to draw a molecule.

Work in pairs. Write your answer in the notebook.

(**)



The mosquito is not floating. It is perched on the surface and it holds on by the surface tension and cohesion force of the water (liquid)

(***)

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.

(****)

The hand is loaded with negative and atoms positive. Rubbing the balloon transfers negative atoms to the balloons. The two balloons are negative and repel. There are more positive charges on the hand and therefore the balloons attract. A neutral body has the same negative and positive charges.