Chemistry in the kitchen

Student's book

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Unit 1

Can we do chemistry in the kitchen?

1.1. Strawberry Smoothie

A1. Your teacher is going to explain to you how to prepare a Strawberry Smoothie through a PowerPoint presentation.. Do you think you are going to be able to prepare this tasty drink?

A2. Which ingredients do you need to prepare a Strawberry Smoothie? What is the quantity of each ingredient needed?

To prepare a Strawberry Smoothie, we need ..... strawberries, ... milk and ..... of fruit yoghurt.

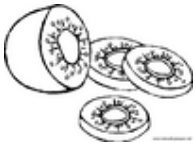
a) 1 small pot *b) 300 ml* *c) 6 large*

Which other fruits could be also used in the preparation of a fruit smoothie? Before choosing the fruits write down their names. The names of the fruits are jumbled in the help box.




…… …… …… ……



…… …… …… ……

pleipnepa	lppae	anbnaa
earp	wiik	
paregs	rrhcye	cahpe

We can also prepare fruit smoothies with ....., ..., ... and .....

A3. Which equipment do you need to prepare a Strawberry Smoothie?

Equipment

For cutting the strawberries, we need .....

For cutting the strawberries we also need to use ..... in order not to damage the work surface.

For adding the yogurt, we need .....

For measuring the milk, we need .....

For blending the smoothie, we need .....

For serving the smoothie, we need .....

A4. Write a proper recipe for the strawberry smoothie.

Recipe title:

Ingredients:

Equipment:

Procedure:

1. ..... the green tops from the strawberries.

2. ..... the strawberries.

3. ..... the strawberries into the blender.

4. ..... the milk and ..... the yoghurt into the blender.

5. ..... for 30-45 seconds until smooth.

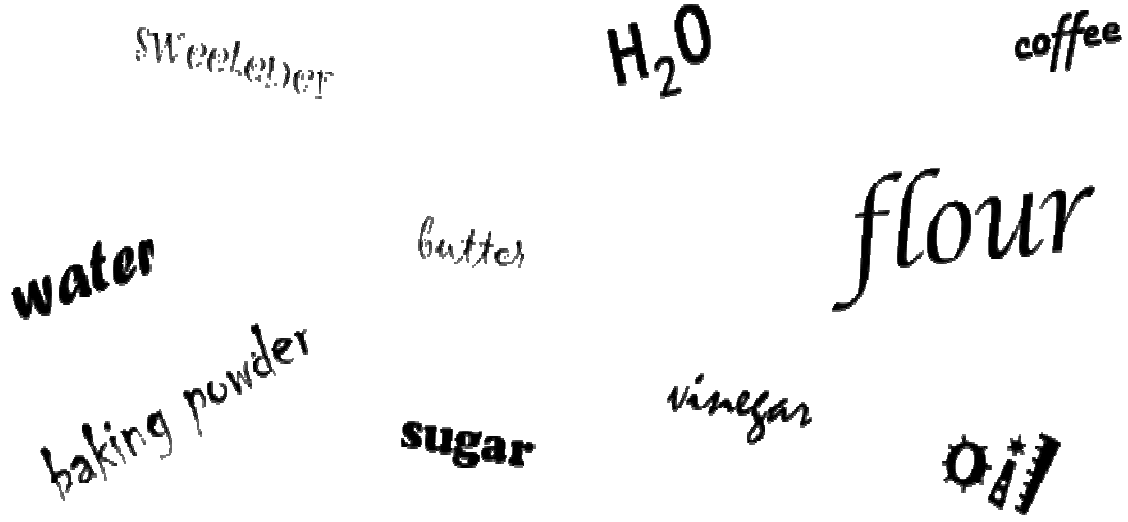
6. ..... into glasses and .....

A5. **Cooking Survey**. Find out who the keen cooks in your class are by doing this cooking survey. You should ask five people in your class. Write their names next to the numbers. Add a question of your own in the empty space.

Name	1.	2.	3.	4.	5.
Are you a good cook?					
What was the last meal you cooked?					
Have you ever had any cooking disasters?					
Who's the best cook in your family?					
What's your favourite meal?					

1.2. Laboratory versus kitchen

A6. Can we consider the kitchen as a laboratory? The next substances are substances that can be found in the kitchen. Circle the ones that are chemicals.



Once you have seen the video, write down the substances that are also chemicals:

.....

.....

Put the words in the right order to make the conclusion:

of ingredient cooking up Every your made chemicals in is.

Every .....

up made is matter the All chemicals of.

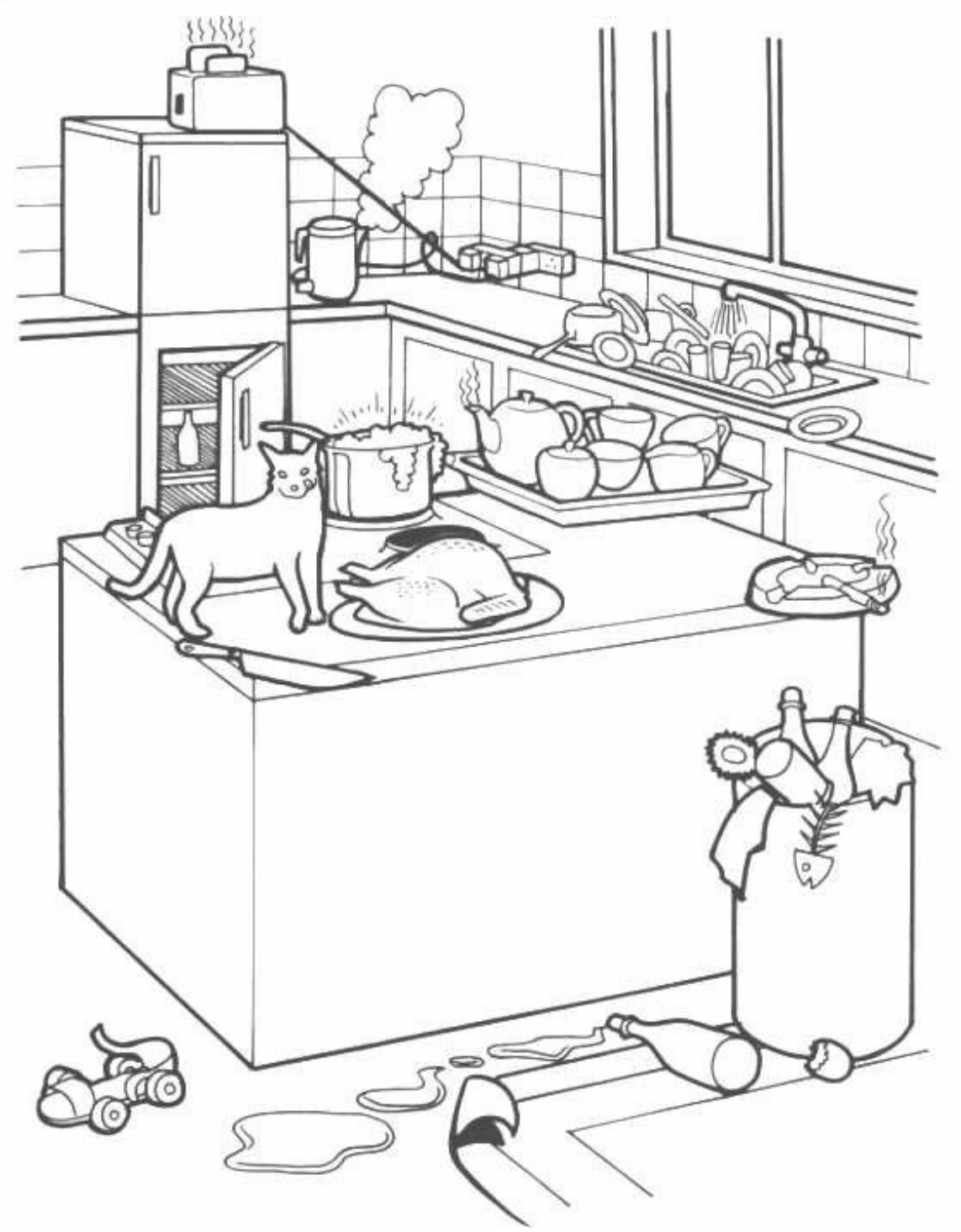
All .....

A7. So, in the kitchen as in the chemistry lab, we have chemicals. What other things can be found both in the kitchen and in the laboratory? What about the equipment? Look for the kitchen and lab equipment that have the following purposes.

Equipment used	Kitchen equipment	Lab equipment
For heating.		
For holding liquids.		
For stirring.		
For measuring liquid volumes.		
For weighing substances.		
For removing solids from liquids.		
For washing the equipment.		
For testing chemical reactions.		
For cutting solid substances like vegetables.		
Item used for heating substances.		
For transferring solids from one place to another.		
For grinding solids and mixing them.		
For holding solids when being weighed and transported.		

1.3. Safety in the kitchen and in the lab.

A8. Do you think everything is safe in this kitchen? Draw a circle around the safety hazards.



Number the safety hazards in the picture and match them with the possible consequences:

Number	Unsafe things	Why is unsafe?

A9. Indicate if the next Science Lab Safety statements are TRUE or FALSE.

1. Long hair must be tied back, especially when near an open flame.
2. It's OK to have combustible materials near an open flame.
3. When heating a test tube, point it in the direction of your friend so she/he can see what's happening.
4. Report any accident, no matter how small, to your teacher.
5. Work areas can be left messy, just like your room. After all, you know that the teacher will clean up after you, just like your mum does at home.
6. Test the smells of the chemicals in order to recognise them.
7. Dispose of waste materials as instructed by the teacher.
8. Clean up spillages immediately, and notify the teacher of spillages involving chemicals.
9. Hot glassware can be placed in cold water so it cools fast.
10. Always replace the cover on a chemical container after you have removed what you needed.
11. You are allowed to eat, drink and chew gum in the lab.
12. To speed up lab work, you are allowed to throw things across the room, such as rubbers, pens or test tubes.
13. Always use electrical equipment near the sink, it will be easy to clean it.
14. Broken glass must be cleaned up carefully.
15. If you are tired, you may sit on the lab tables, even though concentrated acids, corrosives or other chemicals may be present.
16. If you catch fire, be sure to run faster in order to put out the flames.
17. If you accidentally get chemicals in your eyes, immediately clean them with lots of water.
18. Always wear eye protection when you are told to do so by your teacher.
19. Loose clothing, such as sweaters, should be tied or removed before entering the lab.
20. Along with my teacher, it is my responsibility to maintain and practice safe procedures in the laboratory.

A10. Next diagram is a laboratory class where pupils are working. Look for the safety hazards going on, circle them and number them.

Write down the safety rule that each student is breaking in each situation.

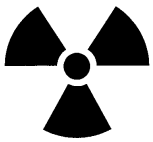
Number	Character and position	Safety Rule broken
1	Boy with the blue sweater at the left near the window.	Don't eat or drink in lab.
2		

3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		

A11. Do you know what the next words refer to? Where can you found them?

corrosive	oxidising	explosive	highly flammable
radioactive	toxic	harmful/irritant	dangerous for the environment

A12. Complete the next table with the words in the previous box.

Symbol Diagram	Symbol Name	Meaning
		Substance that releases harmful radiation.
		Substance may explode if it is • burned • heated • left to dry out
		Causes a small health risk if it is • breathed in • eaten • soaked through the skin
		Substance that will cause damage to animal and plant life in the environment. Be careful when disposing of the chemical.
		May burn when lighted (even when colder than room temperature) • use in a flame-proof area
		May burn skin or wear away solids
		Substance will react with other substances and may cause them to burn or explode.
		Causes a serious health risk if it is • breathed in • eaten • soaked through the skin

A13. Draw and colour the items suggested, adding the correct symbol to the packaging of each substances. Look for two more substances and do the same.

Bleach	Insect killer
Can of petrol	Rat poison

1.4. Cutting onions or a scientific investigation

A14. Write down the investigation report about onions.

What do we know initially about onions?

Which is the problem we want to solve?

Which is our hypothesis?

How are we going to carry out the experiment?

Material needed:

Procedure:

Way to record the observations:

What are your results?

What is your conclusion?

Unit 2

How do we measure in the kitchen?

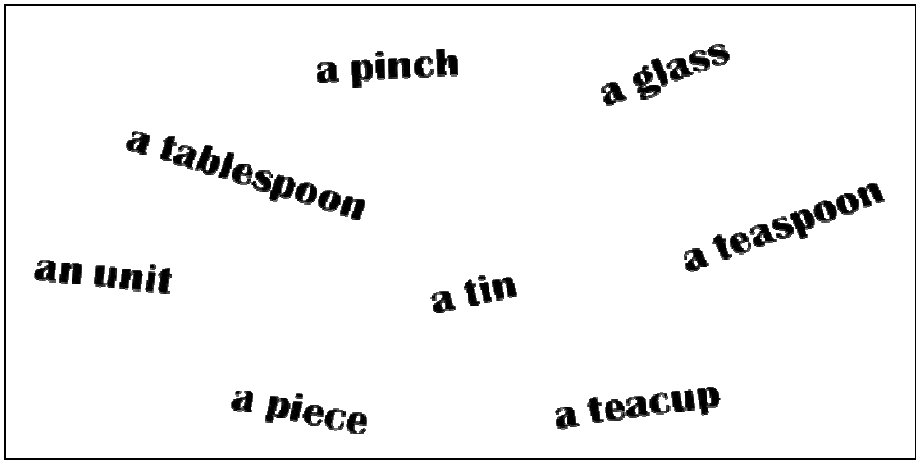
2.1. How do we measure the quantity of each ingredient in our cooking?

A1. How can we measure the quantity of substances in the kitchen?

Write down how we can find the quantity of following substances in a recipe:

Milk:	Flour:
Sugar:	Oil:
Water:	Potatoes:
Eggs:	Cheese:
Tuna:	Salt:

You can use the vocabulary in the following word box.



Do you think these measurements are accurate? Why?

Which other ways of more accurate measurements do you know?

A2. How much do you know about quantities of substances in different recipients? Match the next quantities with the substances. (Each substance can have two ways to express the quantity)

	Quantity of	
30 g	drink in a can	1500 mL
3 Kg	water in a big bottle	0,004 Kg
4 g	sugar in a sugar bag	0,330 L
33 cL	oranges in a bag	3000 g
1,5 L	tuna in a tin	0,03 Kg

HOW DO WE MEASURE THE MASS?

A3. What is the basic unit for mass? .....

What equipment is used for measuring the mass of substances?

.....

A4. Use an electronic balance to find each measurement.

a. Mass of an ink pen _____ g

b. Mass of a sugar packet _____ g

c. Mass of a piece of fruit _____ g

d. Mass of water in a glass _____ g

A5. Circle the best unit for measuring each mass:

a. Mass of a pinch of salt: mg g kg

b. Your mass: mg g kg

c. Mass of a coin of 1 euro: mg g kg

A6. Use the proper equipment to measuring the next masses and write down in the different units.

a. Mass of a pinch of salt

_____ mg _____ g _____ kg

b. Your mass

_____ mg _____ g _____ kg

c. Mass of a coin of a piece of fruit

_____ mg _____ g _____ kg

A7. Complete the next chart with the name and symbol of the subunits of mass in the Metric System.

Milligram	1000	
Centigram		cg
	10	dg
Gram	1	
Decagram		dag
	0,01	hg
Kilogram	0,001	

A8. Order the next masses from the smallest mass to the biggest one.

60 mg 23 Hg 3 cg 2 dg 50 g 2 Dag 3 Kg.

The increasing order is:

..... < ..... < ..... < ..... < ..... < ..... < .....

Complete the next sentences:

The big..... mass is ..... (-ger / -gest)

The small..... mass is ..... (-er / -est)

60 mg is big..... than ..... (-ger / -gest)

50 g is small..... than ..... (-er / -est)

HOW DO WE MEASURE THE VOLUME?

A9. What is the equipment used for measuring the volume of substances in the kitchen? And in the laboratory? Make a draw of both instruments:

Which substances are measured with this equipment?

What is the basic unit for volume? .....

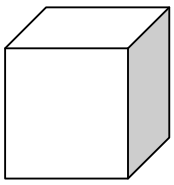
A10. Use the measuring cylinder to measure:

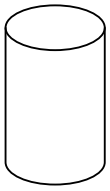
a. Capacity of a glass of water _____ mL

b. Capacity of a tablespoon _____ mL

A11. Do you know how to measure the volume of a regular solid object?

Which measurements do you need to do to determinate the volume of these objects?



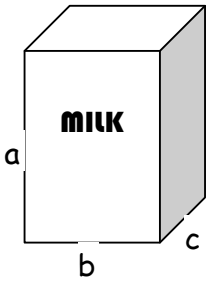


How do you calculate the volume these objects?

Calculate in the same way the volume of the objects that the teacher gives you. Draw the object, write down the measures you do and the calculations you do.

A12. Which is the relation between the unit of capacity (litres) and the unit of volume (m^3)?

Measure the volume of a tetra-brick:



a =

b =

c =

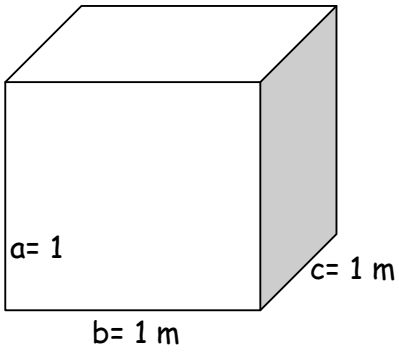
V =

Measure the volume of a recipient of 1 m^3:

a = 1 m = ……. dm

b = 1 m = ……. dm

c = 1 m = ……. dm



$V = (1\ m)^3 = (\ldots\ldots\ dm)^3 = \ldots\ldots\ dm^3 = \ldots\ldots\ L$

A13. Complete the next chart with the name and symbol of the subunits of litre.

Millilitre	1000	
Centilitre		cL
	10	dL
Litre	1	
Dekalitre		daL
	0,01	hL
Kilolitre	0,001	

A14. Complete the next equalities:

1 L = ... dm^3

1 dm^3 = (1 dm)^3 = (..... cm)^3 = ... cm^3

1 mL = ... L = ... dm^3 = ... cm^3

1 kL = ... L = ... dm^3 = ... m^3

A15. Order the next masses from the smallest mass to the biggest one.

23 mL 1 cm^3 3 kL 2 cL 2 dm^3 0,5 L 1 m^3

The increasing order is:

..... < ..... < ..... < ..... < ..... < ..... < .....

Complete the next sentences using the words in the box and starting with:

1 cm^3 is .....

23 mL is .....

3 kL is .....

0,5 L is .....

bigg**er**
bigg**est**
small**er**
small**est**

A16. Do you know how to measure the volume of an irregular object?

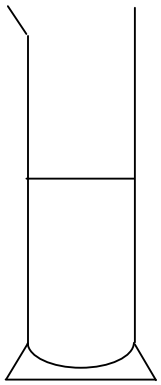
Material: irregular object, water and a measuring cylinder.

Method: Complete the steps with the following words.

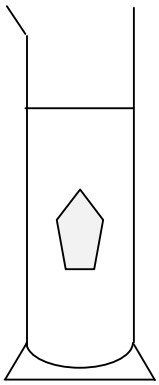
cover	cylinder	final	initial	measure

1. Choose a measuring ..... where the object can be introduced.
2. ..... a quantity of water with the measuring ..... . It must be enough to ..... the object and not too much in order to avoid water overflow.
3. Write down the ..... level in the measuring ..... (V_i).
4. Introduce the object in the measuring ..... . Notice that the level of water has gone up.
5. Write down the ..... level in the measuring ..... (V_f).

Results:



$V_{initial}$ = ...



V_{final} = ...

Calculations: What is the volume of the irregular object?

V_{object} =

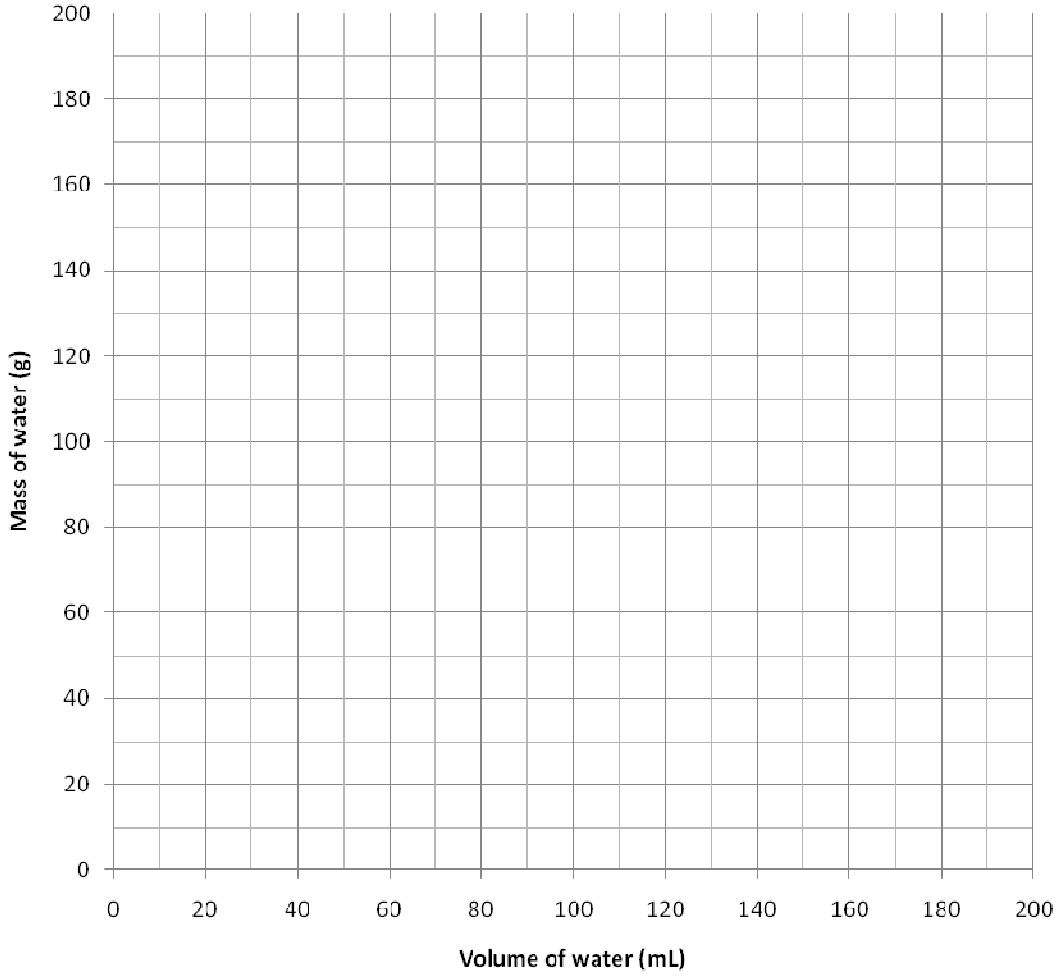
Result: *The volume is* .....

A17. Complete this chart with the relation between the mass of water and its volume. You have to determine the missing values experimentally.

Mass (g)	10 g		30 g		50 g	
Volume (mL)		20 mL		40 mL		100 mL

Make a graph mass versus volume.

GRAPH: MASS vs. VOLUME (WATER)



What do you think is going to be the mass of 200 mL? (Check it and add the point in the graph)

What do you think is going to be the volume of 1 kg of water?

A18. INVESTIGATION: What is the volume of a drop of water?

2.2. An Old Scottish Recipe

A19. Shortbread biscuits are a typical Scottish biscuits. We have found the recipe in an old book.

RECIPE: Shortbread

Ingredients:

For the biscuits:

- 8 oz. butter.
- 3 oz. icing sugar.
- 6 oz. plain flour.

Procedure:

1. ..... the oven to 180°C or gas mark 4.
2. ..... the butter and sugar together in a bowl.
3. Gradually ..... the flour and continue ..... for a further 2-3 min.
4. ..... into thick rounds.
5. ..... on a baking sheet.
6. ..... in the preheated oven for 6-8 minutes, until bottoms are lightly browned.
7. ..... from the oven and ..... to a wire rack to cool.

The actions in the procedure are missing. Fill the gaps with the correct verb in the word-box.

Actions-box

to cream to remove to add to beat to roll
to bake to preheat to transfer to place

Oz. is the abbreviation for ounces. Do you know this unit of mass?

At the end of the book, we found an interesting page.

EQUIVALENT MEASURES

1 tablespoon = 3 teaspoon = ½ ounce

1 ounce = 2 tablespoon

1 cup = 16 tablespoon = 8 ounces

This can help us quite a lot if we want to prepare shortbread!

1. How many tablespoons do we have to use of each ingredient?

To change the units, using proportions is very useful. Write different proportions between ounces and tablespoons:

$$\frac{2\ tablespoons}{1\ ounce} = \frac{1\ tablespoon}{.....\ ounce} = \frac{.....\ tablespoons}{8\ ounces}$$

The proportion is constant and it will help us to find new quantities.

How many tablespoons correspond to 3 ounces?

$$\frac{2\ tablespoons}{1\ ounce} = \frac{.....\ tablespoons}{3\ ounces} \quad \Rightarrow \quad 3\ ounces \cdot \frac{2\ tablespoons}{1\ ounce} = ...\ tablespoons$$

Now, with our ingredients. How many tablespoons do we have to use?

8 oz. butter = $8\ ounces \cdot \frac{2\ tablespoons}{1\ ounce}$ = ... tablespoons of butter

3 oz. icing sugar = ... $ounces \cdot \frac{2\ tablespoons}{1\ ounce}$ =..... tablespoons of icing sugar.

6 oz. flour = ... $ounces \cdot$ ———— = ... tablespoons of flour.

Write the number of tablespoons of each ingredient in the recipe.

2. And how can we calculate the ounces in a certain amount of tablespoons?

If we want to do the opposite calculation, then we just use the inversed proportion.

16 tablespoons = ... $tablespoons \cdot \frac{1\ ounce}{2\ tablespoons}$ =..... ounces

A20. This can be used for many conversions of units.

Imagine that we have teaspoons instead of tablespoons in our kitchen. Calculate the number of teaspoons for each ingredient?

1 tablespoon = ... teaspoons

Butter:

Icing sugar:

Flour:

We can also use it to change units to the metric system. Look for the equivalence between ounces and grams and calculate the quantity of grams for each ingredient of our recipe.

1 ounce = ... grams

Butter:

Icing sugar:

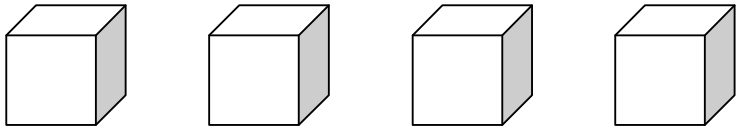
Flour:

INGREDIENTS FOR THE SHORTBREAD (complete)

Units	Ounces	Tablespoons	Teaspoons	Grams
Butter				
Icing sugar				
Flour				

2.3. Does one kilo of sugar weight the same as one of rice?

A21. Your teacher is going to give you have equal recipients completely full with different substances. Can you order them by terms of sensation of heaviness?



Sugar Flour Pasta Lentils

The increasing order of sensation of heaviness is:

..... < ..... < ..... < .....

The mass of each recipient is:

m (sugar) = *m (flour)=*

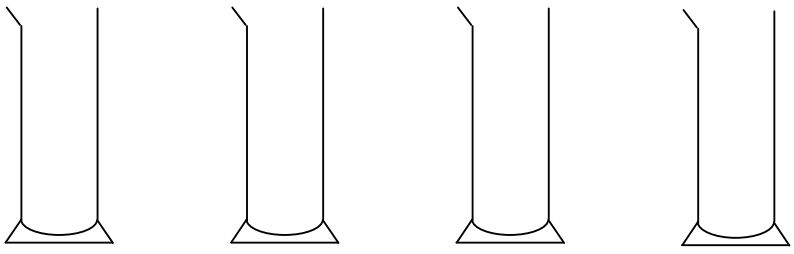
m (pasta) = *m (lentils) =*

Complete the next conclusion:

The b_gg_r the m_ss, the h_gh_r the sensation of h__v_n_ss.

The sensation of h__v_n_ss is pr_p_rt__n_l to the m_ss.

A22. Now, your teacher is going to give you different recipients all with the same mass of the different substances.



Sugar Flour Pasta Lentils

The increasing order of heaviness is:

..... < ..... < ..... < .....

The volume of each substance is:

V (sugar) = *V (flour)=*

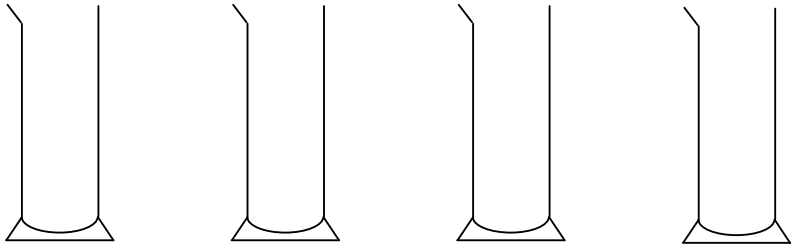
V (pasta) = *V (lentils) =*

Complete the next conclusion:

Th_ sm_ll_r th_ v_l_m_, th_ h_gh_r th_ s_ns_t__n _f h__v_n_ss.

Th_ s_ns_t__n _f h__v_n_ss _s _nv_rs_ly pr_p_rt__n_l t_ th_ v_l_m_.

A23. Now, you are going to have different volumes and masses of the four substances. How are you going to order now the substances in terms of sensation of heaviness?



Sugar Flour Pasta Lentils

The increasing order of heaviness I think it is:

..... < ..... < ..... < .....

	Sugar	Flour	Pasta	Lentils
Mass	..... g	..... g	..... g	..... g
Volume	..... cm^3	..... cm^3	..... cm^3	..... cm^3

Therefore, the definitely increasing order of heaviness is:

..... < ..... < ..... < .....

The relation ..... helps to compare the heaviness.

A24. Lightness is the opposite of heaviness.

Which will be the order of sensation of lightness?

The increasing order of sensation of lightness is:

..... < ..... < ..... < .....

What is the relation between the sensation of lightness and the magnitudes of mass and volume?

If volume is kept constant, the ..... the mass, the higher the sensation of lightness.

The sensation of lightness is ..... to the mass.

If mass is kept constant, the ..... the volume, the higher the sensation of lightness.

The sensation of lightness is ..... to the volume.

What relation can help to compare the sensation of lightness of substances?

	Sugar	Flour	Pasta	Lentils
Mass	..... g	..... g	..... g	..... g
Volume	..... cm^3	..... cm^3	..... cm^3	..... cm^3

The relation ..... helps to compare the lightness.

A25. The relation calculated in activity A23 is characteristic of the substances?

Calculate the same relation with the results of activity A21.

	Sugar	Flour	Pasta	Lentils
Mass	..... g	..... g	..... g	..... g
Volume	..... cm^3	..... cm^3	..... cm^3	..... cm^3

Calculate the same relation with the results of activity A22:

	Sugar	Flour	Pasta	Lentils
Mass	..... g	..... g	..... g	..... g
Volume	..... cm^3	..... cm^3	..... cm^3	..... cm^3

The relation between mass and volume of a substance is .....

This relation is ..... and is also called ***density****.*

A26. Which is the density of water? Look activity A17.

Calculate the density for each situation:

Mass (g)	10 g		30 g		50 g	
Volume (mL)		20 mL		40 mL		100 mL
Density (g/mL)						

Which is the value of density for water at ambient temperature?

Density (water) =

A27. Work in small groups and think which can be the end of the next sentences. Then, your teacher will read them, listen and take notes to complete the sentences.

The name of the new magnitude is .....

Density is a measure of .....

$$\text{Density} = \frac{\qquad}{\qquad}$$

If mass is measured in grams (g) and volume in cubic centimetres (cm^3), the unit of density will be .....

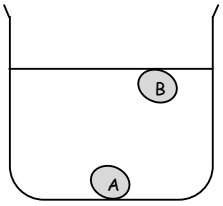
Unit of density depend on .....

2.4. Fresh or old eggs?

A28. We have found the next tip to know if an egg is fresh or old.

> ### Is this egg fresh or not?
>
> There's an easy way to tell if an egg is fresh or not and you don't have to break it open either! Carefully lower your eggs into fresh cold water using a spoon. If the eggs **sink** they're fresh; if the eggs **float**, however, they're old and best avoided.

According to the tip, decide if these eggs are fresh or old?



Egg A is ..... because .....

Egg B is ..... because .....

A29. INVESTIGATION: What is the scientific fundament of this tip?

Looking for information. What is the scientific fundament of this tip? Read the next scientific text about floatation.

Water can only hold up things if they are *lighter than water*. Such stuff is described as being *less dense than water* and it floats (for example, a piece of cork).

Alternatively, stuff *heavier than water* is described as *more dense than water* and it sinks (for example, a coin).

Stuff that floats is ..... (less/more) dense than water.

Stuff that sinks is ..... (less/more) dense than water.

A30. **Hypothesis.** Why fresh eggs sink while old ones float?

Fresh eggs sink because they are ..... (less/more) dense than water.

Old eggs float because they are ..... (less/more) dense than water.

Design your experiment.

Can we determinate the density of old and fresh eggs?

Which magnitudes we need to know? How can we measure them?

Do your experiment.

Material needed:

Method to follow:

Results:

			Density (g/cm^3)
Fresh egg			
Old egg			

Conclusion:

Fresh eggs .....

Old eggs .....

A31. If a fresh egg sinks, how can I make it float? (and no, leaving a fresh egg long enough to go off doesn't count!)

Hypothesis.

Fresh egg will float if it's ..... (less/more) dense than the liquid. Therefore, we can make the fresh egg float ..... (increasing/decreasing) the density of the liquid.

Design your experiment.

How can you ..... (increase/decrease) the density of water?

Do your experiment.

Material needed:

Method to follow:

Results:

Before the fresh egg floats, you need to add .....

Conclusion:

A fresh egg sinks in pure water because it is ..... (less/more) dense than the water, but can float when the liquid itself has ..... (decreased/increased) in density.

When salt is dissolved in the water, the density .....(decreases/increases). Eventually exceeds that of the egg and it ..... (floats/sinks)

You may have noticed yourself that you float ..... (more/less) in the salty water of the sea compared with the water in a swimming pool or freshwater lake. That's because the salty water is ..... (more/less) dense and helps you to float.

Unit 3

Let's go to investigate about solids, liquids and gases.

3.1. Cheese is a solid, milk a liquid and steam a gas.

A1. Enumerate substances that we can find in the kitchen and classify them as solids, liquids and gases.

Solids	*Liquids*	*Gases*

A2. Are all these substances matter? Order the words to make the definition of matter.

has mass	anything that	Matter is	and	takes up space

Matter .....

Are solids matter?

I think that solids .....*(are/aren't) matter because* .....

.....

Are liquids matter?

I think that liquids .....*(are/aren't) matter because* .....

.....

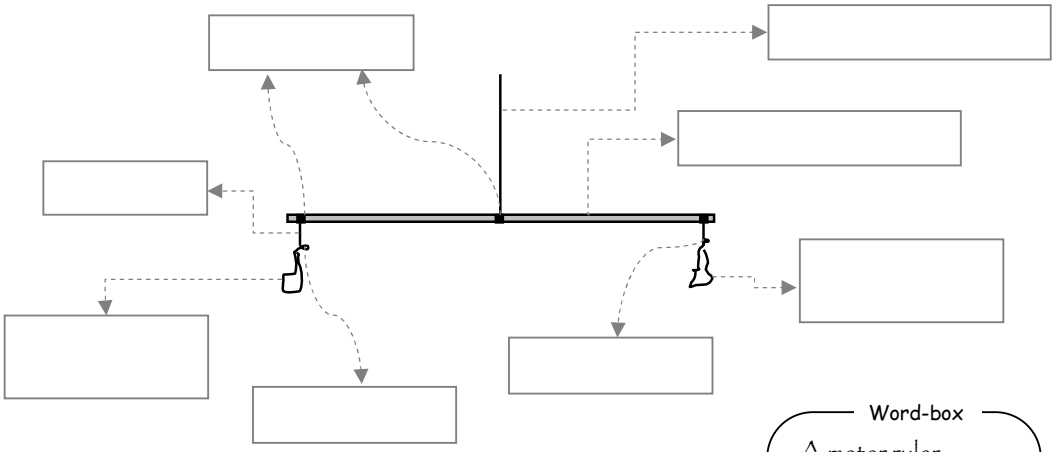
Are gases matter?

I think that gases .....*(are/aren't) matter because* .....

.....

A3. Does the gas have mass? We are going to compare the mass of an uninflated and an inflated balloon with a balance.

First of all, set up the balance. Label the diagram.



Word-box

A meter ruler
String
Sticky tape
Uninflated balloon
Firmly knot
Loosely knot

Procedure

- Balance the structure.
- Untie the balloon with the loosely knot. This will unbalance the system, don't worry in this stage.
- Inflate it or blow it up.
- Tie it so it stays inflated in its place.

Predict: What will happen? Make a drawing and write down your prediction using the expressions in the box.

Predicting

If we do this, then this will happen.

Unless we do this, this won't happen.

.....

.....

Observe: Make a drawing and write down your observations using the expressions in the box.

Describing the observation

If we do this, then this happens.

When we do this, then this happens.

.....

.....

Explain: Write your explanations using the expressions in the box.

Explanation

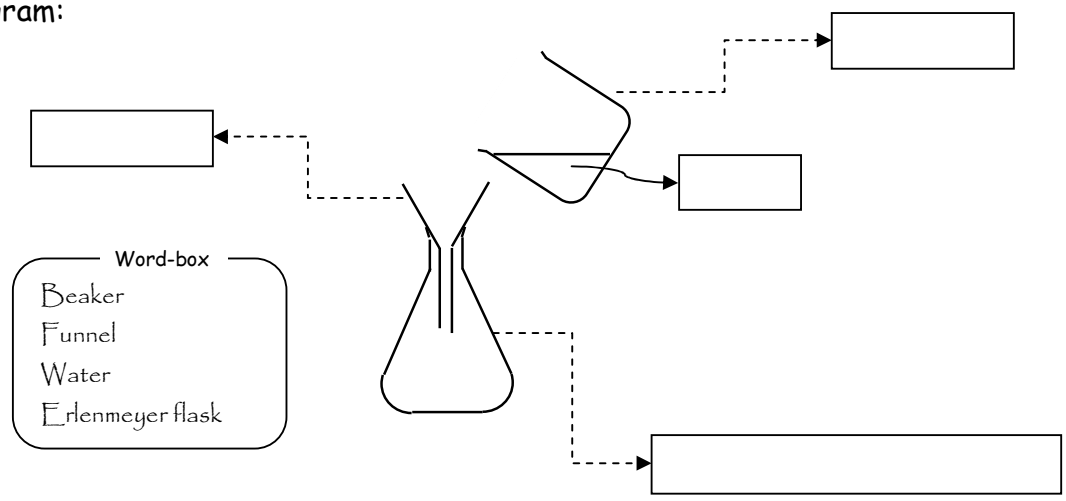
This happens because of this reason.
This happens due to this reason.
This happens because ..... (verb)

.....

.....

A4. Does the gas take up space?

We want to add water to a flask with a funnel. Label the lab equipment in this diagram:



Word-box

Beaker
Funnel
Water
Erlenmeyer flask

Actions-box

- Pour water into the funnel very quickly.
- Pour water into the funnel slowly.
- Pour water into the funnel while holding the funnel above the flask

Predict: Will the water go into the bottle? Write and make a drawing of your predictions.

.....

.....

Observe: Write and make a drawing of your observations.

.....

.....

Explain: Write your explanations.

.....

.....

.....

A5. CONCLUSION: Is gas matter?

Conclusion

My conclusion is ….
This makes me think that ….
This means that ….

……

……

……

A6. Look at the bottles containing solids, liquids and gases. Without opening the bottles investigate the following properties of solids, liquids and gases. Record the results using a tick (✓) or a cross (×)

PROPERTY	SOLIDS	LIQUIDS	GASES
Substances that change shape easily			
Substances that change volume easily			
Substances that can flow			
Substances that can be compressed			

To answer the last question, you can use a syringe and check if these substances can be compressed.

A7. Use the word blank to complete the following sentences.

Word-box

easily

can

cannot

Solids

The shape of a solid does not change .....

Solids ..... move unless you move them.

Solids ..... change their volume.

Solids ..... be compressed.

Liquids

The shape of a liquid can change .....

Liquids ..... flow.

Liquids ..... change their volume.

Liquids ..... be compressed.

Gases

The shape of a gas can change .....

Gases ..... flow.

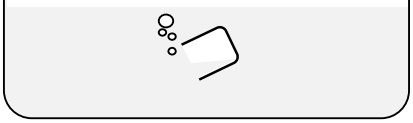
Gases ..... change their volume.

Gases ..... be compressed.

3.2. Why gases have this behaviour?

A8. The other day while washing the dishes something strange happened. We are going to investigate this strange phenomenon with water and glasses.

1



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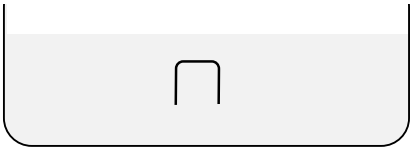

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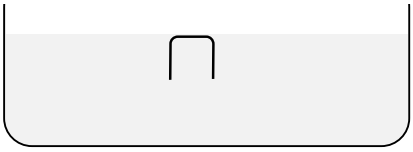


5

You have the pictures in the correct order and the jumbled instructions.

a. *Wait until all the air has bubbled out.*

b. *Bring the glass almost completely out of the water.*

c. *Introduce the glass in the water.*

d. *Raise slowly the bottom out of the water.*

e. *Turn the glass upside down.*

Match the instructions with the pictures

1	2	3	4	5
				b

Using the sequencing phrases, write down a small text of the instructions in the correct order:

Word-box

Following this First of all
The next step is to Finally
After that Then

.....

.....

.....

.....

Predict: What will it happen when the glass is bring almost completely out of the water? Complete the predictions with the future tense of the correct verb and choose one:

Word box

to flows out to stay to go down

a) Water ..... of the glass.

b) Water ..... in the glass.

c) The level of water .....

I think that .....

Observe: Use the present tense to write your observations.

.....

.....

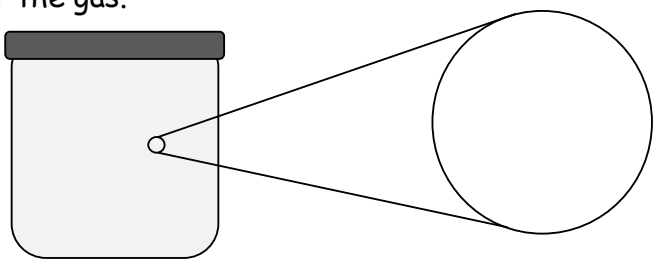
Explain: Write down your explanations.

This has happened because .....

.....

A9. Brainstorm: What do we know about air?

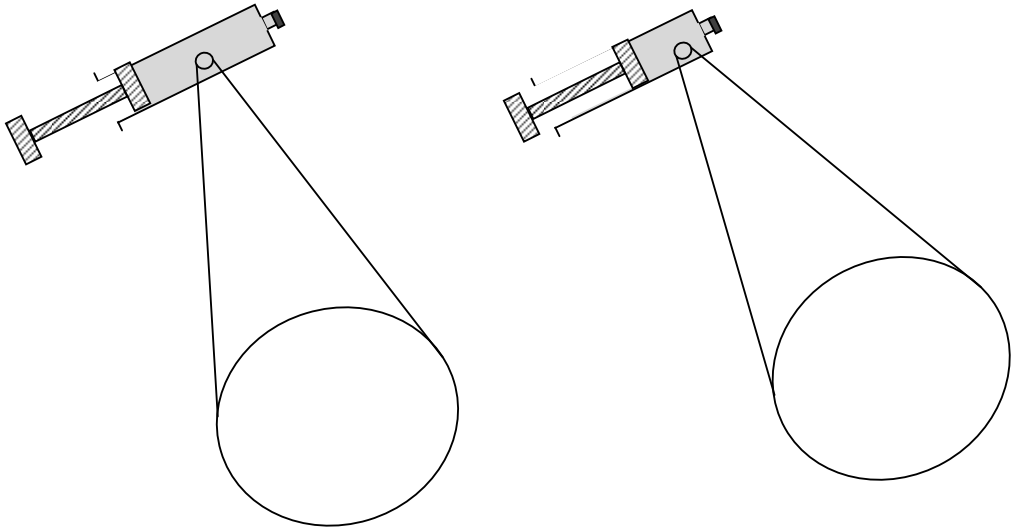
Imagine what is happening on a very small scale inside of a gas, the air. Draw a microscopic model of the gas.



I think that on a very small scale we could see .....

.....

A10. Does this model explain you the ability of gases to be compressed?



When a gas is compressed, on a very small scale what happens is that .....

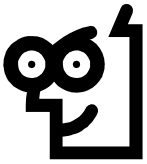
.....

When a gas is expanded, on a very small scale what happens is that .....

.....

A11. Using your model try to answer the next questions about smells.

Why can you smell the toasted bread in the kitchen from a different room?



Why can you realise before of the smell of a hot meal like a soup than the smell of cold meal like salad?

A12. Complete the postulates of the new model to explain the properties of gases.

MODEL TO EXPLAIN THE PROPERTIES OF GASES
(Postulates)

1. Gases are made of .....
2. There is ..... in between the particles.
3. All particles are .....
4. Particles are continuously ..... to other particles and .....
5. Speed of particles depends on ..... that they have.

How far is the validity of this model? We are going to study now more properties of gases. How this model is going to explain these new phenomena?

First, we are going to learn some vocabulary.

Vocabulary box

Match each action with the opposite one:

to expand	*to disinflate*
to cool	*to decrease*
to inflate	*to contract*
to increase	*to pull*
to move faster	*to heat*
to separate	*to move slower*
to push	*to approximate*

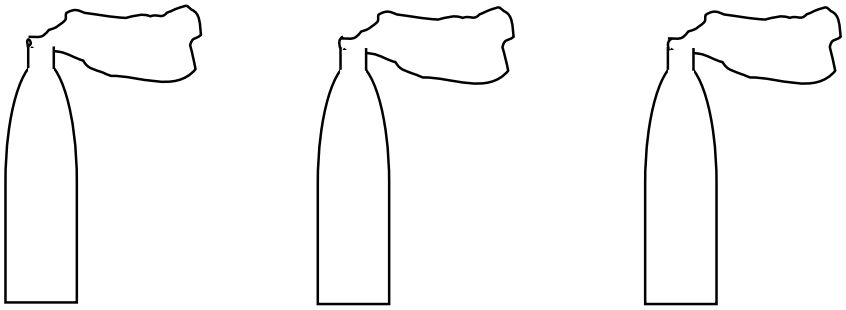
A13. What happens to a gas when is cooled or heated?

1. Attach a balloon to the neck of each of three empty 1-qt soft drink bottles.

2.Put one bottle in a cold place as a fridge (bottle A).

3.Leave other bottle at room temperature (bottle B).

4.Heat the last bottle in a saucepan half filled with water until it starts to boil (bottle C).



A B C

Cold bottle Room temperature Hot bottle

Predict: What will it happen? Make a drawing of your predictions.

Use the future tense to write your predictions.

If we cool the bottle A, the balloon .....

If we leave the bottle B at room temperature, the balloon .....

If we heat the bottle C, the balloon .....

👁 **Observe:** Make a drawing of your observations:

Use the present tense to write your observations.

When we cool the bottle A, the balloon .....

When we leave the bottle B at room temperature, the balloon .....

When we heat the bottle C, the balloon .....

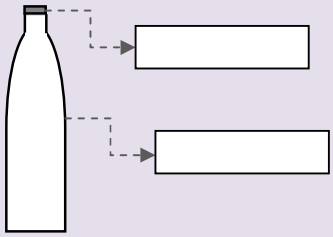
✍ **Explain:** How do you explain this behavior of gases using the particle model?

That we observe	*That we imagine*	*That we observe*
When the gas temperature increases ...	... then particles move ..... (faster/slower), they collide ..... (more/less) often to the walls of the recipient.	Therefore, as the recipient is elastic, the volume ..... (increases/decreases)
When the gas temperature decreases ...	... then	Therefore, as the recipient is elastic, ...

A14. The teacher is going to show you the dancing coin. Observe and listen carefully. Using the sequencing words, write down a text with the instructions to repeat the experiment.

The dancing coin

Material:



Instructions:

.....

.....

.....

.....

.....

.....

Write down what has happened:

.....

.....

How can you explain it using the particle model of gases? Remember the structure of the explanation in A13.

That we observe	*That we imagine*	*That we observe*

A15. Revise again activity A8. Do you remember your explanations? Revise it and write again an explanation for this phenomenon with the concepts your have learnt until here.

What is the atmospheric pressure?

.....

Why doesn't the water in the glass fall down?

.....

.....

Make a drawing that represents your explanations:

A16. DEFINITION BINGO. Choose nine of the keywords and write each one in a square in any order

Word-box

To contract
To expand
Gas
Liquid
Solid
Mass
Motion
Particles
States of matter
Volume
To compress
To diffuse
Gas pressure
Matter

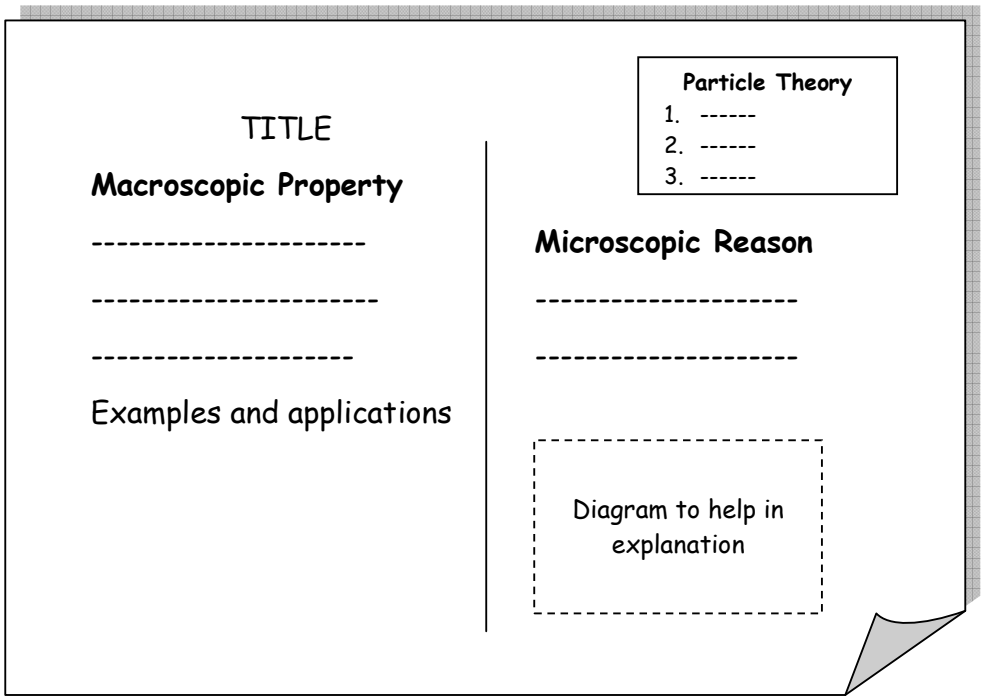
A17. We have proved that our model is valid because it is able to explain the properties and behaviour of gases that we know. This model corresponds to the KINETIC MOLECULAR THEORY OF MATTER, also called the PARTICLE THEORY.

Now we are going to make a revision of all we learned about it and properties of gases. Write down the list of properties of gases that we have learned

We can check and observe all this properties directly, because they happen in our scale. We call them **macroscopic** properties.

The KINETIC MOLECULAR THEORY OF MATTER gives us a **microscopic** model. It explain us how can be gases in a very small scale, so that it explains the macroscopic properties.

Work in small groups and choose one of these properties or behaviours of gases to study them. You are going to prepare a poster where you have to explain which are these macroscopic properties and give the microscopic reasons using the Kinetic Theory of Matter. You can make drawings or diagrams that helps in the understanding.



3.3. Boiling water for the tea.

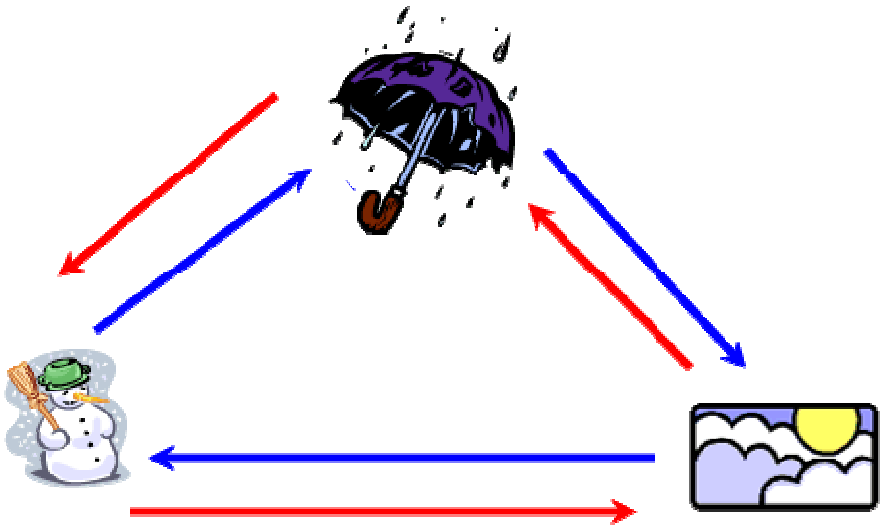
A18. Can you tell processes where a change in the states of matter is taking place? Give examples.

A19. Listen to your teacher naming the different process of changing states. Ask to your partner for the name of the process and he/she will give you the answer. Then swap the papers with your partner.

- *Which is the name of the process where ice turns into water?*
- *The process where ice turns into water is called melting*

Your teacher is going to give you slips of paper with the names of the changes of states. But the letters are jumbled. Each of you takes one slip. You have to order the word. When you have finished, you will explain the changing state and write down in the correct place of the diagram. Then you can take another slip. Who does solve more jumbled words?

- *This is melting. Melting is the process where ice turns into water.*



A20. Is heat added or removed for the change of states to take place? Complete the next table.

CHANGES	FROM	TO	HEAT (added/removed)
Melting or liquefaction			
Freezing or solidification			
Vaporisation			
Condensation			
Sublimation			
Inverse sublimation			

Heat is added in .....

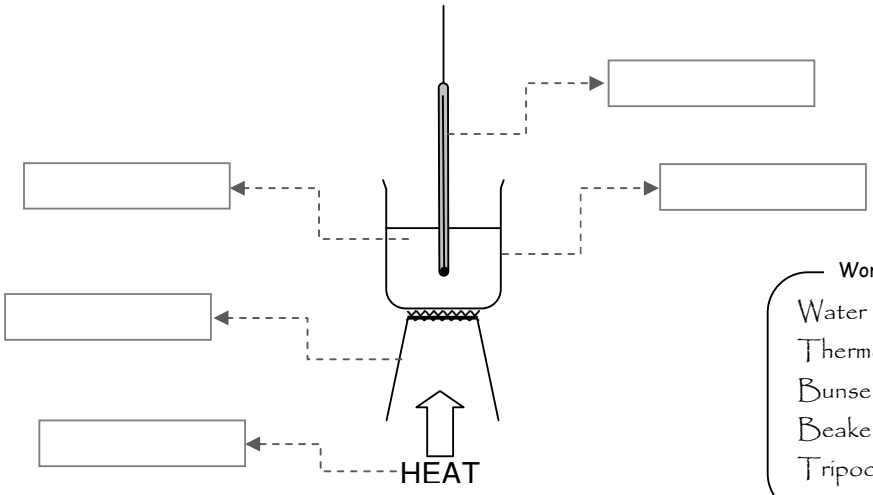
Heat is removed in .....

Heat is flows from one substance to other. Heat is a way to transfer the energy.

A21. In many recipes in the kitchen, the Maria Bath is used for heating without passing certain temperature.

Look for a recipe where this technique is used:

A22. How does the temperature of water change when we heat it?



Word-box

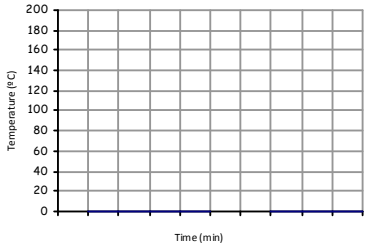
Water
Thermometer
Bunsen Burner
Beaker
Tripod

Predict: Write and make a graph of your predictions.

.....

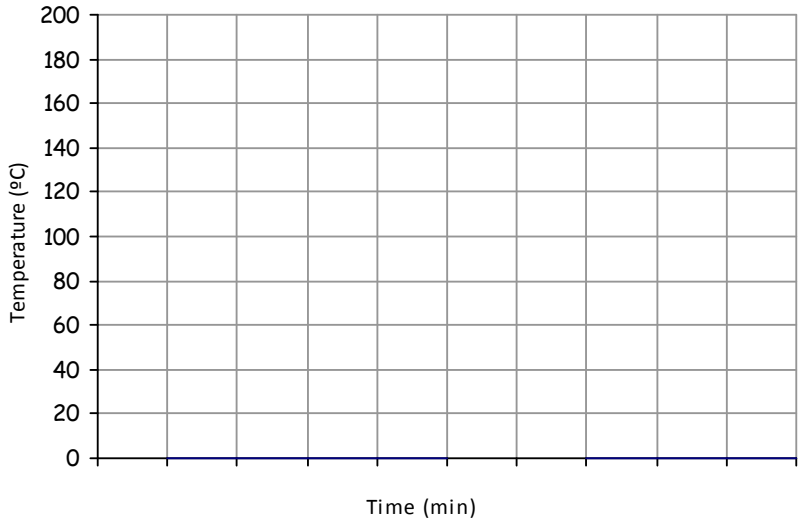
.....

.....



Record the results: Start heating the water and write down the temperature each minute. Record the temperatures in a chart and draw a graph.

Time (min)	
Temperature (ºC)	



1) What happens at the beginning when we heat the water?
   a) Temperature decreases
   b) Temperature increases
   c) Temperature is constant
2) When water starts boiling?
3) What happens with temperature while water boils?
   a) Temperature decreases
   b) Temperature increases
   c) Temperature is constant

✍ **Explain:** Order the next phrases to make an explanation:

the temperature is constant	During the boiling point	is used for the state change.	because the heat

.....

.....

A23. Different fats are used for cooking depending on the cooking process and also in the cooking traditions of an area.

Enumerate different fats used for cooking:

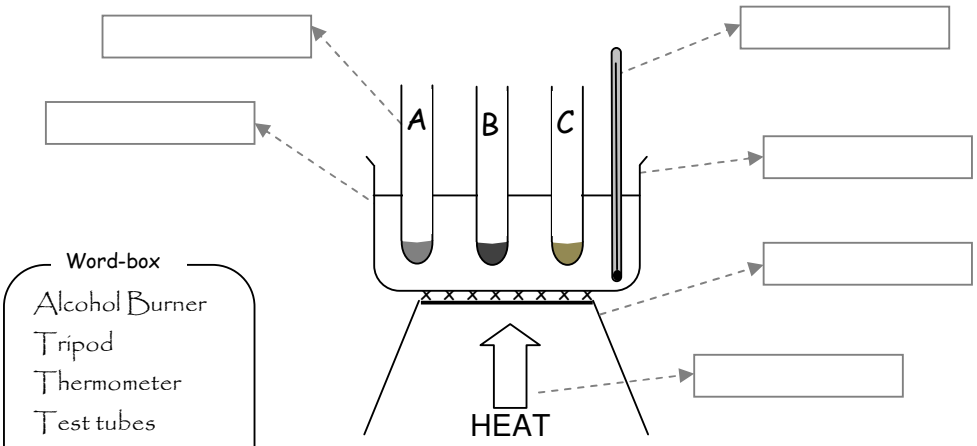
The main difference in the cooking between Spain and Unit Kingdom has to be with fats. Do you know which fat is most used in each place?

In Spain is most used ..... than .....

In Unit Kingdom is most used ..... than .....

The use of one fat or another also depends on its characteristics. Do all fats melt at the same temperature? How can we check it?

A24. We have found the diagram and the steps to determinate the melting point of each fat. First, label the lab equipment in the diagram.



Word-box

Alcohol Burner
Tripod
Thermometer
Test tubes
Water
Beaker

The text with the steps to determinate the melting point have mistakes. Look at the diagram and correct the mistakes. (The steps with a tick (✓) are correct)

Determination of the melting point of fats.

1. Add 5 g of each fat to investigate to each small beaker.
2. Introduce the small beakers in a beaker without water.
3. Put all in the fridge until the fats are completely solidified. ✓
4. Put the beaker below the tripod.
5. Introduce the thermometer in the water and hold it touching the bottom of the beaker.
6. Record the first temperature. ✓
7. Start heating slowly. ✓
8. Record the temperature when each fat starts to melt and also how long it takes to be completely melted. ✓

A25. We are going to compare the melting point of three usual fats in our kitchen: oil, butter and margarine.

Your hypothesis: Which substance has the highest melting point?

The substance with the highest melting point will melt ..... (the first/the last)

I think that the first to melt will be ..... and the last to melt will be.....

So, the substance with the highest melting point will be..... and the lowest melting point will be .....

Do the experiment and observe. Write down a small paragraph describing the experiment and the observations you did. (Write it in the past tense)

.....

.....

.....

.....

.....

.....

Record the results: Write down in the table the dates you want to record.

Test tube	Substance			
A				
B				
C				

✍ **Conclusion:**

Melting order: 1st - ; 2rd - ; 3rd -

Melting point: ..... <..... <.....

*The substance that melts the **first** has the ..... (highest/lowest) melting point.*

*The substance that melts the **last** has the ..... (highest/lowest) melting point.*

New questions:

When the substances cool back down again, which fat would you expect to be the first or the last to freeze back to a solid again?

Does the temperature change during the melting of these fats? Why?

3.4. How does the pressure cooker and the coffeemaker work?

All processes and equipment in the kitchen has a scientific explanation. What about equipment like the pressure cooker and the coffeemaker? How they work has to be with the changes of matter and their properties. A microscopic model for these changes will help us to interpret how they work.

Is the model we used for gases valid for the matter changes? And for liquids and solids?

A26. Do you remember the model for the gases? Decide if the next statements are true or false. If they are true translate the statements. If they are false correct them.

- Gases are made up of very small particles.

  .....

- Particles in gases don't move.

  .....

- Particles in gases are touching each other.

  .....

- Gases can be compressed because particles are far apart.

  .....

- The higher the temperature of a gas, the lower the speed of its particles.

  .....

- Air pressure is caused by particles of the gas hitting objects and walls.

  .....

A27. What happens when is changed the state of matter? How are liquids and solids at a microscopic level?

Gases are made up of ..... and gases can easily change into liquids or solids.

a) When a gas is cooled, it turns into a liquid. What happens at a microscopic scale?

When a gas is cooled, particles move ..... (faster/slower). The forces between particles are ..... (stronger/weaker). Therefore, the particles start to approach

b) What we can say about the microscopic structure of liquids?

Liquids are made up of .....

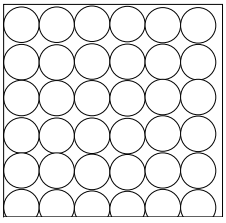
c) When a liquid is cooled, it turns into a solid. What happens at a microscopic scale?

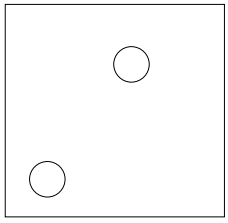
When a liquid is cooled, particles move ..... (faster/slower). The forces between particles are ..... (stronger/weaker). The particles take a fixed position and lose their motion. From now, particles only vibrate.

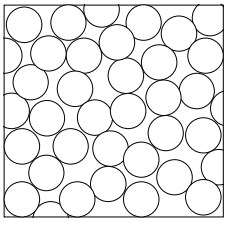
d) What we can say about the microscopic structure of solids?

Solids are made up of .....

A28. The next diagrams represent the different states of matter according to the Kinetic Molecular Theory of Matter. Label each one with the state of matter than represent: solid, liquid or gas.

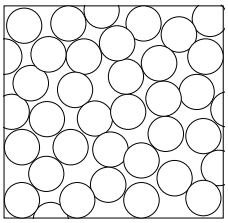




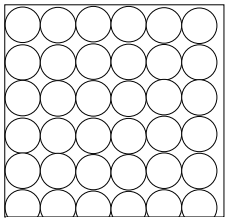


The next explanations correspond to the different states of matter according to the Kinetic Molecular Theory of Matter. Match them with the three states of matter.

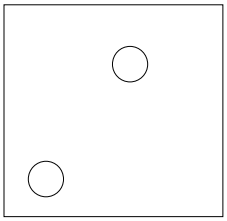
- Forces between particles are very weak.
- Particles are in constant motion.
- Space between particles is larger than the size of particles.



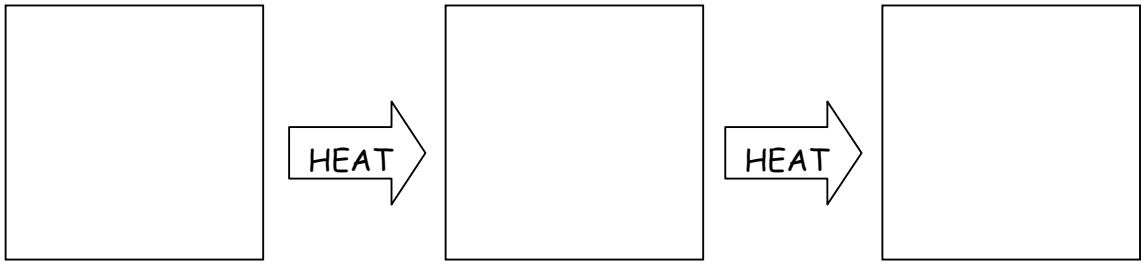
- Forces between particles are strong, but not enough to keep them in a fixed position.
- Particles are in constant motion.
- Particles are touching each other (empty space between particles)



- Forces between particles are very strong.
- Particles have a fixed position but they vibrate continuously.
- Particles are touching each other (empty space between particles)



A29. When a solid or a liquid is heated, what happens to the particles?



SOLID ....

Can you explain the changes at a microscopic level?

Melting: *process when solid turns into .....*

When a solid is ....., particles vibrate ..... (faster/slower). The forces between particles are ..... (stronger/weaker). Therefore, the particles start to move and the particles are ..... (more/less) ordered.

Vaporisation: *process when ..... turns into .....*

When a ..... is heated, particles move ..... (faster/slower). The forces between particles are ..... (stronger/weaker). Therefore, the particles move very quickly and they start to ..... (approach/separate)

A30. We know that Kinetic Molecular Theory of matter provides a valid model for gases. But is it valid for liquids and solids? It will be valid just if it explains the properties of solids and liquids. Give a microscopic reason for the next phenomena using the model that we proposed in the last activity.

Liquids can flow because .....

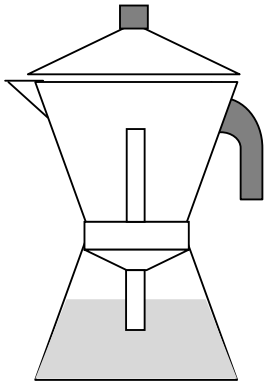
Solids have a fixed shape because .....

Liquids cannot be compressed because .....

Liquids don't have a fixed shape because .....

A31. We arrive to our first question. How do a pressure cooker and a coffeemaker work?

First, investigate at home. How are these utensils? Make a diagram of them.



The coffeemaker

The pressure cooker

Look at the diagrams. In pairs, try to make up an explanation for both kitchen equipments using the Kinetic Molecular Theory of Matter.

3.5. Making ice-cream

A32. Have you ever done an ice-cream or ice pops? What do you need?

A33. Ask at home how they used to make ice-cream when no freezer where at home.

A34. Do you think we can prepare ice-cream at the classroom? We have the recipe, so we will try.

The instructions are not completed. Match the beginning of each instruction with the endings.

1. Add the milk, the sugar and vanilla to ……
2. Close zip lock carefully and ……
3. Surround the small bag with ……
4. Carefully check that the small bag is ……
5. Shake the bag system for 5 minutes until ……

- ... the mix hardens into ice cream.
- … ice to 1/2 large bag full and add the salt on ice.
- … perfectly closed and close carefully the larger one.
- … the small bag and mix.
- ... place the small bag in the larger bag.

Write down the ending of the instructions for prepare the ice-cream.

RECIPE: Ice-cream

Ingredients:

- One cup of milk
- One half-teaspoon of vanilla
- One teaspoon of sugar
- 6 tablespoon of salt
- Crusted ice

Equipment:

- Two zip lock bag (one of half litre and a smaller one)
- A plastic spoon

Procedure:

1. *Add the milk, the sugar and vanilla to* .....

   .....

2. *Close zip lock carefully and* .....

   .....

3. *Surround the small bag with* .....

   .....

4. *Carefully check that the small bag is* .....

   .....

5. *Shake the bag system for 5 minutes until* .....

   .....

Prepare your ice-cream and enjoy it!

A35. Can you make the temperature of melting ice lower than 0°C? How?

In small groups plan your experiment. Show the planning to your teacher and then you can carry out the experiment. After finishing it, remember to write down your results and conclusion. Present the final report to you teacher

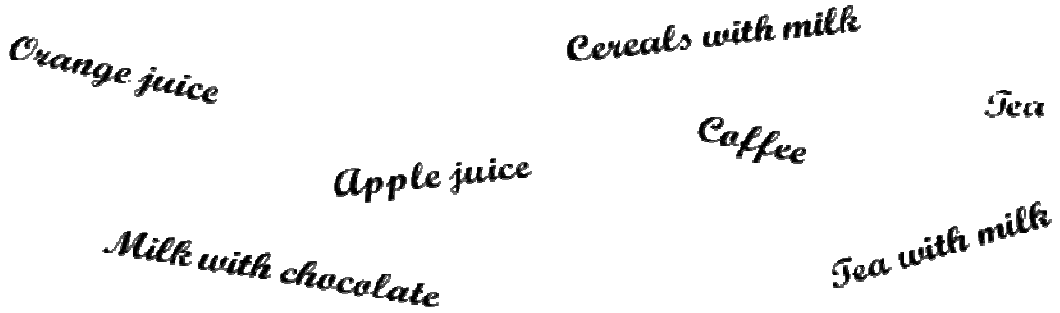
Hypothesis	
Material needed	
Method - What you are going to do? – How are you going to record the results?	
Results – Use tables and graphs to record the results.	
Conclusion	

Unit 4

Let's go to mix up the ingredients!

4.1. Breakfast with mixtures.

A1. We can have many different combinations for breakfast. You have some of them here, can you think of anymore?



Think about how we can classify these mixtures. Classify them into two or three groups according to their properties, taste, colour, ...

I made the classification according to ……

A2. Scientists classify mixtures in homogeneous and heterogeneous categories. Now, your teacher is going to read a text about mixtures. Your teacher is also going to give you some key words. You have to decide which ones belong to homogeneous mixtures and which ones belong to heterogeneous mixtures. Write down the keywords.

HOMOGENEOUS MIXTURE	HETEROGENEOUS MIXTURE

A3. Classify again the different mixtures of A1 according to the text you have listened in the previous activity. Write down the mixtures you don't know how to classify.

Homogeneous mixtures	Heterogeneous mixtures
I cannot classify them (Write down the reason)	

A4. Read the text again and complete the next comparison diagram with the characteristics of homogeneous and heterogeneous mixtures.

Homogeneous mixtures	**Heterogeneous mixtures**
Similarities	
Differences	

A5. Write two paragraphs about the similarities and differences between homogeneous and heterogeneous mixtures.

1. Comparing

…is like…, …is similar to…, … and … are similar,	because both are .....

.....

.....

.....

2. Contrasting

…is unlike… …is different from… …differs from … One can distinguish…from…	(1) but (2) (1) whereas (2) (1). However, (2)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

A6. Follow the instructions for making the four different mixtures. Then make a diagram of your observations and decide if they are homogeneous or heterogeneous mixtures.

Hypothesis: Which of the following mixtures do you think are homogeneous and which ones are heterogeneous? Why?

*I think that **salt and water** form an ..... mixture because .....*

.....

*I think that **flour and water** form an ..... mixture because .....*

.....

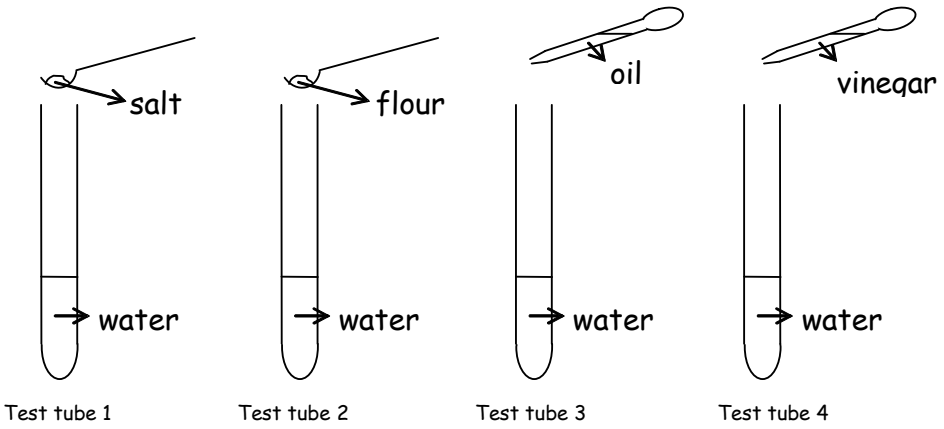
*I think that **oil and water** form an ..... mixture because .....*

.....

*I think that **alcohol and water** form an ..... mixture because .....*

.....

Procedure:



Complete the instructions to prepare the four mixtures:

1. Collect ..... test tubes and a test tube rack.

2. Fill each test tube with ..... to a depth of 2cm.

3. Add a spatula of ..... to test tube 1, and shake the test tube.

4. Add a spatula of ..... to test tube 2, and shake the test tube.

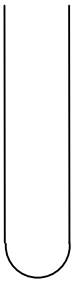
5. Add ..... up to a depth of 2cm to test tube 3, and shake the test tube.

6. Add ..... up to a depth of 2cm to test tube 4, and shake the test tube.

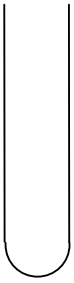
7. Leave the test tubes standing undisturbed, and record your observations.

Results: Draw and describe the mixtures you have prepared. You can use the words in the box to describe them:

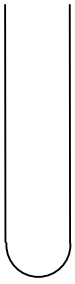
clear	white	cloudy	is made up of many small bubbles
soluble	insoluble	miscible	immiscible



Test tube 1: The mixture of water and salt is .... When it is left standing undisturbed, ...



Test tube 2: The mixture of water and flour is .... When it is left standing undisturbed..... .....



Test tube 3: The mixture of water and oil is .... When it is left standing undisturbed, ...

Test tube 4: The mixture of water and vinegar is .... When it is left standing undisturbed, ...

Conclusion: Decide if these mixtures are homogeneous or heterogeneous.

The mixture of water and salt is .....

The mixture of water and flour is .....

The mixture of water and oil is .....

The mixture of water and vinegar is .....

A7. The teacher is going to give you a set of cards with the definition of different kinds of mixtures. Each student will read one definition aloud and ask the next student of the group to identify and match the definition with the corresponding mixture prepared in **A6**.

Which of the mixtures is a solution?

I think that a mixture of ..... is a solution because .....

A8. Ask your classmates the following questions about the mixtures in order to complete the table.

/	Solution	Solution of liquids	Suspension	Emulsion
What is this mixture made up of? (liquid and solid / two liquids)				
If it's a mixture of a solid and a liquid, is the solid soluble or insoluble?				
If it's a mixture of two liquids, are they miscible or immiscible?				
Is it a stable or an unstable mixture?				
Does it change when left standing undisturbed? How?				
Is it a homogeneous or heterogeneous mixture?				
Can you give me an example?				

A9. Some of the mixtures in **A1** couldn't be classified because we couldn't find out the size of the particles that formed the mixture. These are a different kind of mixtures, they are called *colloids*. The teacher is going to give you a sheet with some information about colloids and how to recognise them. Answer the next questions. You won't be able to answer all the questions because you don't have all the information. Pair up with one of your classmates that has read the other text and ask him or her the questions that you couldn't answer.

- Who first described the Tyndall effect? When?

  ……

- Why can we see most things?

  ……

- Why can't we see atoms and molecules?

  ……

- Why can you see the beam of light when it is passing through dusty air?

  ……

- When can it be seen the Tyndall effect?

  ……

  ……

- What is the size of the particles in a colloid?

  ……

- What characteristics do a colloid and a solution have in common?

  ……

- What material do you need to differentiate colloids and solutions?

  ……

- Which mixtures demonstrate the Tyndall effect?

  ……

- Which mixtures are cloudy and which ones are clear?

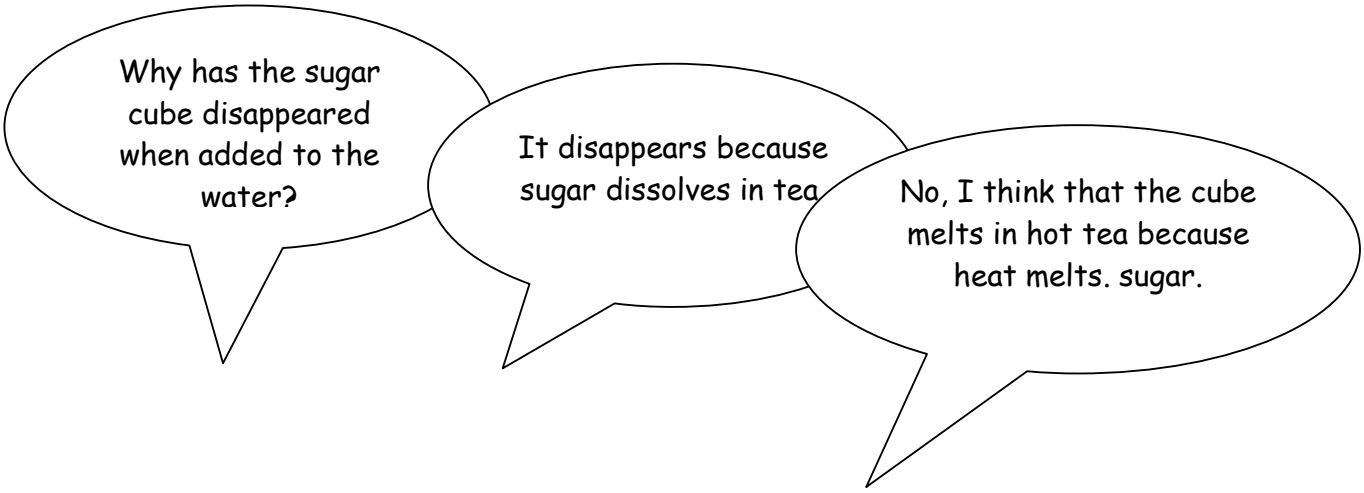
  ……

A10. Which of the liquids listed are colloids and which are solutions: tea, orangeade, coffee, milk, salt water, jelly, consommé, vinegar, egg white, apple juice, peach juice? Design your own experiment. When you have finished, show it to your teacher, then do the experiment and complete the report.

Aim	
Material needed	
Method (you can make a diagram of what you are going to do)	
Results (you can draw a table to record the results)	
Conclusion	*Solutions are* ..... *Colloids are* .....

4.2. Rock candy

A11. Two students are discussing what happens when a sugar cube is placed in a cup of tea. Which student do you think is right? Give your reasons.



A12. We found the next instructions on the web to prepare a Rock Candy, but they are not in the right order. Order them.

Read the instructions again carefully and find out the equipment and the ingredients we need to prepare the Rock Candy. Underline them in different colours.

Once you have checked the order of the instructions, the equipment and the ingredients with the rest of the class, write down the recipe.

Recipe title:

Ingredients:

.....

Equipment:

.....

.....

Procedure:

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

A13. Carry out the steps to prepare the Rocky Candy and answer the questions:

STEPS 4&5

- What happens to the sugar?

  ……

- How can you tell that the sugar is still present?

  ……

- Where does the sugar go when it is dissolved?

  ……

- Is the solution homogeneous? How can you tell this?

  ……

  ……

STEP 6

- How many spoonfuls of sugar did you add until it was saturated (no matter how long you were stirring)?

  ……

- Why does some sugar lie on the bottom of the saucepan?

  ……

- What is the name of this solution now? Why?

  ……

  ……

STEPS from 7 onwards

- After heating the solution, how many spoonfuls of sugar did you add until it became saturated (no matter how long you were stirring)?

  ……

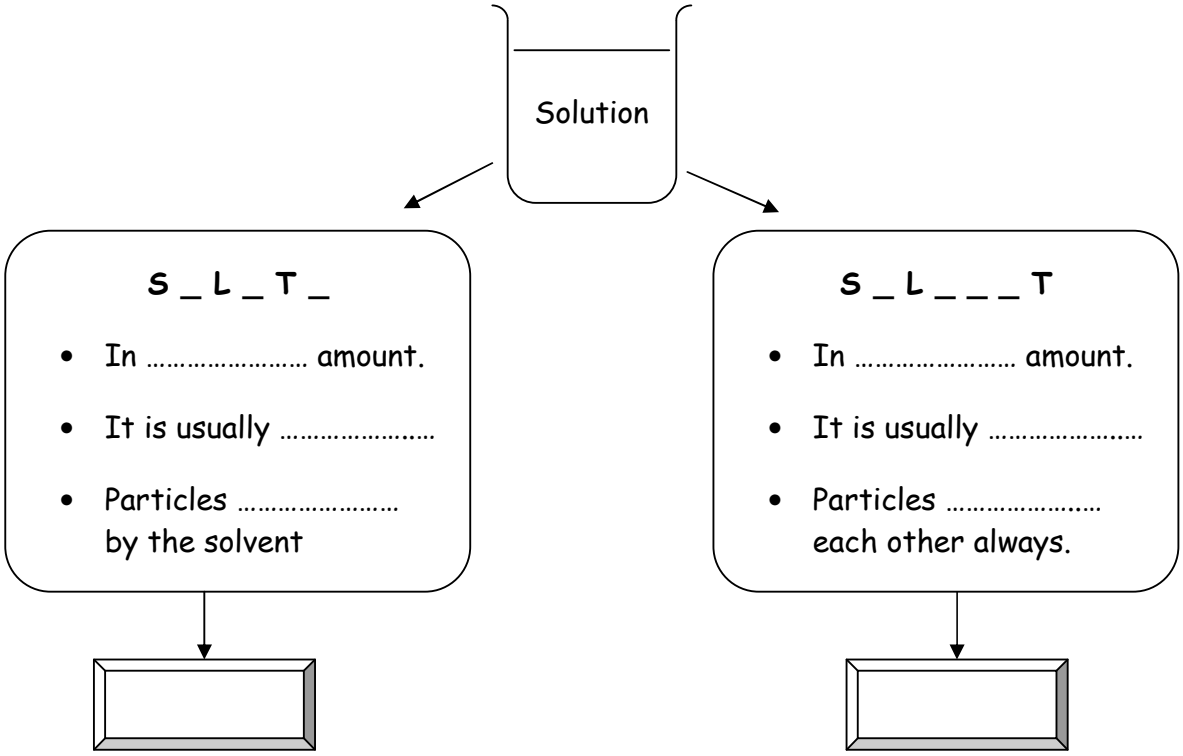
- Does it mean that the solubility of the sugar has increased or decreased?

  ……

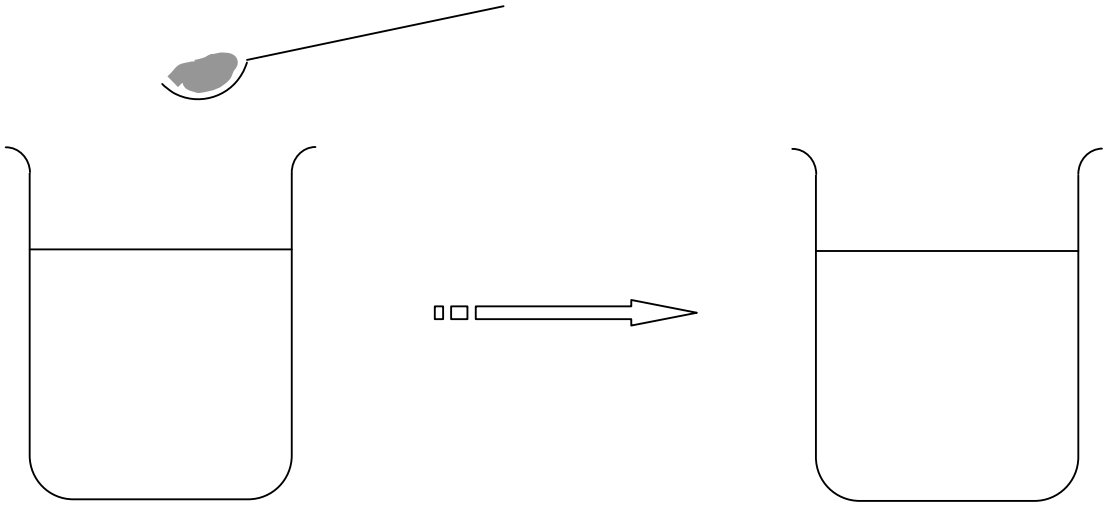
A14. Read the next text about the solutions.

> ***A solution has two components: the solute and the solvent.***
>
> *The **solvent** is the substance in greater amount. It is usually a liquid, although it does not have to be. It is usually water, but it does not have to be. The particles of the solvent are always touching each other.*
>
> *The **solute** is the substance in lesser amount. It is usually a solid, although it does not have to be. The particles of the solute are separated by the solvent particles.*

A15. Complete the next diagram with the characteristics of solute and solvent. Write in the square boxes at the bottom which will be the sugar and which the water.

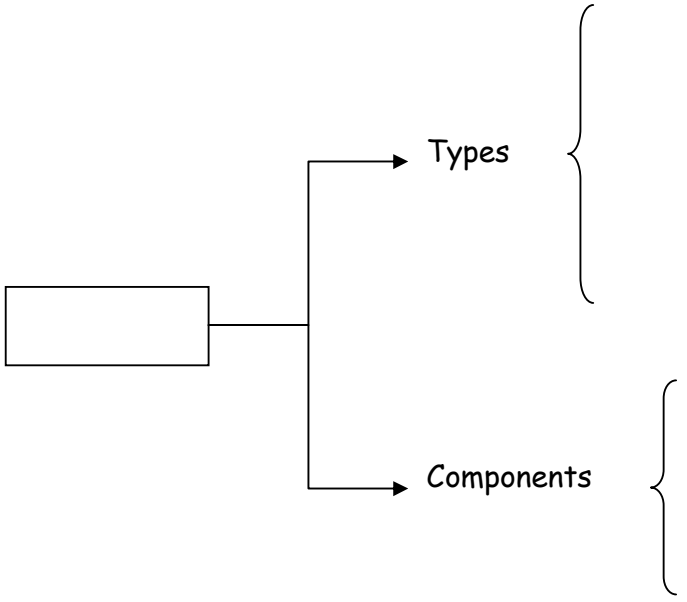


A16. Now you have more information about what a solution is and what their components are. Draw an accurate microscopic view of the solution.



A17. Read the next keywords. Decide what they refer to and complete the map:

Supersaturated solution		Saturated solutions
	Unsaturated solutions	Solution
Solute	Aqueous solution	Solvent

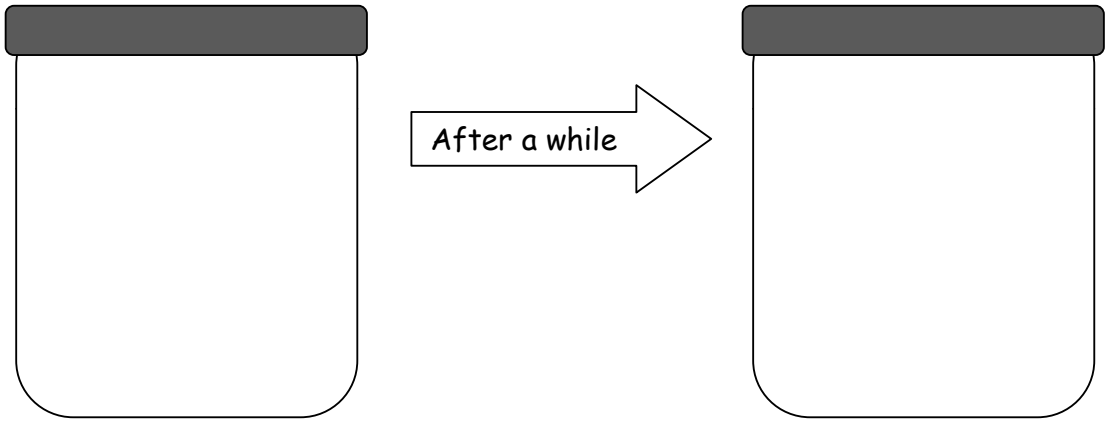


A18. Put the words in the right order in order to make the correct sentence, and match the sentence with the word it describes.

	of two or more pure substances A clear and homogeneous mixture. ....
	the the amount of by lesser component dissolved in The is solution solvent that. ....
	solution a of component The solute the dissolves that amount greater in. ....
	possible much Solutions solute that as hold is as ....
	can solute more which in Solution dissolved be. ....
	have solute Solutions amount and the are more dissolved that of can normal unstable than that. ....
	of in is solution substance solvent A any which water. ....

4.3. Vegetable soup

A19. Observe the vegetable soup that your teacher shows you. Shake the jar. Draw your observations and answer the questions. (Remember what you learned about mixtures)



1- Can you see more than one colour or type of matter? YES / NO

2- Has the mixture more than one phase? YES / NO

3- Has the mixture a uniform composition? YES / NO

4- Do the soup particles settle at the bottom when the mixture is left standing undisturbed? YES / NO

5- Is it a homogeneous or a heterogeneous mixture? .....

6- Write down a small paragraph justifying your answer.

I think this is a ..... mixture because .....

....., ...

..... and .....

7- Shake the soup again. Use your watch to time how long it takes for the particles to settle at the bottom.

The particles of the soup settle at the bottom after ..... minutes.

8- Do some particles stay suspended longer than others? Which ones?

.....

A20. We want to separate the suspended particles in the soup.

Predict: What will the difference be if we use a sieve or if we use a sieve and a coffee filter?

I predict that, using the sieve alone, ...

..... *However, using the sieve and the coffee filter,*

.....

Observe:

1. Pour about a cup of the settled soup through a sieve into a glass jar.

What is the size of the particles that pass through the sieve? Are they smaller or larger than the holes in the sieve?

.....

2. Wash the sieve. Put a coffee filter in the bottom of the sieve and place it over the second glass jar.
3. Pour the liquid you have just strained from the first glass jar through the filter paper and let the mixtures drip through.

What evidence do you have that the filter paper has holes even though you can't see them?

.....

Are there any vegetable particles on the filter paper? Are these particles smaller or larger than the holes in the filter paper?

.....

Taste the liquid that you have just filtered. Is there any salt? How can you tell?

.....

What can you say about the size of salt particles compared to the size of the holes in the filter paper?

.....

✍ **Explain:**

The particles retained by the sieve are ..... than the holes in the sieve because .....

The particles retained by the filter paper are ..... than the holes in the filter paper because .....

The particles that pass through the filter paper (for example .....) are ..... than the holes in the filter paper because .....

A21. Suspended particles settle on the bottom after a while.

Predict: What can you say about the relation between the settling rate and the particle size?

I predict that the ..... (bigger/smaller) the size of the particles, the ..... (higher/lower) the settling rate.

Observe:

1. Remove the filter paper from the strainer.
2. Take two large spoonfuls of vegetables from the bottom of the jar of the vegetable soup. Push them through the sieve with a spoon into the liquid in the glass jar.
3. Be sure to scrape the vegetables off the outside of the sieve. You can use some liquid from the jar you are using to wash the vegetable residue through the sieve.
4. Stir or shake the vegetable residue into the liquid.

How long does it take for these particles to settle at the bottom?

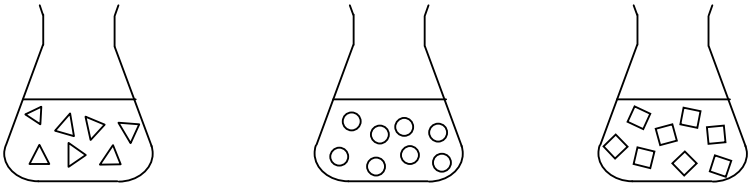
The particles of the pureed vegetables soup settle at the bottom after ..... minutes.

Do they all settle eventually? .....

✍ **Explain:**

The particles of the soup settle on the bottom ..... (faster/slower) than ..... because the particles of the soup are ..... than .....

A22. From the results of these experiments, can you explain how settling rates and filtering can be used to find the size of the particles? Order the particles of the next mixtures according to their size.



Suspension A Suspension B Suspension C

Fact 1. Suspension C settles faster than suspension A, but suspension B is the fastest.

Fact 2. Suspension B can be filtered with a sieve, suspension C can be filtered with a filter paper but suspension A can't be filtered.

Compare the size of the particles in these suspensions:

particles ..... > particles ..... > particles .....

Particles ..... are ..... (bigger/smaller) then particles .....

Particles ..... are .....

Particles ..... are the smallest because .....

Particles ..... are the biggest because .....

A23. What can we say about the size of the particles of solute in a solution? Are they bigger or smaller than the particles of a suspension?

.....

.....

4.4. Salad dressing and mayonnaise.

A24. A salad dressing recipe.

Vinaigrette salad dressing

Ingredients:

½ cup Virgin Olive Oil
¼ cup Balsamic Vinegar
2 tablespoons of chopped fresh Basil
3 tablespoons of Parmesan Cheese
Salt and Fresh Black Pepper

Procedure:

1. Combine all the ingredients except the oil.
2. Add half the oil.
3. Screw the lid and shake.
4. Add the remaining oil and shake all vigorously.
5. Pour immediately on the salad.

Will it be a homogeneous or a heterogeneous mixture? Why?

.....

A25. Do you remember what the behaviour of oil and water is when they are mixed? As vinegar is a water-based substance, the same will happen when we mix oil and vinegar, so it will be the same when we prepare vinaigrette. Complete the next sentences.

Vinaigrette salad dressing is a mixture of ....., ... and seasoning. Vinegar is a water-based substance and is also ..... (miscible/immiscible) with oil. Vinegar ..... (dissolves/doesn't dissolve) in water. In order for all flavours of the dressing to be evenly spread through the salad, it must be thoroughly mixed. To use the vinaigrette, you have to ..... it vigorously and immediately ..... on a salad before the two liquids have a chance to .....

A26. Does the size of the droplets of two immiscible liquids affect the rate of separation into layers? Design an experiment to answer this question. When you have finished, show it to your teacher, then do the experiment and complete the final report.

Hypothesis	*I think that if you shake the mixture longer, the droplets will be ..... (smaller/bigger) and separation will be ..... (faster/slower)*
Material needed	*Oil* *Vinegar* *A jar with a tight cover.* *A watch with a second hand.* *A magnifying glass*
Method (what you are going to do)	
Results (you can draw a table to record the results)	
Conclusion	

A27. Text: EMULSIONS AND EMULSIFIERS.

EMULSIONS AND EMULSIFIERS

Question:

Answer:

A28. You are working in a food technology laboratory. You are asked to find out which of the following things found in a kitchen are emulsifiers: *Washing up liquid; Sugar; Flour; Mustard; Salt; Egg white and Egg yolk.*

You need to plan what you will do to find out which of your test substances are emulsifiers and how you will record your results. When you have decided, let the teacher check the design of your experiment and carry it out.

Hypothesis	*If a substance is an emulsifier, it will* ....
Material needed	
Method (what you are going to do)	
Results (you can draw a table to record the results)	
Conclusion	

When you have finished, write down the results of the report and answer the questions below.

1. Which of the substances you tested are emulsifiers?

2. Which of the substances you tested is the best emulsifier?

3. Is there enough evidence to make a firm conclusion? If not, what further experimental work could you carry out or how could you change your experiment to make your results more reliable?

4. A salad dressing is made of oil and vinegar. Which of the substances you have tested would be best to use in the dressing? Explain why you have chosen this substance and not any of the others.

5. At home, look for foods that contain the emulsifiers you have identified today?

6. What other emulsifiers can you find?

7. Which types of food contain emulsifiers?

A29. Mayonnaise is an emulsion of oil in vinegar or lemon juice. In the process of making mayonnaise, you disperse five parts of oil into only one part of water (the vinegar or lemon juice). The water forms a thin coating around the oil droplets. Look for a recipe of mayonnaise sauce.

Recipe title: Mayonnaise sauce

Ingredients:

.....

Equipment:

.....

Procedure:

.....

.....

.....

.....

.....

.....

.....

1. Which is the emulsifier?

2. Why is the oil added drop by drop while beating constantly?

3. Why does the mayonnaise separate if you add the oil too fast or you add too much oil at one time?