

Crystals Showcase.

Discussion of states of matter activity

In this handout, you will find a brief discussion of the substances presented in question 4, and an empty table that the learners can fill in with the substances from their list in question 1.

! **Be aware:** Some of the substances in this list, especially in the least common state, might be dangerous. We do not recommend any hands-on demonstration for this question.

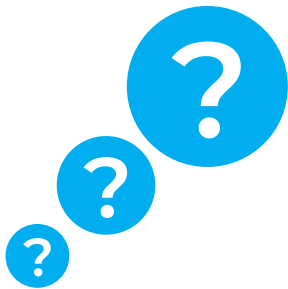
Discussion of question 4: Can you identify the state?

You can find **water** (H_2O) in all three states: as a liquid, as a solid in the form of ice and snowflakes for example, and as a gas dispersed in the air, and even when we make tea!

Carbon dioxide (CO_2) is a very famous gas. It is produced by combustion (when something burns) and in the respiration process we breath out CO_2 . But did you know that dry ice used for example for sport injuries is solid carbon dioxide? But be careful, it is incredibly cold!

Nitrogen (N_2) is the most abundant gas in the atmosphere: 79% of the air around us is N_2 ! Liquid nitrogen, instead, is extremely cold and is used for many different applications, including in some cases in the ice-cream making process.

Cocoa butter is usually found in its solid form, but melted chocolate is still very yummy. Did you know that cocoa butter has at least six different solid forms? To learn more about it, try the activity **Lego, Chocolate and Polymorphs**.



We usually use **sugar** in its solid form, where we can notice many little crystals. Caramelised sugar is instead based on the liquid form.

Paracetamol is a drug often sold in tablets, so we usually see it as a solid.

Helium (He) is a gas. It is used in balloons to make them fly!

Carbon (C) is usually found in its solid forms. An example is **diamond**. But graphite is also made of carbon atoms!

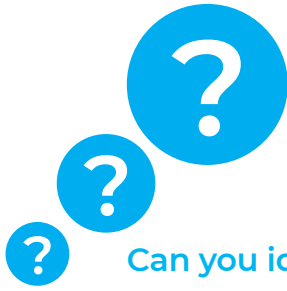
Quarz (SiO_2) is a beautiful mineral (solid).

Styrene (C_8H_8) is a chemical generally found as a liquid. If the name sounds familiar, that is probably because you know a material made with this: polystyrene! Polystyrene (a solid) is made of long chains of styrene molecules connected to each other.

Hydrogen sulfide (H_2S) is a gas. To be more precise, it is a smelly gas! H_2S is responsible for the odour associated with rotten eggs.

If you are looking for more ideas, here are some other molecules and substances that you can propose to the learners:

- Table salt (NaCl);
- Caffeine;
- Lactose;
- Urea.



Can you identify the state?

For this activity, you can add substances from your own list in this additional table, and match them to the appropriate [state or states](#).

<i>substance</i>	<i>solid</i>	<i>liquid</i>	<i>gas</i>