

This story is an English translation of "Agá-dois-ó: uma gota de água" from the Portuguese book "Histórias com Química" (Stories with Chemistry)¹, which is used during the storytelling activity of the project.

Agá-dois-ó: a drop of water



TOMÁS'
SPACE

Hello, friend,
I have another story to tell you.
It has a slightly confusing
beginning for Pepo, but
everything ends up
becoming clear. Let's find out!

After playing on the riverside for a long time, Pepo and Lina ran under a tree to have a snack in the shade. Quite curious, they opened the lunch box their grandmother had prepared for them and were delighted to see a delicious chocolate cake. They ate the cake with great satisfaction as they watched the calm river flowing past, bathed the fish and stones it encountered along the way. Meanwhile, Pepo, with his mouth smeared with chocolate, asked Lina:

— Do you know what ingredients Grandma used to make this cake?

Lina, noticing that he had already eaten more than five slices of cake, asked:

— Why? Don't tell me you're going to eat more cake?!

— No, no! I'm already quite full — replied Pepo hastily.

More relaxed now that she realised Pepo wasn't such a glutton after all, Lina said:

— The cake contains sugar, flour, eggs, salt, chocolate

¹Morais C. and Teixeira P. M. (2012), *Histórias com Química [Stories with Chemistry]*, QuidNovi.

and water.

— Hum... are you sure? — Pepo asked suspiciously.

— Yes! These ingredients, after being thoroughly mixed and subjected to high temperatures, undergo transformations that create new substances and give the cake a different appearance and flavour — explained Lina.



— On second thought, you might be right, but I'm still not sure about the water. Will there really be water in the cake? — asked Pepo.

— Water is essential for life, and as such, almost all foods contain water — replied Lina.

— While Lina was trying to explain to Pepo that there was water in the chocolate cake, a small icicle fell from the tree branches and landed on Pepo's head. While Lina was trying to explain to Pepo that there was water in the chocolate cake, a small icicle fell from the tree branches and landed on Pepo's head. At the sight of this, Lina burst out laughing:

— Pepo, what fell on your head is also water.

— Water?! This?! It can't be! It's not the same as river water — said Pepo, very impressed.

— Listening to the twins' chat, a small drop of water

passing by in the river jumped onto the riverside and reached them.

— Hello, kids! My name is Agá-dois-ó. I was listening to your dialogue and decided to help you.

— Hello! I'm glad you came to meet us, because my brother Pepo doesn't know anything about you —Lina joked.

— That's not true. Of course, I know — grumbled Pepo.

Seeing the twins in total disagreement, the little drop Agá-dois-ó suggested to them:

— I can tell you a little about myself and about all the drops of water.



Observing that the twins liked the idea, the Agá-dois-ó pointed to some clouds moving across the sky:

— Just yesterday I was up there floating in those white clouds, and today I'm here walking along the riverside.

Upon hearing this, Pepo asked:

— How? Did you come by plane?

— Oh, what nonsense, Pepo! The little drop Agá-dois-ó fell from the clouds when it started to rain — explained Lina.

— That's right, I and other water droplets circulate continuously between the Earth's surface and the atmosphere — added the drop Agá-dois-ó.

Now more knowledgeable on the subject, Pepo continued:

— So, this means that, due to the sun's energy, the water that constitutes the oceans, seas, rivers and lakes slowly rises and goes into the atmosphere?

— Yes, Pepo. That is exactly what happens. Then we return to Earth in the form of rain, snow or hail. Thus, the water cycle repeats itself, keeping the amount of water on our planet constant — replied the little drop Agá-dois-ó.

Pepo, picking up the icicle that had fallen on his head, said:

— But this is also water, as Lina said?

— Yes, that is water in its solid state — replied the little drop Agá-dois-ó.

— Water in its solid state? — asked Pepo, surprised.

— I only know sugar water, salt water, lemon water, sparkling water. Now this... I don't know! — stated Pepo, quite confused.

Bursting into loud laughter, the little drop Agá-dois-ó retorted:

— Water can exist in different states: solid, like ice or snow; liquid, like the water that flows in rivers and from the taps in your homes; and gaseous, like the water vapour that rises to form clouds.



Realising that the twins still had some doubts, Agá-dois-ó suggested that they conduct an experiment to better understand the water cycle.

— Wow! Shall we try an experiment? — asked Pepo, who was jumping up and down with excitement.

— Yes, just as scientists do in their laboratories when they want to learn more about the properties of substances and their transformations — informed the little drop Agá-dois-ó.

— Let's experiment to learn better! — completed Lina, who was also really excited about the idea.

The twins, accompanied by other water droplets that had joined them and Agá-dois-ó, walked home to carry out their long-awaited experiment. With the help of Pepo and Lina's mother, they gathered all the materials they needed.

— Shall we begin? — asked Pepo, already impatient.

After Agá-dois-ó whistled, all the other water droplets jumped into a pan. Then, the little drop Agá-dois-ó asked the twins' mum to turn on the hob and asked everyone to watch carefully what was going to happen.

After a while, water vapour could be seen coming out of the pan.

Somewhat uneasy, Lina asked:

— Have all the droplets turned into water vapour and gone up into the clouds?



Before Agá-dois-ó had time to respond, a voice was heard coming from inside the pot:

— No, Lina, some of us are still here.

— But we cannot see you as clearly as before — noted Pepo.

Then, the twins' mother turned off the hob and Agá-dois-ó asked Lina to put the glass lid on the pan.

— The lid of the pan is quite cold! — said Lina as she picked up the lid.

After Lina put the lid on, the twins noticed that the water vapour, upon hitting the cold lid, turned back into liquid water.

The twins were fascinated by the experience. But to further increase their enthusiasm, the little drop Agá-dois-ó added:

— Our experiment isn't over yet! Let's turn the liquid water droplets into ice.



Always supervised by his mother, Pepo placed the pan with liquid water in the freezer. After some time, they saw that all the water had turned to ice. Realising that Pepo was distressed to see all the water droplets motionless, the Agá-dois-ó drop calmed him down:

— Don't worry, Pepo. We'll heat them up and they'll return to a liquid state.

Back to their original form, the droplets participating in the experiment asked the twins:

— Do you now have a better understanding of the transformations that water can undergo?

— Yes, much better — replied the twins.

— Conducting experiments is very important, as it helps humans to better understand the world around them — added the little drop Agá-dois-ó.

Very excited and now better informed about water and its transformations, Pepo did not hesitate to ask:

— In any of the states, solid, liquid, and gaseous, is the water “inside” all the same?

— Yes, all water is made up of the chemical elements hydrogen and oxygen — clarified Agá-dois-ó.

Pepo, still a bit frightened, stated:

— I thought these “genies” only existed in the stars and in quite strange things here on Earth. I never thought they also existed in the water we use for drinking, cooking, washing, watering plants and many other things.

— Where else can we find hydrogen and oxygen? — questioned Lina next.

— These elements are also present in the air we breathe, although nitrogen gas exists in greater quantities than either of these two. Currently, hydrogen is used as fuel for rockets and is being tested as a “clean” energy source for transport — explained the little drop Agá-dois-ó.

— Planet Earth is going to experience an energy crisis. Reserves of oil, coal and natural gas will run out in a few years, and we need to find other sources of energy — took the opportunity to add the twins' mother.

— Yes, that is why it is even more important to use the water you have available on Earth wisely. There are some gestures that help save water, such as:

◆ Do not leave taps dripping.



Take a shower.



Brush your teeth with the tap turned off.



Wash food using only the necessary amount of water.

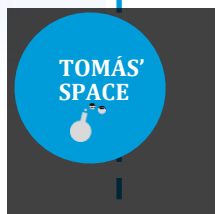


Watering gardens using buckets or watering cans instead of hoses — advised the little drop Agá-dois-ó.

As soon as the little drop Agá-dois-ó had finished speaking, a voice was heard saying:

— Agá-dois-ó, darling, where are you? Today we have to go to sleep in the clouds so that tomorrow we can join the little drops that are in the ocean.

Hearing the call, the little drop Agá-dois-ó and all the other little drops said goodbye to the twins and their mother and left. The twins, who were quite pleased to have learned more about the composition of water, continued to talk to their mother about the simple measures they could take to save this important resource.



Dear friend,

You have just learned more about one of our planet's greatest treasures. Made up of hydrogen and oxygen, water is essential to life. Just like Pepo and Lina, you too should avoid wasting water in your daily life.

I hope to see you soon for another adventure.