

SCIENCE:

Matter

2

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BRIEFING

Lesson objective

- To explore different forms of matter.
- To learn about features of matter.
- To research and compare the qualities of different matters.

Lesson fact

- There are four states of matter: solid, liquid, gas, and plasma.
- Each matter can be recognised based on its characteristic qualities.
- Matter can also be classified based on its physical or chemical qualities.
- Physical qualities include, for example, the state of a matter or the colour of a matter.
- Chemical qualities include, for example, how a matter reacts with other chemicals or other matter.



Lesson observation

Place a glass of water on the table and let the kids guess what matter it is. Ask why they think that it is water.



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Briefing: Matter

Lesson objective

- To study matter in pure form and then mixed with other matter.
- To get to know the physical and chemical qualities of matters.
- To learn what the terms viscosity and polymerisation mean.

Lesson fact

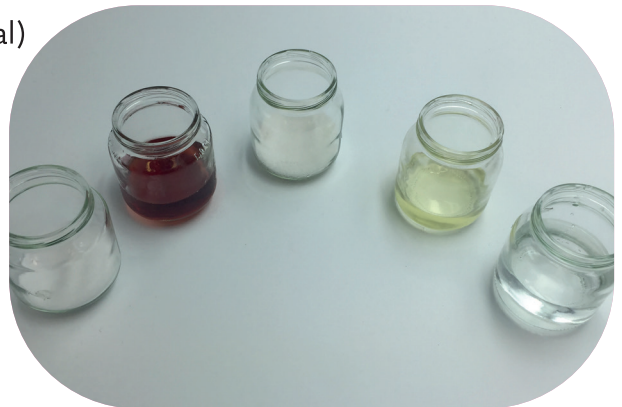
- The qualities of a matter can be altered by changing its physical or chemical qualities. A matter can be, for example, melted, which changes its state from solid to liquid. Or one matter can be mixed with another, which causes the two to chemically react.
- The term dissolution means a reaction in which a soluble substance (e.g. sugar) is dissolved into a solvent (e.g. water). For example, firm sugar dissolves into water and its crystal structure breaks down into smaller particles. The small particles of sugar interact with the type of chemical bond that exists in the water.
- The ability of a substance to resist flow is called viscosity. In everyday terms, it means the thickness of a liquid.
- The viscosity of cooking oil is higher than the viscosity of water. The viscosity of water can, however, be altered by adding something that thickens it, for example, corn or potato flour. Adding flour to water causes water to solidify.
- Polymers are long chains of molecules where the small molecules (monomers) are joined together in a process called polymerisation. Polymers occur in nature (e.g. starch and proteins) but can also be manufactured chemically (e.g. plastic). Polymers form a continuous structure and are therefore usually used in materials that should last long (such as plastic or clothing).

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Lesson exercise: Let's research how matter behaves in different situations

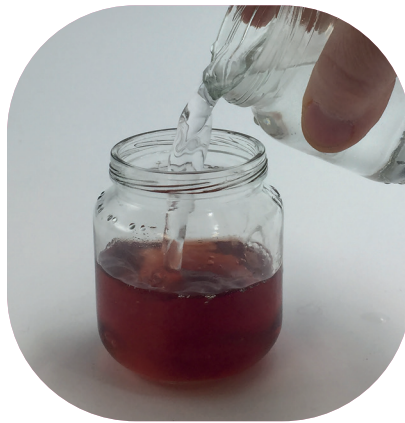
Supplies

- small jars (glass or other see-through material)
- water
- cooking oil
- juice concentrate
- sugar
- salt
- spoons



Execution

1. Add a small layer of each matter into different jars. What does the ingredient look like? How does it smell?
2. Pour some water into the jar with cooking oil in it. What happens?
Answer: Cooking oil and water tend to form layers. The oil stays on top of the water because oil is lighter than water.
3. Pour some juice concentrate into the jar with water in it. What happens to the colour of the solution? What does it smell like?
Answer: The concentrate dilutes, the colour lightens, and its scent weakens.
4. Pour some water into the jar with sugar in it and mix it well. What happens?
Answer: The sugar melts into the water. In this reaction, sugar crystals break down and its chemical qualities interact with the chemical qualities of water. If you add enough sugar to a glass of water, the sugar stops melting. This is called a saturated solution.
5. Pour some water into the jar with salt in it and mix it well. What happens?
Answer: The salt melts into the water and its chemical qualities interact with the types of chemical bonds in the water. Again, when the salt stops melting, the solution is saturated.



Lesson discussion

- What kind of things can you tell about different types of matter, alone or mixed with other matter?
- What happens if you mix sugar or salt with oil?

Answer: Because the bond types of sugar or salt are similar to the bond types of water, but water and oil are different types (don't mix), so the added sugar or salt does not melt into the oil.

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Lesson exercise: Polymerisation of matter

Non-edible slime

Supplies

- bowl
- food colouring
- water
- glue (Erikeeper)
- one big spoon
- corn starch (Maizena)
- dish soap
- Minigrip plastic bags



Execution

1. Mix some food colouring into the water in a bowl.
2. Add a few spoonfuls of glue.
3. Add corn starch. Flour to water ratio should be approx. 2:1 but find the best possible ratio by experimenting.
4. Add dish soap.
5. Mix until perfect.
6. Compare the qualities of the slimes you made.

Observation: By adjusting the amount of water and starch, you can get the slime as slimy as you want. The slime should not be too dry or too wet.

7. Slime can be stored in a Minigrip bag.



Lesson discussion

- What are the ingredients used in the experiment like separately?
- What are the ingredients like when mixed?
- Which factors affect the qualities of the slime?

Answer: The ratio of liquid and starch.

- What happens?

Answer: The starch thickens the water.

Lesson exercise: How does temperature affect matter qualities

Edible candy slime

Supplies

- bowl or plate
- spoons
- icing sugar
- corn starch (Maizena)
- candies (soft wine gums, e.g. Gummy bears)
- plastic bags (Minigrip)
- microwave



Execution

1. Place some candies in a bowl or a plate.
2. Heat the candies in the microwave for 10–30 seconds. Mix with a spoon. If the candies are not yet melted, try heating them a bit longer.
3. Mix an even amount of icing sugar and corn starch, and add the mixture to the melted candies little by little. What happens?

Answer: The mixture gets slimy.

4. You can store the candy slime in a Minigrip bag.

Lesson discussion

- What are the ingredients used in the experiment like separately?
- What are the ingredients like when mixed?
- Which factors affect the qualities of the candy slime?

Answer: Even though the basic principle is similar to exercise 2 and has to do with chemical bonds, in this experiment the heat separates the water molecules farther from each other. When we add corn starch and mix the mass, we add air to the mixture, and it causes it to become stretchy.

Lesson outdoor activity: Matter in nature

Lesson fact

- Our nature is full of different matters and we can find one matter from many different places.
- We might not see some matters straight away and some matters can be difficult to detect.

Execution

1. Can you find something solid from the forest? What about liquid? What about gas?
2. In which places can you find water?
3. Can you find resin from tree trunks? What is it like?
4. Find some leaves, some already dead ones and others that are still green. Can you spot any differences?



Let's play "Spot something" in the nature

Spot something:

- » green
- » soft
- » sticky
- » yellow
- » light
- » bendy
- » heavy
- » sharp
- » rough
- » wet

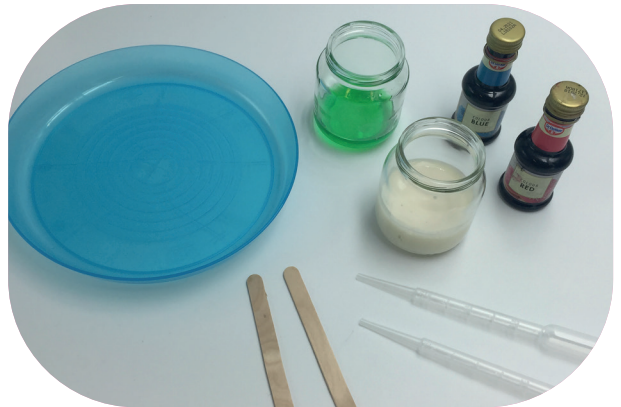


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Lesson exercise: Milk star

Supplies

- soup plate or small bowl
- full-fat milk
- food colouring
- dish soap
- pipettes
- popsicle sticks or cotton buds etc.
- camera



Execution

1. Pour some milk on a plate
2. Drop a few drops of food colouring into the milk with a pipette.
3. Dip the head of a stick into some dish soap. Place the head of the stick on a spot of food colouring on the plate. What happens?

Answer: The colour escapes the stick towards the edges of the plate.

4. You can photograph the milk stars and create an art show.



Discussion

- What can you observe?
- What can you see when you place the stick on a drop of food colouring?

Answer: Milk is made of water, minerals, proteins and fats. When the dish soap touches the milk, it reacts with the fats in the milk and draws them towards itself. This causes the water of the milk to escape to the other direction taking the colouring with it as it goes.

- Why did all the movement stop after some time?

Answer: Motion stops when there are no more fats near the stick.

- What else did you observe?

