



Lycée Blaise Pascal
Clermont Ferrand

FETE DE LA SCIENCE 2012

**Les élèves de Terminale S EURO
DNL Physique-Chimie
vous accueillent pour des expériences
présentées en anglais**



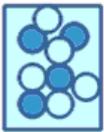
Solid or fluid ?

That is the question !

If a pool is filled with water and corn flour...
people can walk on water...
and sink if they stop walking !

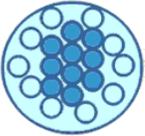


Université P. et M. Curie Fête de la Science 2011



 water cornflour

When the mixture isn't in movement,
water separates maïzena molecules.



When the mixture is in movement,
there is no water between maïzena molecules.

Magic Stuff

You need : Corn flour ; water ; a crystallizer

How to proceed

1. Empty the corn flour into the bowl
2. Slowly , add water and mix it with the corn flour
3. Slowly try submerging your hand into the goop : the mixture is still fluid.
4. Hurt the mixture (hard !) : it becomes solid
5. Try and make a ball with the mixture. While making it , the ball seems solid . But if you stop moving it between your hands, the mixture becomes fluid again and the ball destroys itself.

How does it work

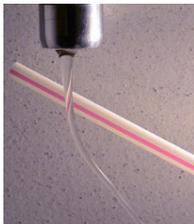
You know that the molecules are usually linked by bonds : the Maizena molecules are.

In the experiment , when no movement is forced, the mixture is fluid because of large spaces between the molecules : molecules of water squeeze easily between the molecules of corn flour. They can move so the mixture is fluid.

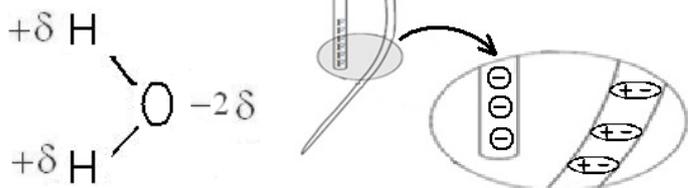
As soon as the mixture is in movement, water is hunted out, molecules have less space, they can't move : the mixture looks solid.

Deviating a stream with a straw

- Rub the straw against your clothes or into your hair in order to charge it negatively.
- Approach the straw near to the stream of water.
- The stream of water is attracted by the straw.



*A possible explanation
(there are others !)*



It happens that water molecules (H_2O) have more positive charges on the hydrogen side and more negative charges on the oxygen side.

Thus, molecules of water tend to point their positive side to the straw. They are eventually attracted by the negative charges of the straw.

If you use a glass stick (positively charged), the stream is still attracted, but water molecules point the other way.

How can you earn
1€ dropped into water
WITHOUT
touching this latter?

... Do you want a clue?

Well, we can give you the materials
to this amazing experiment...

- a candle
- a container
- a beaker
- 1 euro

SO NOW,

FIND AN IDEA!!!

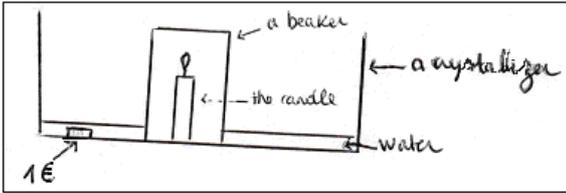
If after 3 minutes of reflexion
you haven't found any idea,

ask the experts... (US!)

FURNON Benoit
OUANNOU Ilyasse
ARCHAMBEAUD Agathe

T.O.P → page 5

So here,
a little diagram to help you:



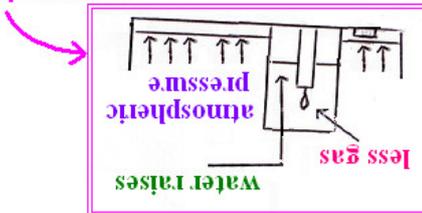
WHAT WILL HAPPEN

ACCORDING TO YOU? ...

So now, do the experiment with us
and see the consequence...

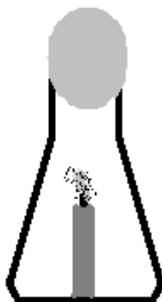
→ You can try this experiment at home
and wow ALL YOUR FRIENDS !!!

Explanation



Sucking an egg into a bottle

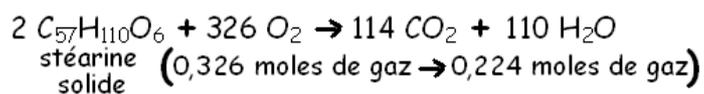
- Put a candle in an Erlenmeyer, light it.
- Put an oiled boiled egg (no shell !) on the neck of the container.
- Wait a few minutes until the egg is breathed into the Erlenmeyer.



How does it work

The combustion of the wax consumes oxygen and the gas that are produced occupy a much smaller volume than the oxygen. This phenomenon explains a partial vacuum that breathes the egg into the Erlenmeyer.

Actually, the egg is pushed by the outside air because the atmospheric pressure is more important than the pressure inside the flask.



Can an aluminium ball both be attracted and repulsed by a straw ?

Rub the straw against your clothes or fur in order to charge it negatively.

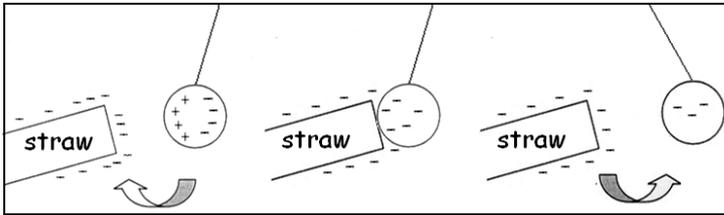
Approach your straw near to the little ball of aluminum.
Is the ball attracted or repulsed by the straw ?

Why?

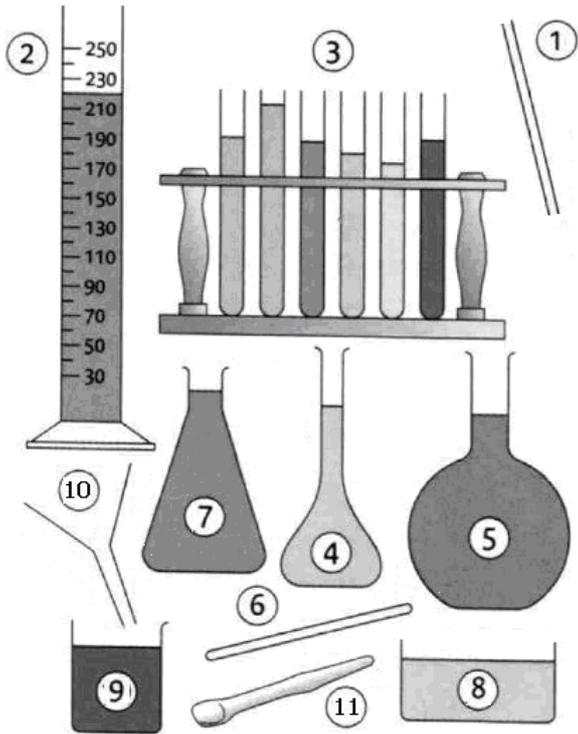
The straw is negatively charged and the electrons of the aluminum are repulsed. The positive side of the ball is attracted by the straw...

The aluminum is a conductor, and when the straw touches the ball, some of the minus charges go onto the ball.

Then, the straw repulses the aluminum ball.



Glassware



See answers p12

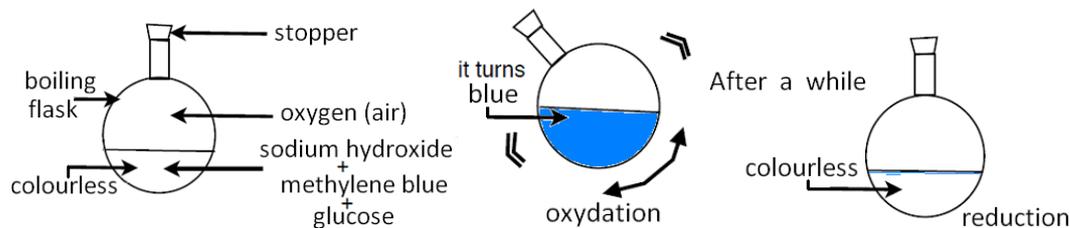
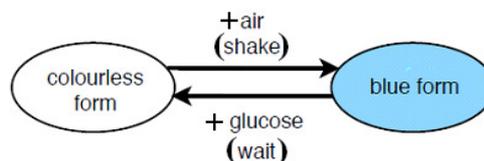
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The blue bottle experiment

Shaking the solution raises the concentration of oxygen in the mixture. This brings* the methylene blue (M.B.) back to its blue form.

When the dissolved oxygen is consumed, the M.B. is slowly brought** back to its colourless form by the remaining glucose, and the cycle can be repeated...

* oxidises
** reduced



You should also notice that once the mixture has gone colourless, a blue zone remains close to the surface : oxygen dissolves into the mixture from the air space within the flask.

Morgane et Lucie

pages 10 et 11

Answers (see glassware p9)

- 1- Pipette
- 2- Measuring cylinder
- 3- Test tubes
- 4- Volumetric flask
- 5- Boiling flask
- 6- Glass stirrer / rod
- 7- Conical flask (Erlenmeyer)
- 8- Crystallizer
- 9- Beaker
- 10- Funnel filter
- 11- Spatula

Magic Ink

Experience :

- Put 2 drops of ink in a beaker .
- Add some hot water in it.
- Pour some of this solution in a test tube.
- Then, add about 2 drops of HCl .

What happens??

- Now, add about 5 drops of soda

What can you notice??

- Continue adding HCl and soda .

Amazing, isn't it?

What happens?

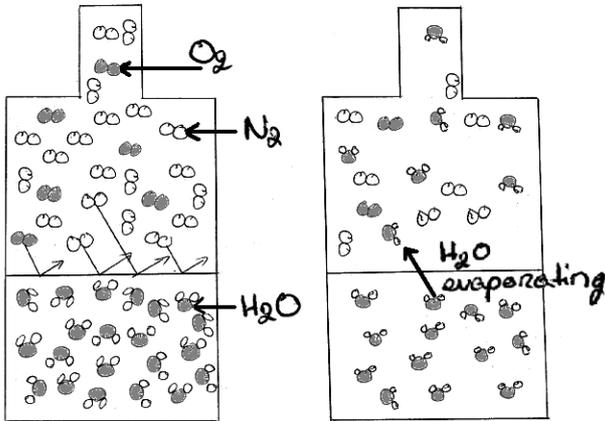
When the ink is in an acid solution it is blue. It becomes colorless in a basic solution.

Why can't you boil an egg at the top of the Himalaya ?

- Pour boiling water in a heat resistant glass bottle.
- Put a special stopper that lets the air out but not in.
- Pump to remove air from the bottle until bubbles appear in the bottle ; the water is boiling again but the temperature is not high enough to boil an egg !

Explanation

The boiling point of water is 100 degrees at a "normal" pressure. When there are not so many air molecules, the water evaporates more easily and the boiling point is lower. Moreover the water evaporates in the bottle to palliate the pressure decrease according to the drawings.



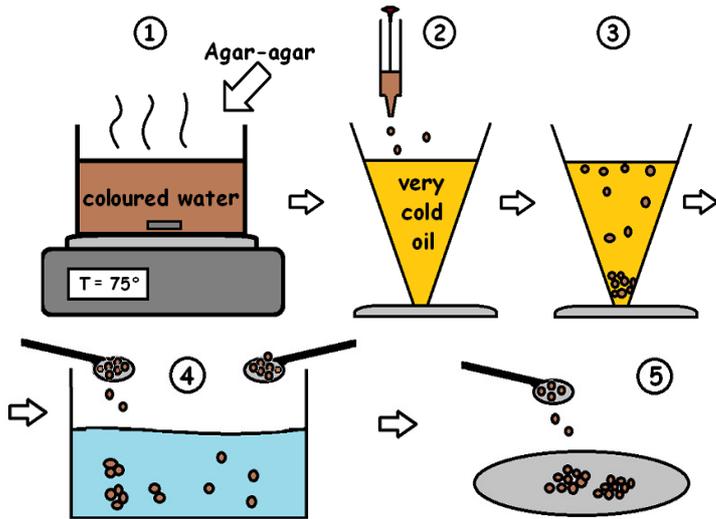
*Hughes
Et Léa*

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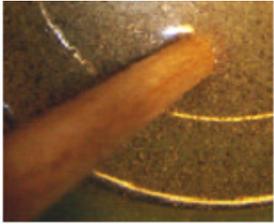
Molecular cuisine...

Juicy pearls...

- Put 300 mL of oil in the freezer during 30 min.
- Put water in a pan and heat it to boiling. (1)
- Add the agar agar and mix it. (1)
- With a syringe drop small tears of the hot mixture into the cold oil. Let the pearls cool down. (3)
- Extract the small pearls with a slotted spoon and wash them in a crystallizer full of cold water. (4)
- Remove from the water and shake to separate (5)



Milk, food coloring, pepper and...soap !



no soap



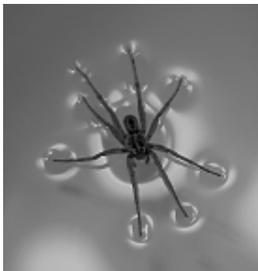
with soap

Floating a paper clip on water

- ❖ Pour water in a crystallizer
- ❖ Place the paper clip on the water crystallizer
- ❖ That's magic the paperclip is denser than the water, but... it does not sink !
- ❖ Add a drop of soapy water ...

That's magic, the paper clip sinks !

Explanation: Water molecules attract each other but they are not (or much less) attracted by the air molecules. They form a kind of skin on the surface due to the famous superficial tension (or surface tension). The paper clip rests on this skin.



Google image

When soap is added, the substance breaks the links between molecules. The paper clip sinks.

An artistic experiment...

On milk, soap acts as a dispersal agent that separates fat molecules and helps the dyes to mix together.

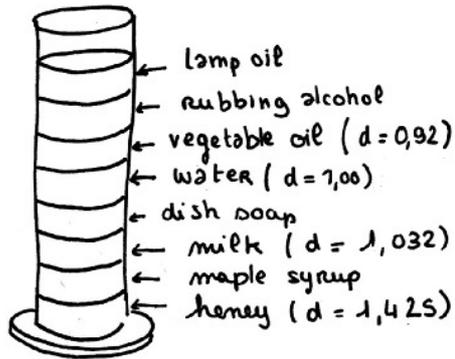
Likewise, soap scatters water molecules and pepper particles that were stuck to the spoon.

WHAT IS DENSITY ?

It compares the masses of a definite volume of different liquids



water is denser than oil so it stays under the oil.

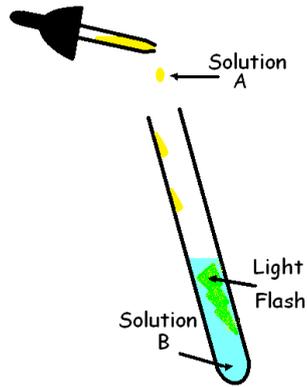


Light test tube....

How light sticks work...

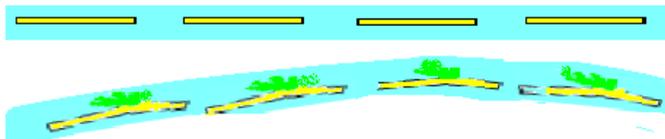
When you add a drop of the solution A in the test tube containing the solution B, a flash of light is emitted.

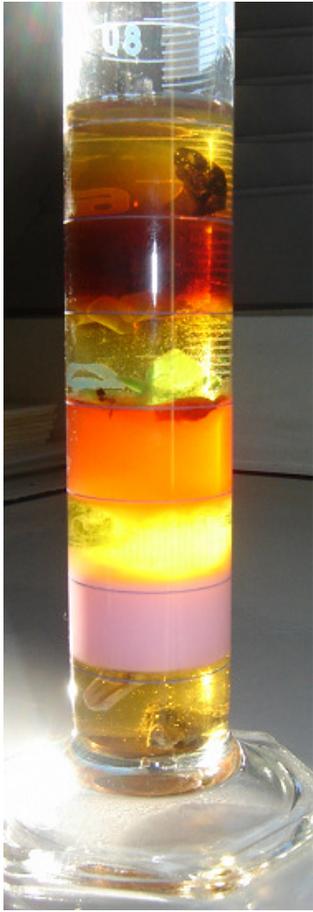
You know that some chemical reactions produce heat (exothermic ones). Light is just another way of releasing energy. The chemical reaction that occurs in the test tube releases energy, but instead of heat, it creates light!



A necklace contains solution B. In it, are vials (small glass containers) which contain solution A.

You break them when you bend the plastic necklace, releasing solution A in solution B...





If you carefully pour one by one the liquids in the cylinder, thanks to a pipette and a bulb, they won't mix.



If you drop different objects, they won't all fall down

Which one is the densest?

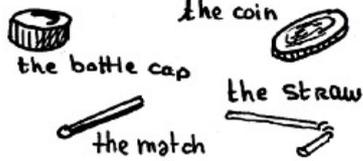


Photo de Julie
See p18

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