

Classroom Sequence

Step 4: Complex mixtures in everyday life

Discovering mixtures (4/4)

Introduction

Topics covered	Chemistry, mixture, solution, mass, volume, matter, separation techniques.
Summary and objectives	In this step, students learn about the complex mixtures around them.
Discipline engaged	Science and Technology
Duration	1 hour approx.

This sequence compiles older resources, produced by the teachers of the *La main à la pâte* networks, on the subject of mixtures of liquids and solids.

The four steps of the sequence on mixtures can be carried out independently.

We encourage teachers to create their own progression, adapted to their students and the time available. To help teachers choose from the proposals, here is the order in which the activities have been designed:

Step 1: Mixtures of solids and simple liquids

Step 2: The concept of density

Step 3: Challenge - The Liquid Tower

Step 4: Complex mixtures in everyday life

Getting started

Do not hesitate to watch the videos [Billes de Sciences #7](#) : Tania Louis - *Mélanges de liquides* (Mixtures of liquids), and [Billes de Sciences #3](#) : Tamar Saison - *La dissolution* (Dissolution).

Disclaimer: These videos are in French. But we encourage you to activate the English subtitles. Just be aware that is an automatic translation.

Activity: Complex mixtures in everyday life

General objective: Seek information in order to build knowledge.

Summary	
Discipline	Science and Technology
Procedure and modalities	Through a documentary approach, students become aware of the various complex mixtures that surround them. The notions acquired previously are applied and reviewed.
Duration	1 hour approx.
Material	For the class: <ul style="list-style-type: none">• A computer and a video projector.
Takeaway	
The living world and the environment that surrounds us are mostly composed of mixtures of varying degrees of complexity.	

Disclaimer: This activity has not been tested in the classroom. Please feel free to send us your feedback if you implement it with your class.

Teaching note:

- This activity allows the students to go further and apply the notions they have learned in the previous sessions, as well as giving them a more comprehensive study of the world around us. Some proposals may spark debate in class and there is not necessarily one right answer. For example, an unmixed paint is a heterogeneous mixture, whereas once stirred, it is a homogeneous mixture. A sweater may be a heterogeneous mixture if the weave shows the different yarns used, but a child wearing a tightly woven black cardigan would think it was a homogeneous mixture.

Suggested procedure

The teacher distributes Worksheet 1 to the students. This sheet is a documentary activity presenting complex mixtures from everyday life (blood, textiles, air, mineral water, paint, composite materials). The students read the documents and answer the questions independently. They can make a table to group the answers to the questions, in order to gain clarity.

The teacher will find an example of correction in the form of a summary table (Worksheet 2).

Conclusion (5 to 10 min)

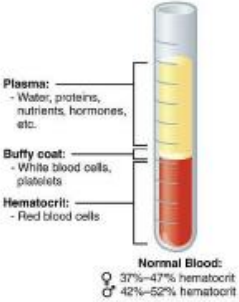

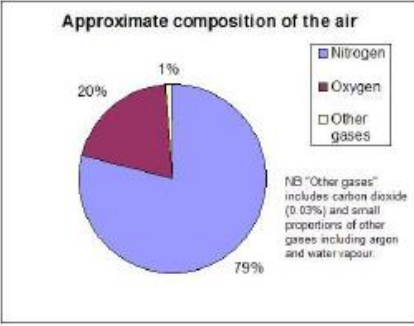
The teacher discusses with the class what seems important to remember at the end of this activity. The teacher emphasizes that there are many more mixtures than pure substances in the world around us. The completed table can be used as a written record for this activity.

Credits

- Infographic on composite materials adapted from: *La chimie dans le sport, Chimie et... Junior* collection, EDP SCIENCES, Fondation de la Maison de la Chimie (2014), available [here](#). Courtesy of the Fondation de la Maison de la Chimie.
- Documents for the documentary approach are adapted from:
https://cache.media.eduscol.education.fr/file/Matiere/50/0/RA16_C3_SCTE_T1_sequence2_matiere_melange_812500.pdf
- Anatomy & Physiology, connexions Web site <http://cnx.org/content/col11496/1.6/>, Jun 19, 2013
- Pie chart by Charlie123 16:22, 23 Jun 2005

Worksheet 1: Complex mixtures in everyday life


Instructions: Read the documents and answer the questions below.


<p>Composition of blood</p> 	<p>Clothing label</p> 																								
<p>Information on the label of a bottle of mineral water</p> <table border="1"> <thead> <tr> <th colspan="2">Typical Mineral Composition in mg/l</th> </tr> </thead> <tbody> <tr><td>Calcium as Ca</td><td>4</td></tr> <tr><td>Magnesium as Mg</td><td>1.5</td></tr> <tr><td>Sodium as Na</td><td>52</td></tr> <tr><td>Potassium as K</td><td>0.5</td></tr> <tr><td>Chloride as Cl</td><td><5</td></tr> <tr><td>Sulphate as SO₄</td><td>7</td></tr> <tr><td>Alkalinity as CaCO₃</td><td>106</td></tr> <tr><td>Nitrate as N</td><td><0.1</td></tr> <tr><td>Fluoride as F</td><td>0.2</td></tr> <tr><td>pH</td><td>4.8</td></tr> <tr><td>Total Dissolved Solids</td><td>217</td></tr> </tbody> </table>	Typical Mineral Composition in mg/l		Calcium as Ca	4	Magnesium as Mg	1.5	Sodium as Na	52	Potassium as K	0.5	Chloride as Cl	<5	Sulphate as SO ₄	7	Alkalinity as CaCO ₃	106	Nitrate as N	<0.1	Fluoride as F	0.2	pH	4.8	Total Dissolved Solids	217	<p>Composition of air in the atmosphere</p> 
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Composite materials

Composites used in sport must be a lot lighter, and are almost always made of fibers embedded in a matrix that may be a mixture of glue and polymer.

Thanks to chemistry, composites are used a lot in other fields such as aeronautics, automaking, and construction. They are frequently used in the Airbus A450, the new electric BMW and in all Formula 1 racing cars.

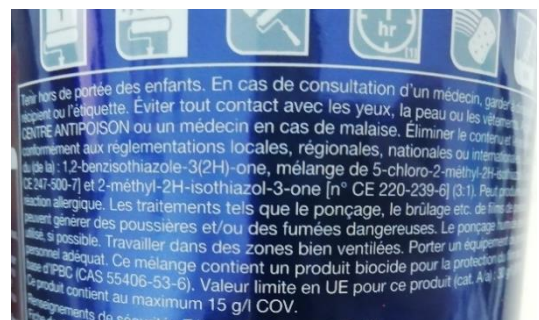
 A composite material, as its name suggests, is a material made up of several elements.

 Concrete is a mix of pebbles and sand bound by cement.

Did you know ?

The oldest and most natural composite is wood. If we look closely at a cross-section under a microscope, we can see it is made up of cellulose fibers, which is a natural polymer in a lignin matrix. This structure gradually expands as the tree grows over the years until it forms the concentric circles that show a tree's age.

Ingredients: 1,2-benzisothiazole-3(2H)-one; 5-chloro-2-methyl-2H-isothiazol-3-one mixture; 2-methyl-2H-isothiazol-3-one.



Documentary review:

1. List the mixtures presented and name the main component(s).
2. How many components are there?
3. Classify the different mixtures presented according to whether they are homogeneous or heterogeneous.
4. Identify the state (solid, liquid, gas) of the mixtures.
5. Are these mixtures cloudy or transparent?

Worksheet 2 : Correction of worksheet 1

Name of the mixture	Main component	Number of ingredients	Homogeneous/heterogeneous mixture	State of the mixture	Cloudy/transparent (when possible)
Paint	1.2-benzisothiazole-3(2H)-one	3	Homogeneous or heterogeneous	Liquid	Cloudy
Composite material: concrete	Pebble	3	Homogenous	Solid	X
Air	Nitrogen	4	Homogeneous	Gas	Transparent
Mineral water	Bicarbonate	At least 8	Homogenous	Liquid	Transparent
Sweater	Cotton and wool	2	Heterogeneous or homogeneous	Solid	X
Blood	Plasma (water)	At least 9	Homogenous	Liquid	Cloudy

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