



Chemistry: All About You

Module 5. Hands on activities: Material and
Properties

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MODULE 5. HANDS ON ACTIVITIES: MATERIAL AND PROPERTIES

In this section we propose a number of hands-on activities in chemistry to increase students' knowledge of chemistry concepts and scientific processes. The experiments proposed have been developed in the context of the Xperimania project organised by the Association of Petrochemicals Producers in Europe (Appe) and coordinated by European Schoolnet on their behalf.

The activities proposed cover important topics and conceptual understanding in science and also provide a variety of opportunities to learn important experimental and data gathering skills. They consist of classroom and laboratory activities to be carried out by the teacher and his/her students.

With the experiments from the Xperimania project, students are expected to come up with a small scientific research study on materials and properties found in their everyday lives.

In these teacher guidelines, we provide teachers with three examples of experiments on material and properties that can be included in a lesson plan and easily connected with the video "*Chemistry: All About You*". The selection of three experiments developed in the context of the Xperimania project that is presented in this guide has been chosen by the Young EPCA Think Tank as the best one to relate to the video "*Chemistry: All About You*".

More hands-on activities from the Xperimania project can be found on: www.xperimania.net.

1. SODIUM POLYACRYLATE – A POLYMER FOR BABIES’ HEALTH

Experiment purpose	Finding out why nappies keep baby’s pants dry
Link	http://www.xperimania.net
Pedagogical objectives	Students will observe what is inside a nappy and how it reacts to water
Time needed	15 minutes
Materials	<ul style="list-style-type: none"> • a nappy • water • a beaker and a spatula • a measuring cylinder for water • a measuring mass for sodium polyacrylate • food colouring (optional)
Procedure	<ul style="list-style-type: none"> • Open the nappy and collect the white powder into a beaker • Weigh the white powder • Add water and note the volume • Add food colouring (optional) • Weigh again and record how much mass the powder has gained
Outcomes for students	<p>Knowledge gained in terms of scientific processes:</p> <ul style="list-style-type: none"> • Measuring mass of solids and volumes of liquids. • Interpreting data. • Asking scientific questions. • Carrying out scientific investigations. <p>Knowledge gained in terms of chemistry background.</p> <ul style="list-style-type: none"> • Polymers: sodium polyacrylate. • Water • Chemical reactions that involve water / water absorption.



2. COMBUSTION OF NATURAL AND ARTIFICIAL FIBRES

Experiment purpose	Investigation of the different behaviour of natural and artificial fibres in combustion.
Link	http://www.xperimania.net
Pedagogical objectives	Students will test in the laboratory the difference in the combustion of natural and artificial fibres
Time needed	30 minutes
Materials	<ul style="list-style-type: none"> • natural fibres: cotton, wool, silk, linen (2 cm strips) • artificial fibres: nylon, orlon, rayon, cellulose acetate (2 cm strips) • Bunsen burner
Procedure	<ul style="list-style-type: none"> • Cut 4 cm strips from different cloths/ towels/ bed sheets/ curtains/ equipment for chemical industry made of natural and artificial fibres. • Ignite each strip in turn. • Note in a table of results the difference of combustion regarding: velocity, smell, ash left behind, colour of the flame.
Outcomes for students	<p>Scientific processes:</p> <ul style="list-style-type: none"> • Investigating the behaviour of fibres in combustion. • Interpreting data. • Asking scientific questions. • Carrying out scientific investigations. <p>Chemistry background:</p> <ul style="list-style-type: none"> • Combustion. • Polymers. • Natural and artificial fibres. • Chemical reactions that involves molecular oxygen.

3. THE SURFACE OF SUBSTANCES



Experiment purpose	To investigate what happens when oil, water and detergent are mixed.
Link	http://www.xperimania.net
Pedagogical objectives	Investigating the influence of the structure of the substances on reactivity
Time needed	10 minutes
Materials	<ul style="list-style-type: none"> • 2 boiling tubes • bung • water • oil • detergent / washing up liquid • microscope • measuring cylinder
Procedure	<ul style="list-style-type: none"> • Take two boiling tubes; put about 25 ml water and 25 ml oil into each. • Put a bung into one of the tubes and shake it. Leave it for a few minutes. What happens to the mixture? • Where are the oil and the water touching each other? • Add a few drops of detergent (washing-up liquid) to the other boiling tube. Observe what happens at the boundary between the oil and water. Watch carefully for a couple of minutes, then put a bung in the boiling tube, shake it and leave it for a few minutes. What happens to the mixture? • Put a few drops of your mixture onto a microscope slide and look at it at low and medium power. If you have difficulty focusing the microscope, add a drop of blue food colouring to your boiling tube mixture, shake it and try again. • Draw and label what you can see under the microscope. • Where are the oil and the water touching each other now that you have added detergent? • What has happened to the amount of oil touching the water? What has formed at the surface where the water touches the air? • Do the particles at the surface of a substance behave the same way as the ones in the middle?



Outcomes for students	<p>Scientific processes:</p> <ul style="list-style-type: none">• Investigating the behaviour of different liquids when they are mixed.• Interpreting data.• Asking scientific questions.• Carrying out scientific investigations. <p>Chemistry and physics background.</p> <ul style="list-style-type: none">• Dissolving process.• Water – polar substance.• Oil – non-polar substance.• Detergent – tensioactive substance.
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