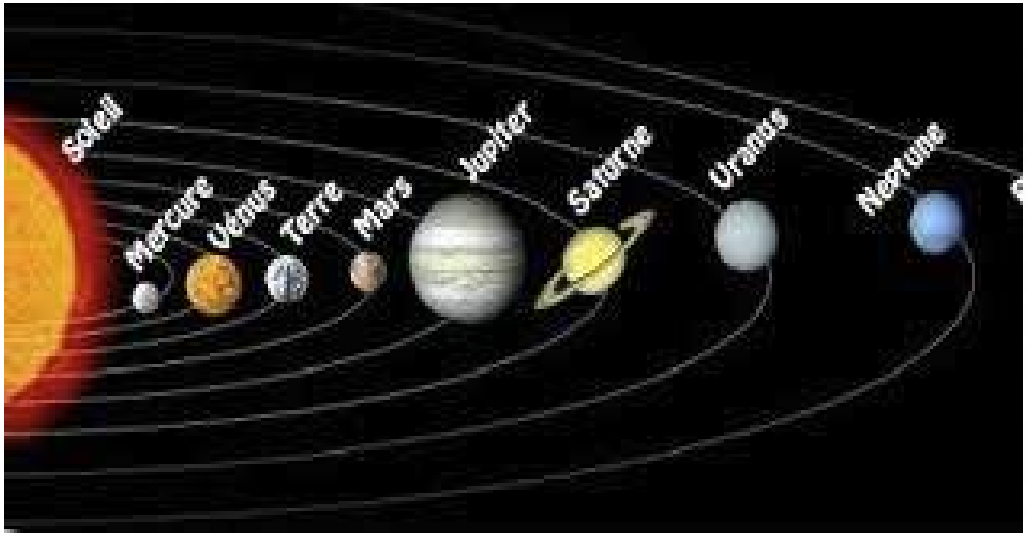
Why can we live on Earth?



Solar system

Earth:

Mars

Possible answers:

1. Because of the sun which gives light and heat

2. Because of liquid water that can be found on Earth.

- **Water? What is it?**

- **How can we recognize water in the laboratory?**

Éthanol	
Identification	
Nom IUPAC	Éthanol
Apparence	liquide incolore, d'odeur caractéristique.
Propriétés chimiques	
Formule brute	C_2H_6O
Propriétés physiques	
T° fusion	−117 °C[1]
T° ébullition	79 °C[1]
Masse volumique	0,789 kg pour 1 litre à 15°C
Précautions	

cyclohexane	
Identification	
Nom IUPAC	cyclohexane
Apparence	liquide incolore[1]
Propriétés chimiques	
Formule brute	C_6H_{12}
Propriétés physiques	
T° fusion	6,47 °C
T° ébullition	80,75 °C
Masse volumique	0,7786 g·cm^{-3}
Précautions	

Danger : H225, H304, H315, H336, H410,

Site : https://fr.wikipedia.org

From : E.S.P.A.C.E. Brodas

Security

Nouveaux pictogrammes


Explosif


Inflammable


Comburant


Gaz sous pression


Corrosif


Toxicité aiguë pour l'organisme


Dangereux pour la santé


Toxicité spécifique sur la santé : cancérigène, mutagène, reprotoxique


Dangereux pour l'environnement

Au laboratoire, il ne faut pas...

... manger et boire

... pipeter à la bouche

... respirer le contenu des flacons


... agiter en bouchant les tubes ou les erlenmeyers avec les doigts ou la main

Water (Wikipedia)

Water is a transparent and nearly colorless chemical substance that is the main constituent of Earth's streams, lakes, and oceans, and the fluids of most living organisms. Its chemical formula is H2O, meaning that its molecule contains one oxygen and two hydrogen atoms, that are connected by covalent bonds. Water strictly refers to the liquid state of that substance, that prevails at standard ambient temperature and pressure; but it often refers also to its solid state (ice) or its gaseous state (steam or water vapor). It also occurs in nature as snow, glaciers, ice packs and icebergs, clouds, fog, dew, aquifers, and atmospheric humidity.

Appareance	White solid or almost colorless, transparent, with a slight hint of blue, crystalline solid or liquid
Chemical formula	$H_2 0$
Physical properties	
Melting point	0°C
Boiling point	100°C
Density	1.00 kg per liter (15°C) 0.96 kg per liter (100°C) 0.73 kg per liter (300°C)

- Water? What is it?
- How can we recognize water in the laboratory?

On a new page of your notebook

Chapter 4 : CARACTERISTICS OF WATER

1. Characteristic quantities:

Activity 1 : Quantity, unit, measuring device

Questions:

1. Classify the following words into three groups :

Temperature, thermometer, degree Celsius, Mass, balance, kilogram, volume, litre, burette, time, second, chronometer

*** Call the teacher ***

2. Placethese words in the table

*** Call the teacher ***

4. Add the right symbol in front of the name

T, t, V, °C, L, m, kg, s

5. Give a name to each column.

6. Add a column in order to write a definition:

6a. of the volume?

6b. of the mass?

1. Caracteristics quantities

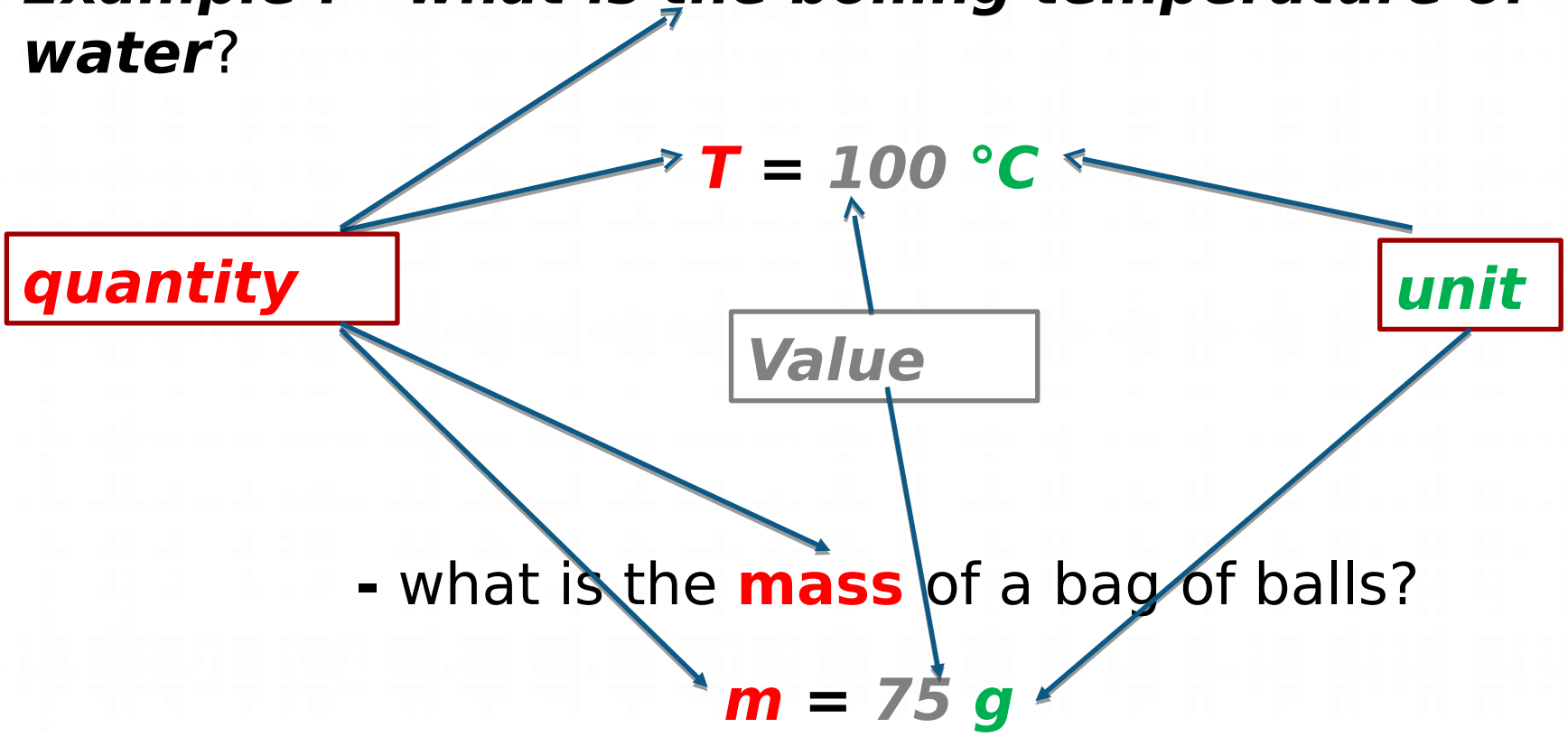
Définition						
	Nom	*Symbole*	Nom	*Symbole*	Nom	*Symbole*
La ..... représente	....	.....	....	.....	....	
Le volume est	....	.....	....	.....	....	
	....	.....	....	.....	....	

***Example : what is the boiling* temperature?**

quantity → ***T = 100 °C*** ← ***unit***

Value

***Example : - what is the boiling temperature of water*?**



- what is the **mass** of a bag of balls?

m* = 75 *g

Remark : units of volume (litre or m^3)

1 L = 1 dm^3

1 mL = 1 cm^3

With 1 L = 1 000 mL

Exercice p 103
n°2

Activité 2 : Quelles sont les températures caractéristiques de l'eau ?

Questions *(ne pas copier les questions, écrire les réponses)* :

1. Quel est la température de l'eau liquide ?
2. À 0°C, dans quel état est l'eau ?
3. À 100°C, dans quel état est l'eau ?
4. Comment mesurer la température ?

http://physiquecollege.free.fr/cinquieme.htm

Water (Wikipedia)

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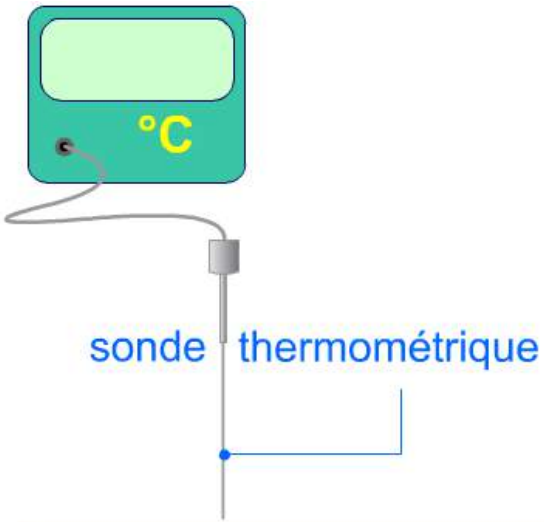
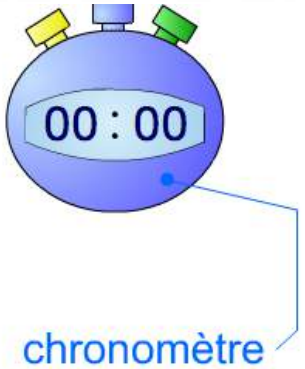
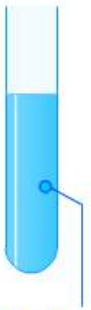
Solidification of liquid water

http://physiquecollege.free.fr/cinquieme.htm

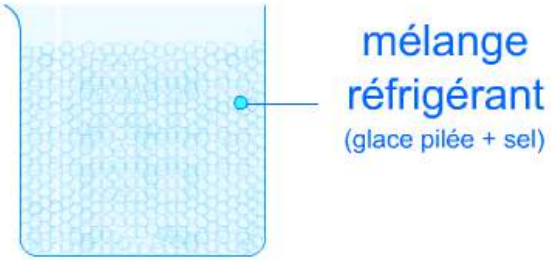






Les CONSIGNES s'affichent ici :

Plonger le tube d'eau dans le mélange réfrigérant.



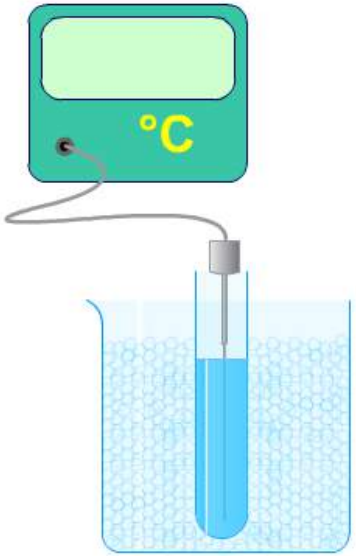
Solidification of liquid water

t (min)	0	1	2	3	4
θ (°C)	16				
état	L				

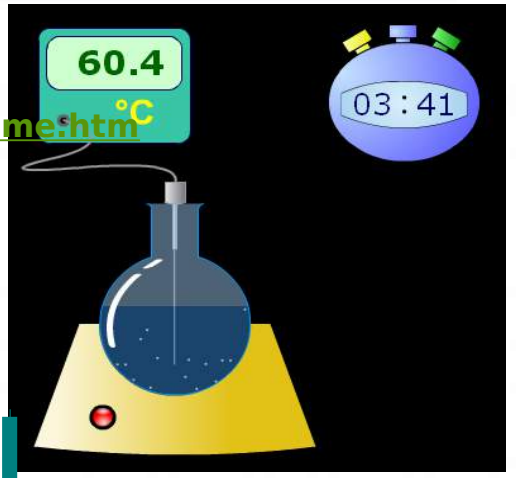
5	6	7	8	9	10

http://physiquecollege.free.fr/cinquieme.htm

In order to complete the table, you must :
Click on the red button (the chronometer will start and the thermometer will measure the temperature)
Click on the red button each minute
Remarks
- You must stay vigilant and precise.
- The process is quicker thant in the real world.



Boiling water



http://physiquecollege.free.fr/cinquieme.htm

Experience : Pouring water into a flask and heat the flask.

Observations :

Temps (en min)	0	1	2	3	4	5	6	7	8	9	10
Température (°C)	**16**	**28**	**40**	**52**	**65**	**77**	**89**	**97**	**100**	**100**	**100**
ETAT	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**L**	**L + G**	**L + G**	**L + G**

The temperature is increasing

The temperature is constant

The state of water doesn't change

The state changes

Water is boiling at ..... **100°C**

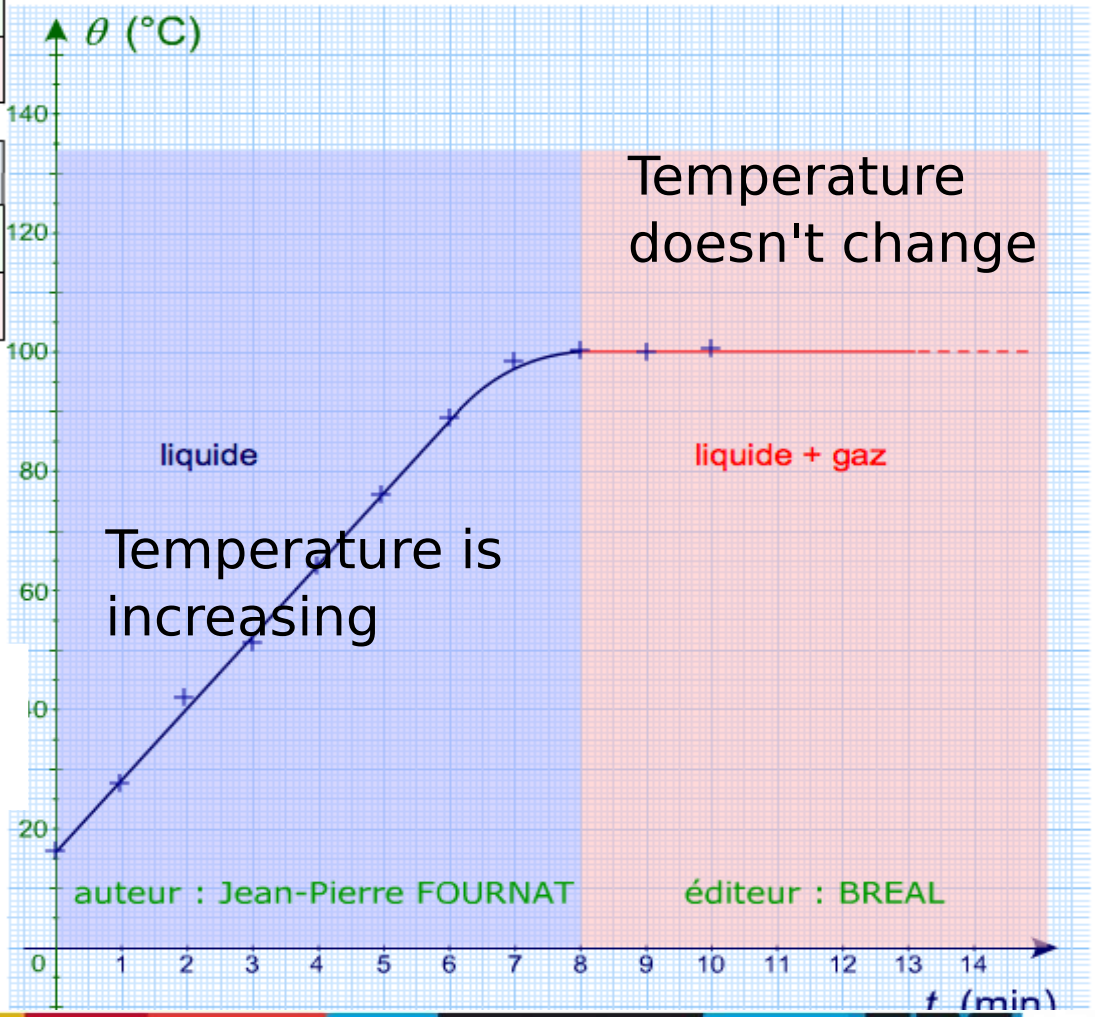
The temperature doesn't increase any more after having boiled.

Interpretation :

http://physiquecollege.free.fr/cinquieme.htm

t (min)	0	1	2	3	4
θ (°C)	16	28.3	40.3	52.4	64.5
état	L	L	L	L	L

5	6	7	8	9	10
76.5	88.5	97.3	100	100	100
L	L	L	L+G	L+G	L+G



- Verify if points are on the curve.
- Is there a stable temperature?

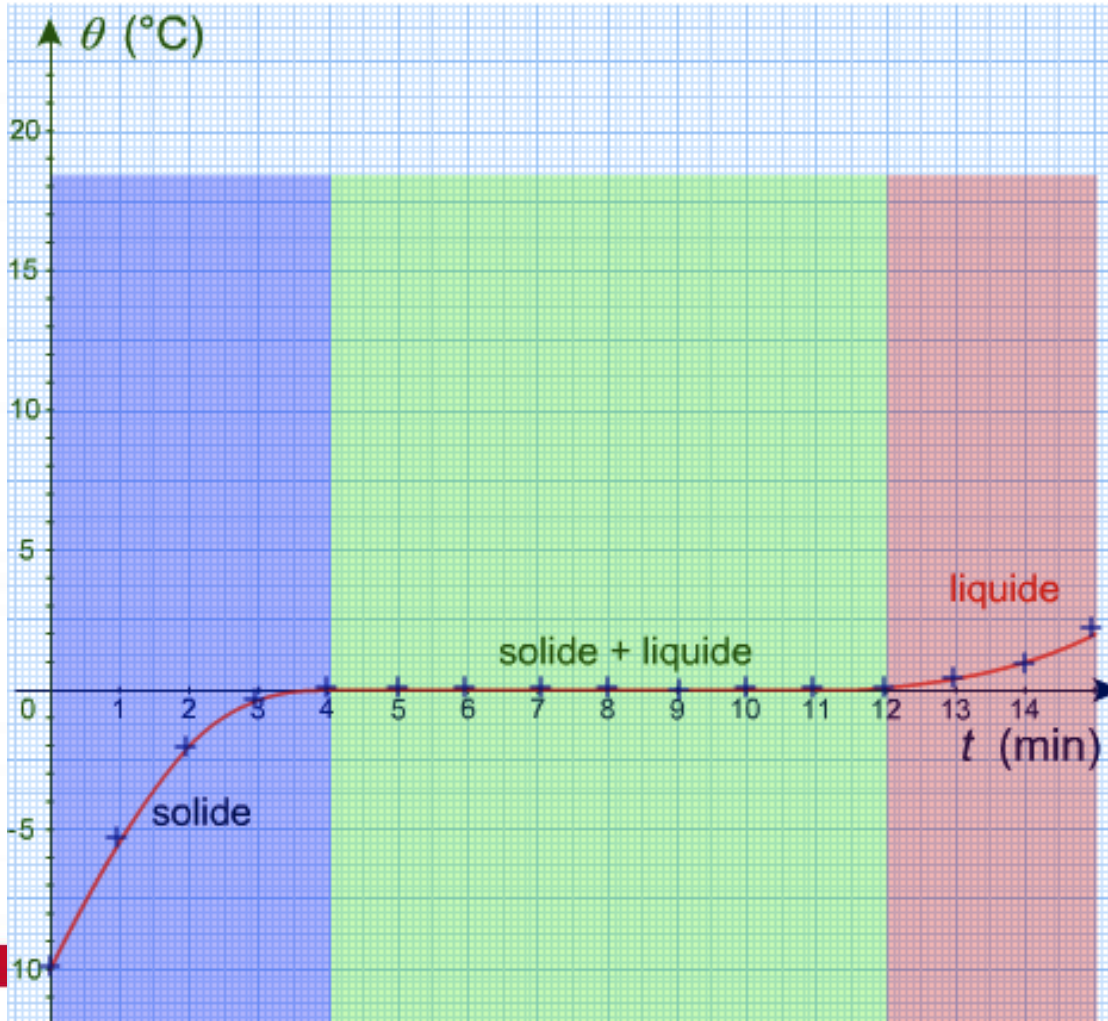
Melting point

http://physiquecollege.free.fr/cinquieme.htm

t (min)	0	1	2	3	4
θ (°C)	-10	-5.5	-2	-0.5	0
état	S	S	S	S	S+L

5	6	7	8	9	10
0	0	0	0	0	0
S+L	S+L	S+L	S+L	S+L	S+L

11	12	13	14	15
0	0	0.5	1	2
S+L	S+L	L	L	L

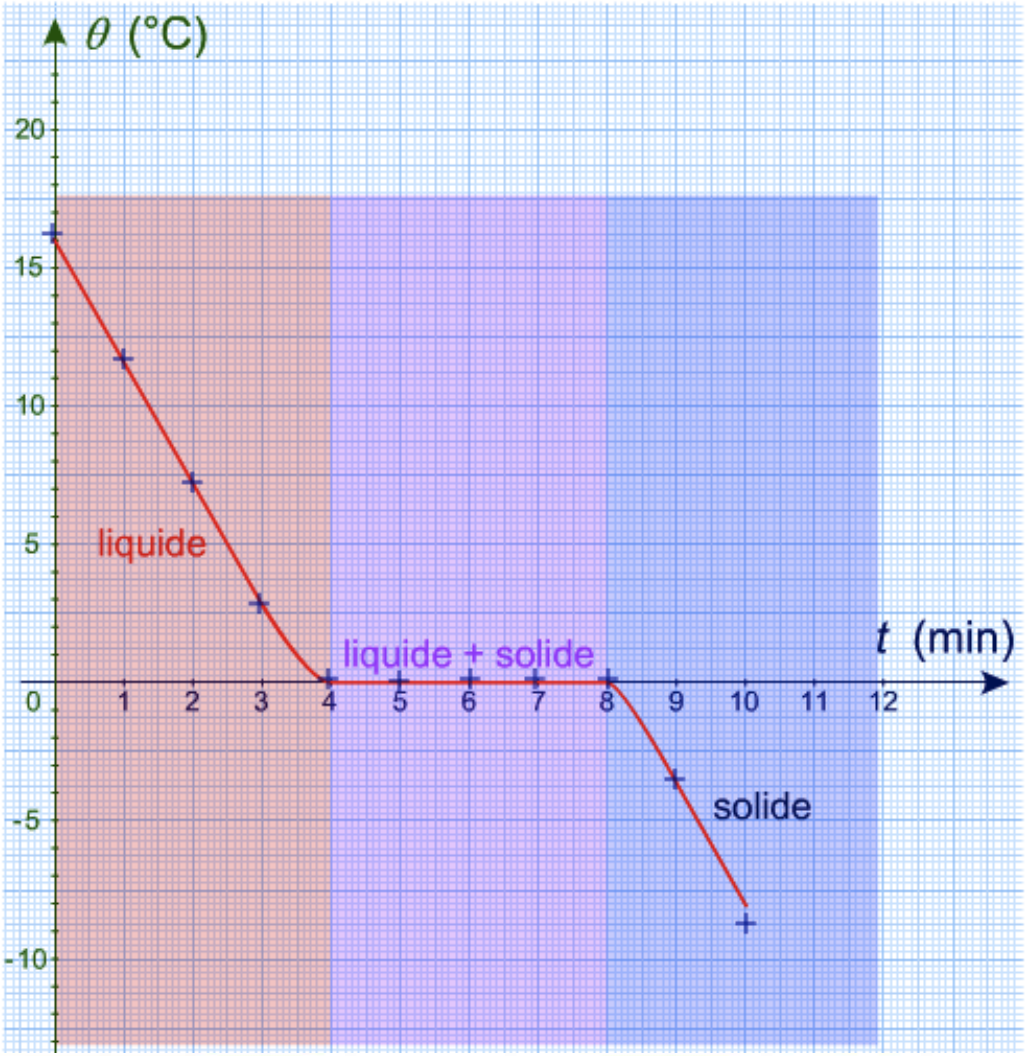


Solidification of liquid water

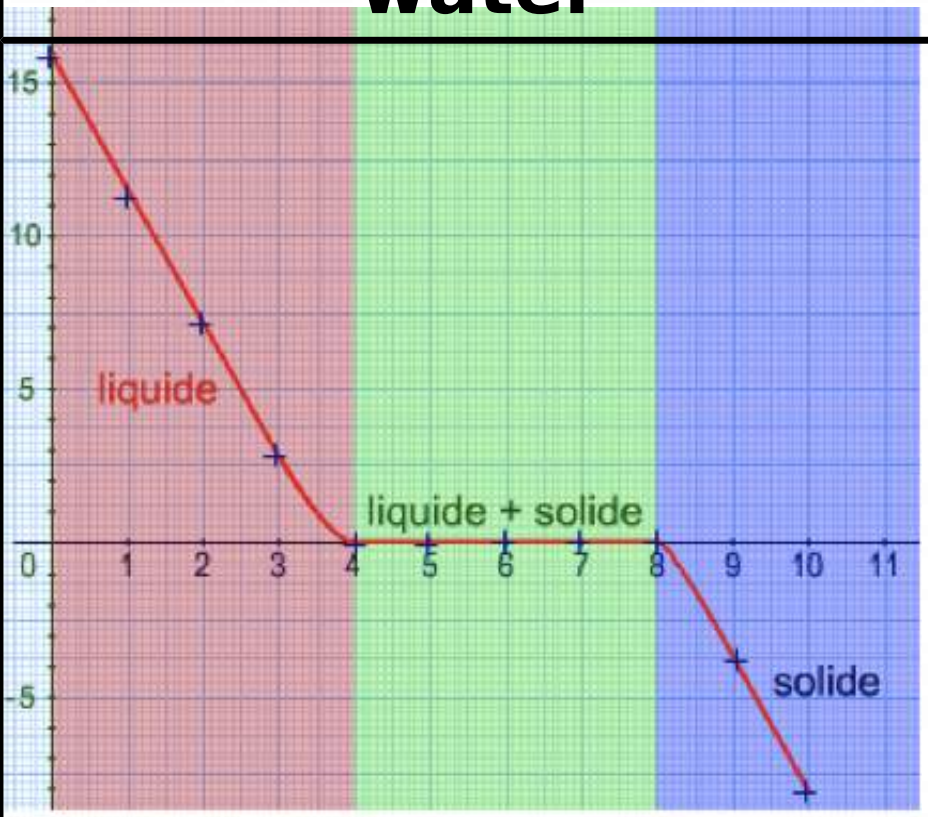
http://physiquecollege.free.fr/cinquieme.htm

t (min)	0	1	2	3	4
θ (°C)	16	11.5	7.1	2.8	0
état	L	L	L	L	L+S

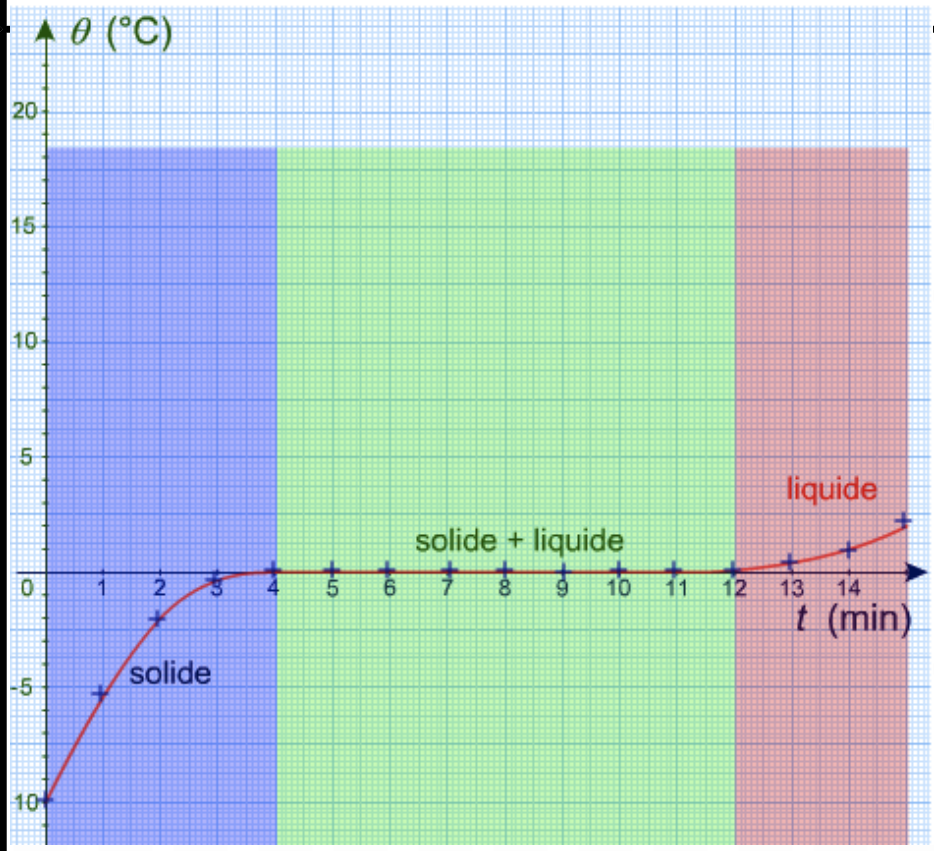
5	6	7	8	9	10
0	0	0	0	-3.8	-8.1
L+S	L+S	L+S	L+S	S	S



Solidification of pure water



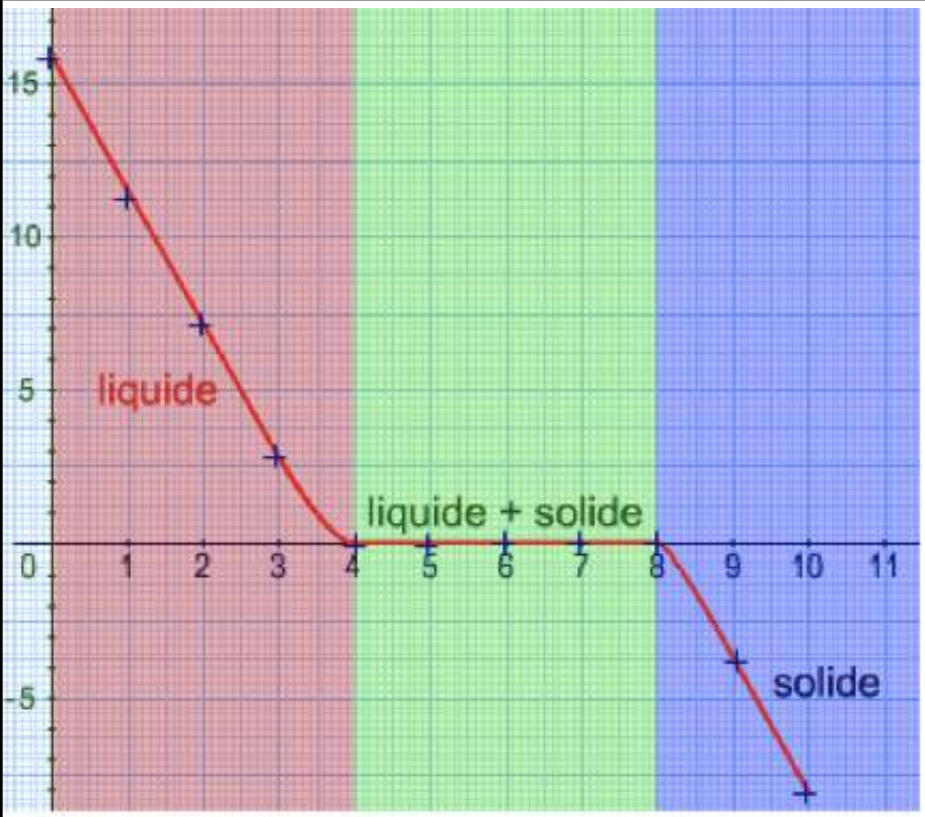
Fusion of pure water



http://physiquecollege.free.fr/cinquieme.htm

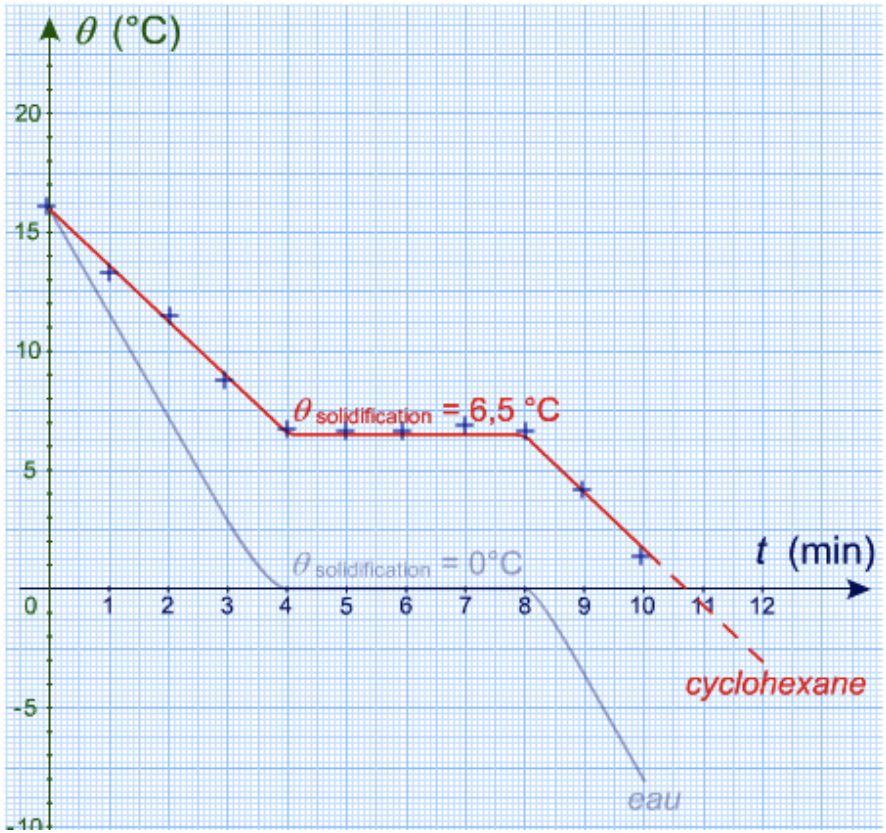
Solidification of a pure stuff

Water

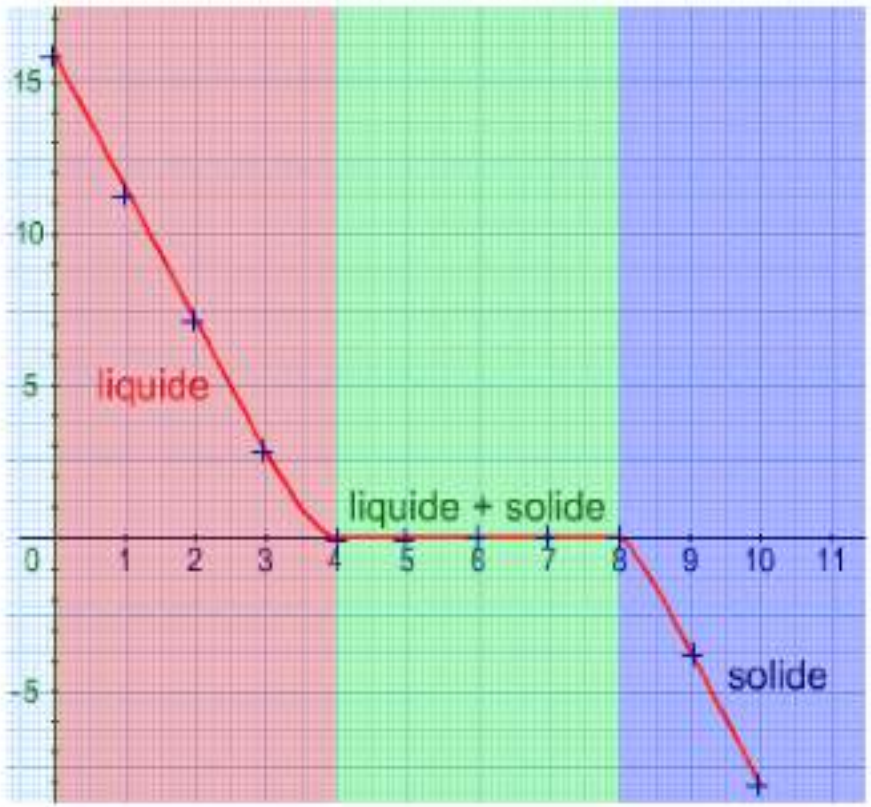


http://physiquecollege.free.fr/cinquieme.htm

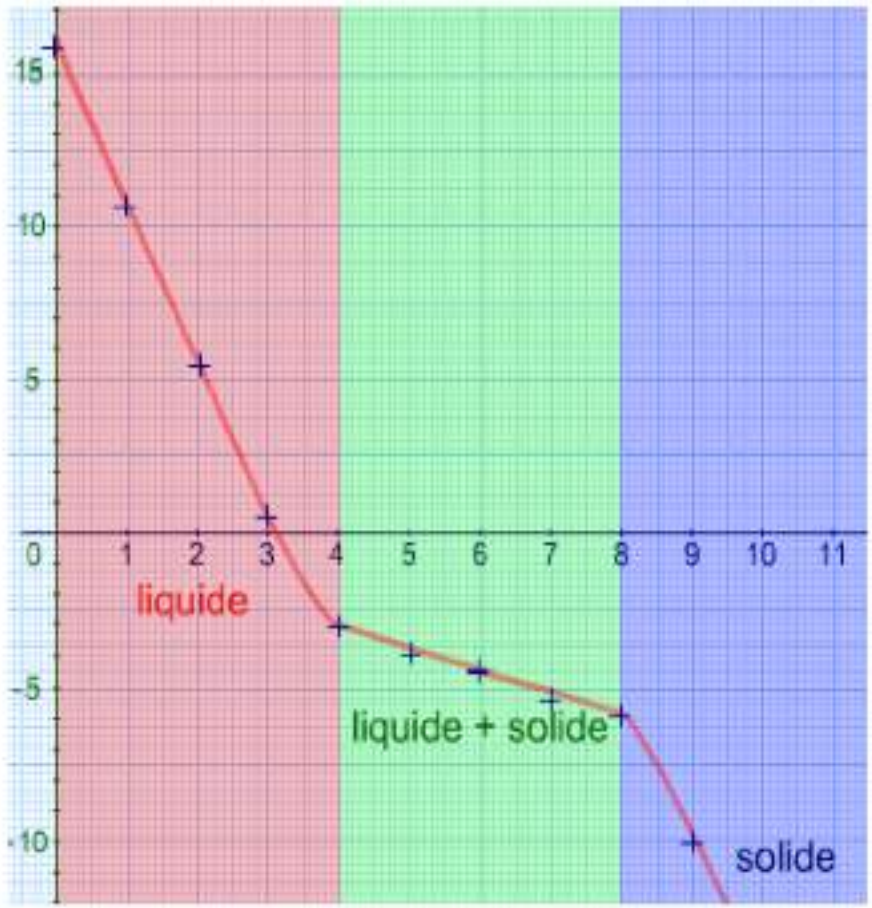
Cyclohexane



Observations : 1- Voici les deux graphiques obtenus :



EAU PURE



EAU SALEE

http://physiquecollege.free.fr/cinquieme.htm

Questions

1. What is the temperature of liquid water?
2. At 0°C, what is the state of water?
3. At 100°C, what is the state of water?
4. How to measure temperature?

Answers :

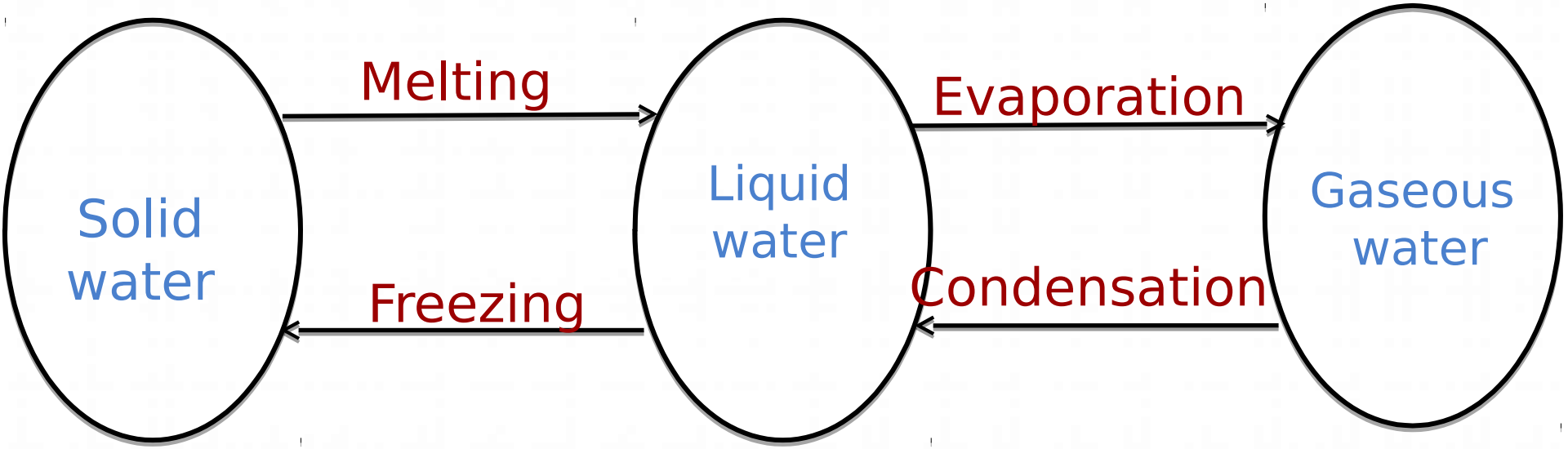
1. The temperature of liquid water varies from 0°C to 100 °C.
2. At 0°C, it is a blending of liquid and solid water.
3. At 100°C, it is a blending of liquid and gaseous water.

When a substance goes from one state of matter — solid, liquid, or gas — to another state of matter, the temperature stays constant.

a. The caracteristics temperatures of pure water:

The caracteristics temperature are the tempertures of change of state

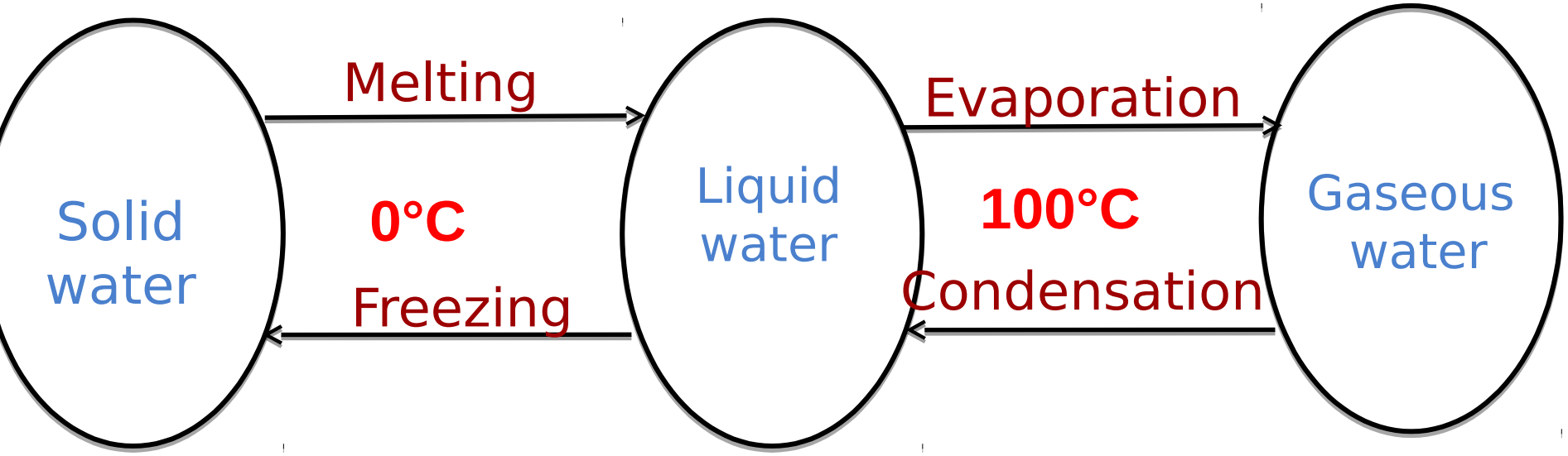
- Temperature of fusion and solidification of pure water: **0°C**
- Temperature of vaporization et de liquefaction of pure water is: **100°C**



Temperature between 0°C et 100°C

Livre de quatrième :

Temperatures of water change of state:

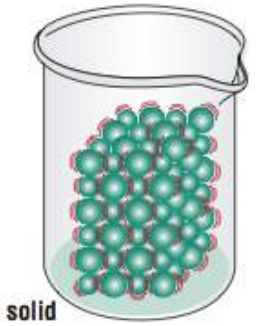


Activity coming from SESAME

Intoduction to a particle model: *from https://wikis.engrade.com/a75science/solidsliquidsgases*

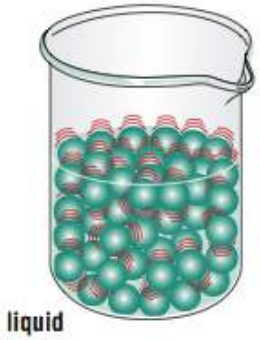
The particle model

Properties of solids:
- have a definite shape
- do not flow
- virtually impossible to compress
- expand if heated, but usually less than liquids and gases.



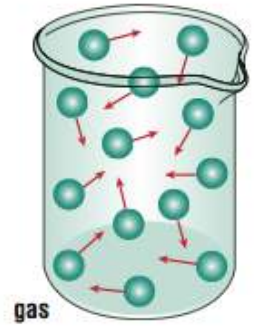
Particles in solids:
- strongly bonded to each other
- vibrate a little, but not much compared to liquids and gases
- vibrate faster when heated.

Properties of liquids:
- no definite shape
- can flow to take the shape of the bottom of a container
- very difficult to compress (virtually incompressible).



Particles in liquids:
- weakly bonded to each other
- break their bonds easily
- vibrate and move more than those in a solid
- move faster when heated.

Properties of gases:
- no fixed shape
- gases spread (or diffuse) to completely fill a container
- gases are easily compressed.



Gas particles:
- are 'free', having no bonds between them
- have much more energy than those of a solid or liquid
- fly around, bouncing off each other and the walls of their container.

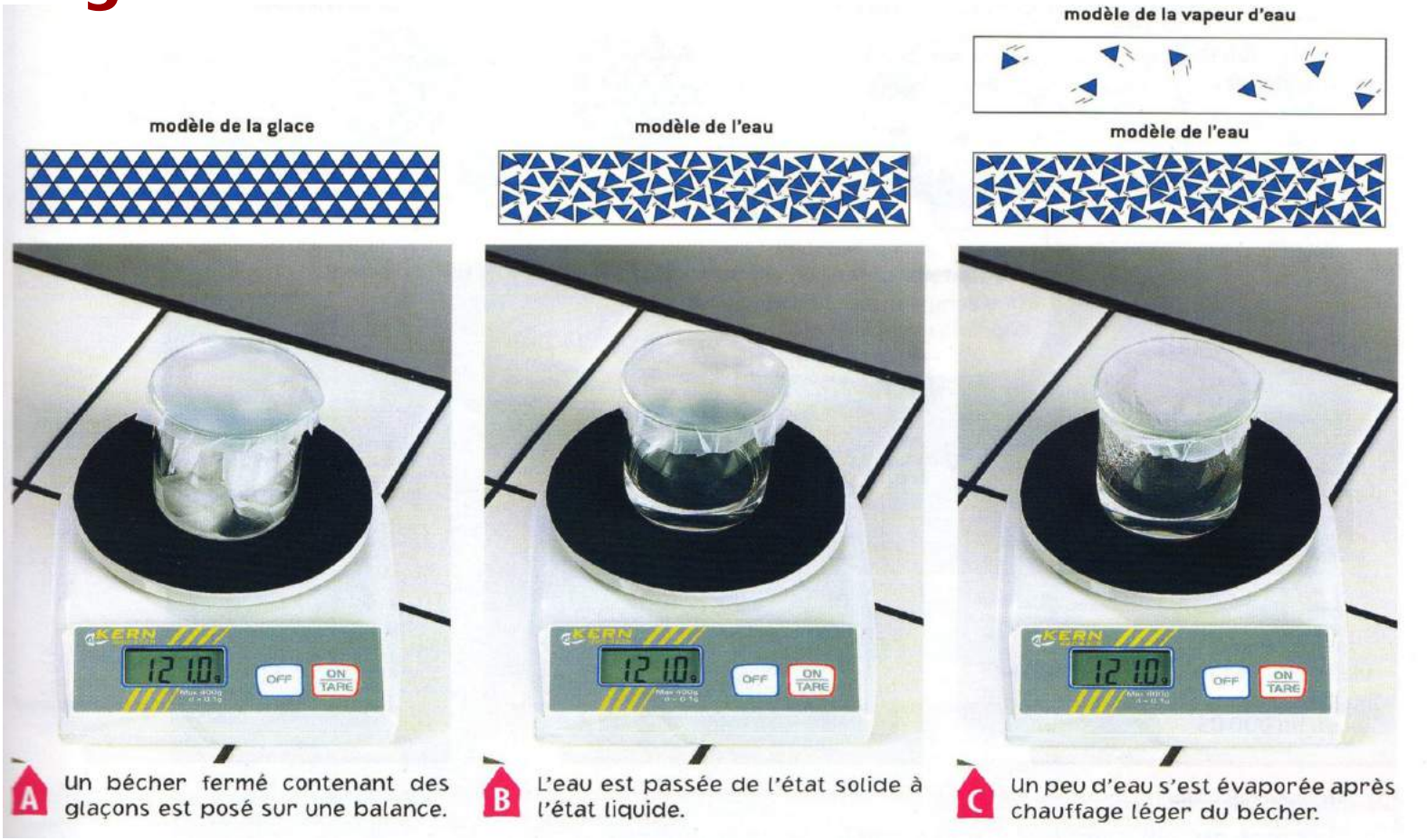
PP Interactive

Livre de quatrième :

Activity : Changeof states

http://physiquecollege.free.fr/physique_chimie_college_lycee/quatrieme/chimie/etats_eau.htm

Why does the mass of water doesn't vary during changes of state?



1. What are the different states of water represented on the previous photographs and models ?
2. What is the water mass in solid state and in liquid state ? Compare results.
3. Why is there a clingfilm on the beaker?
4. Does the mass vary when water evaporates?
5. How can the particle model can explain the weighing scale comportment?

1. A : solid state; B : liquid state; C : gaseous state.

2. $\mathbf{m}_A$ = 121,0 g; $\mathbf{m}_B$ = 121,0 g;

3. The clingfilm prevents the gaseous water to slip out of the beaker.

4. $\mathbf{m}_C$ = 121,0 g; The mass doesn't change during evaporation

5. As the number of particles doesn't change, the mass doesn't vary even if water changes of state.

b. The mass of 1 L. of liquid water:

Introduction : *Why the water of the planet Tchouri is different from the water on Earth?*

Activity 3 : What is the mass of liquid water?

Under normal conditions of pressure and temperature (about 20°C), **the mass of 1 litre of liquid water is 1kg.**

Remarks:

- 1 litre of oil weighs 850 g (approximatively)
- 1 kg of solid water has a volume greater than 1 L.

Revising :

1.Caracteristics quantities :

Quantities, units, measuring device

2.Caracteristics quantities of water:

a. Temperatures of change of states;

b. The mass of 1L of water ;

Book : microméga – Hatier : p 12 à 32