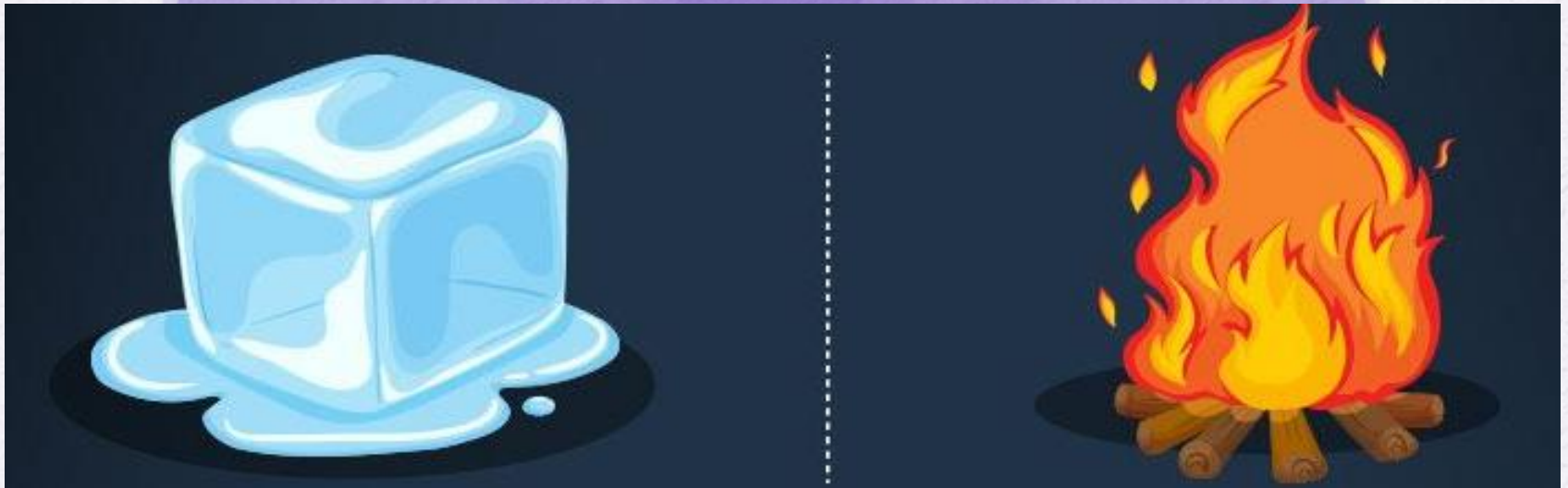


Reversible and irreversible changes



Physical and chemical changes

Getting started pg.49

1 a. What has happened to the ice after five minutes?

The ice started to melt.

b. Make a drawing of your observation.



2. What causes the ice to change?

Heat causes the ice to melt because it makes the particles in the ice move faster and further apart until they have enough energy to become a liquid.

3. What will happen to the ice if you put it back in the freezer? Why?

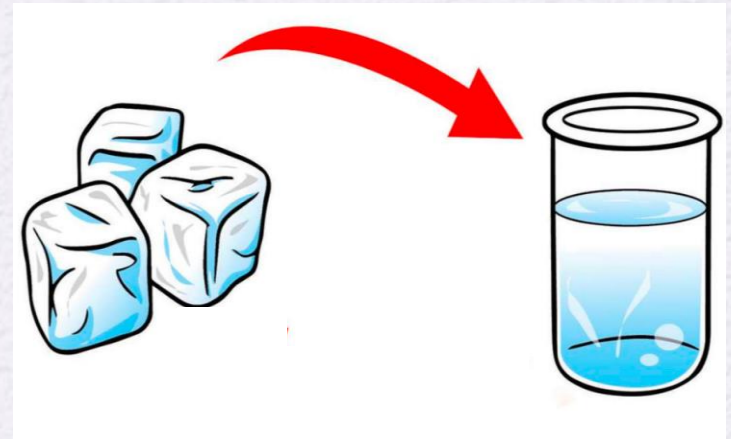
If we put the melted ice back in the freezer it will become solid ice again because it loses heat energy. As the particles lose heat energy, they slow down and move closer together until they form a solid.

Physical change

- Any change that does not change a substance into a different substance.

Example: Melting ice

- Melting ice changes states but the substance does not change into a new substance.



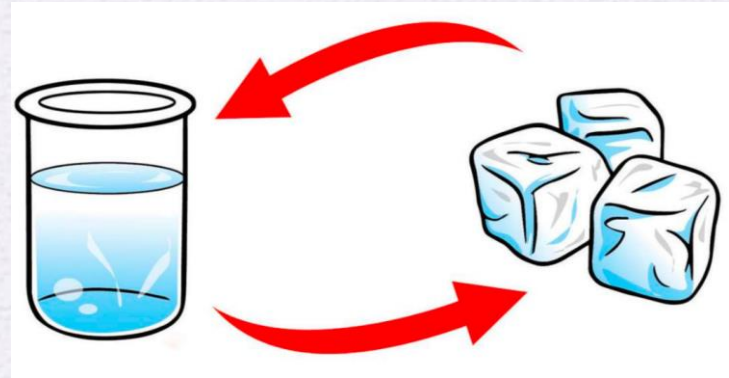
Reversible changes

- When a substance can be changed back to the way it was before.

Example:

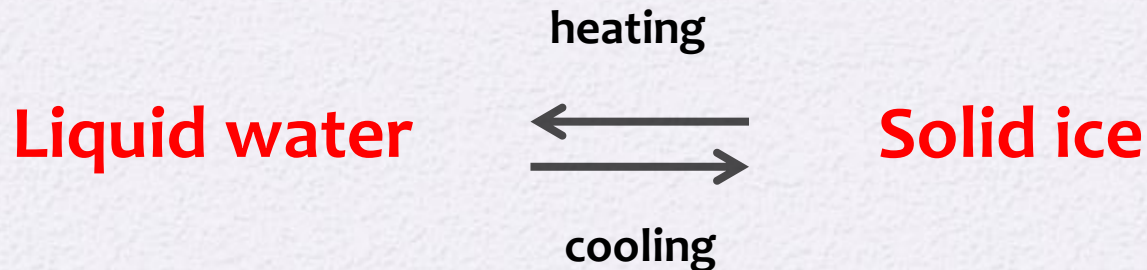
When liquid water is put in the freezer it becomes ice. When ice is put in a warm place it becomes liquid water again.

- Cooling causes liquid water to freeze into ice.
- Heating causes ice to melt into liquid water.



Flow diagram

We can show the change of state in a flow diagram.



Irreversible changes

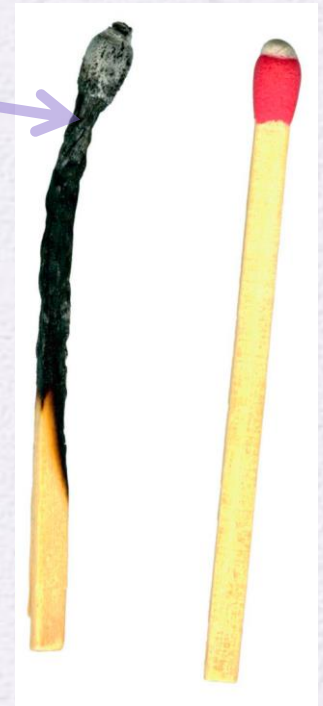
- When a substance cannot be changed back to the way it was before.

Example:

When we burn a match the wood changes into a black substance called carbon.

- Some irreversible changes turn one substance into another substance. This means that there is **chemical change**.

carbon



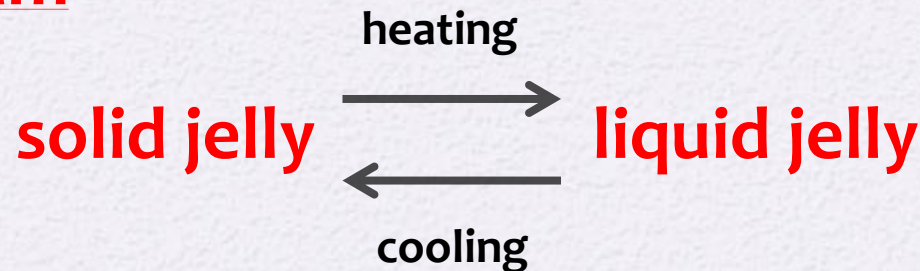
Questions

pg. 50

1. When we mix boiling water with jelly powder it becomes a liquid. In the fridge it becomes solid. How can we make solid jelly change back to a liquid? Draw a simple flow diagram to explain your answer.

- **We can make solid jelly becomes liquid by heating.**

Flow diagram



Making jelly

<https://www.youtube.com/watch?v=PbCFAzm3vuk>

2. Does boiling an egg cause reversible or irreversible change? Explain why.

- **An irreversible change. The liquid egg white and yolk become solid and cannot be changed back to liquids.**

Boiling eggs

<https://www.youtube.com/watch?v=FTha4zARGN4>

Dissolving

- Some substances can dissolve in water or other liquids.

Example: Seawater

- Seawater is salty because there is dissolved salt in the water.
- The seawater is a **solution**; the salt is the solute and the water is the solvent.

What is a solution?

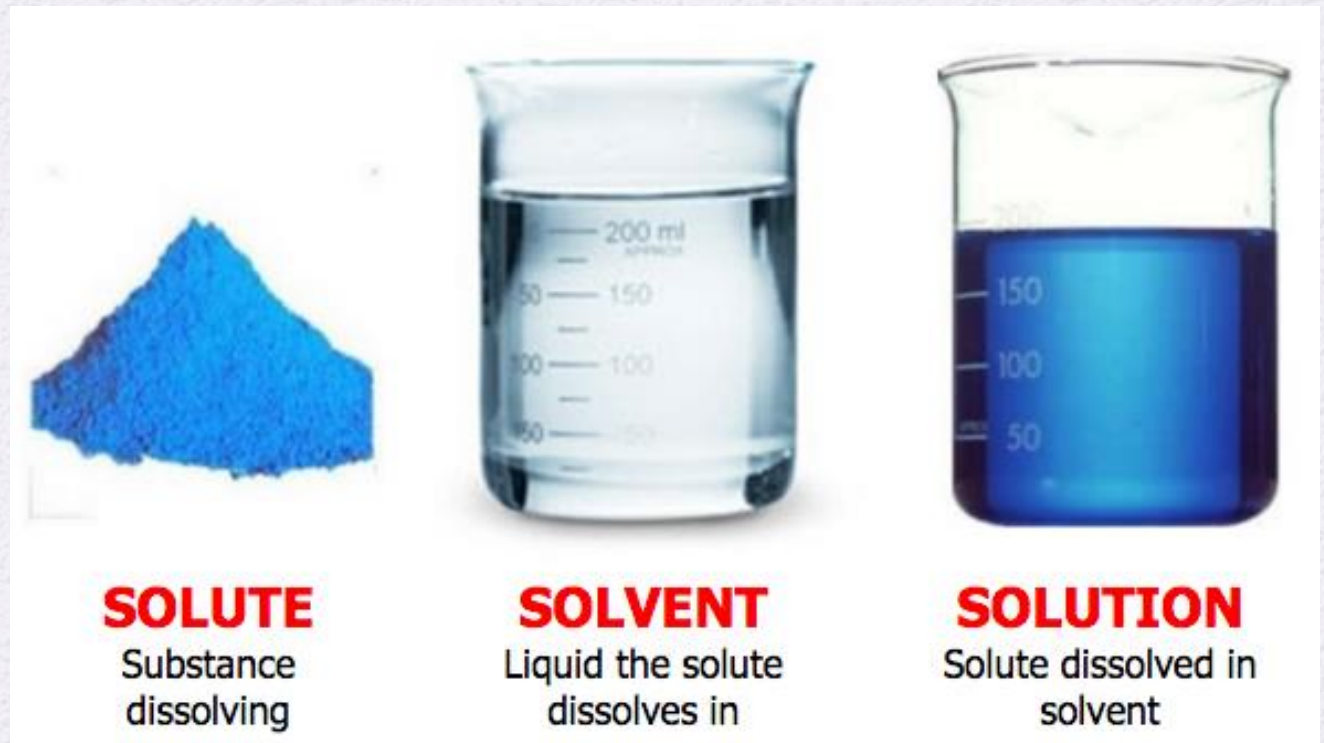
A **solution** is a mixture usually made of a solid dissolved in a liquid.

✧ A Solution has two parts:

- Solute
- Solvent

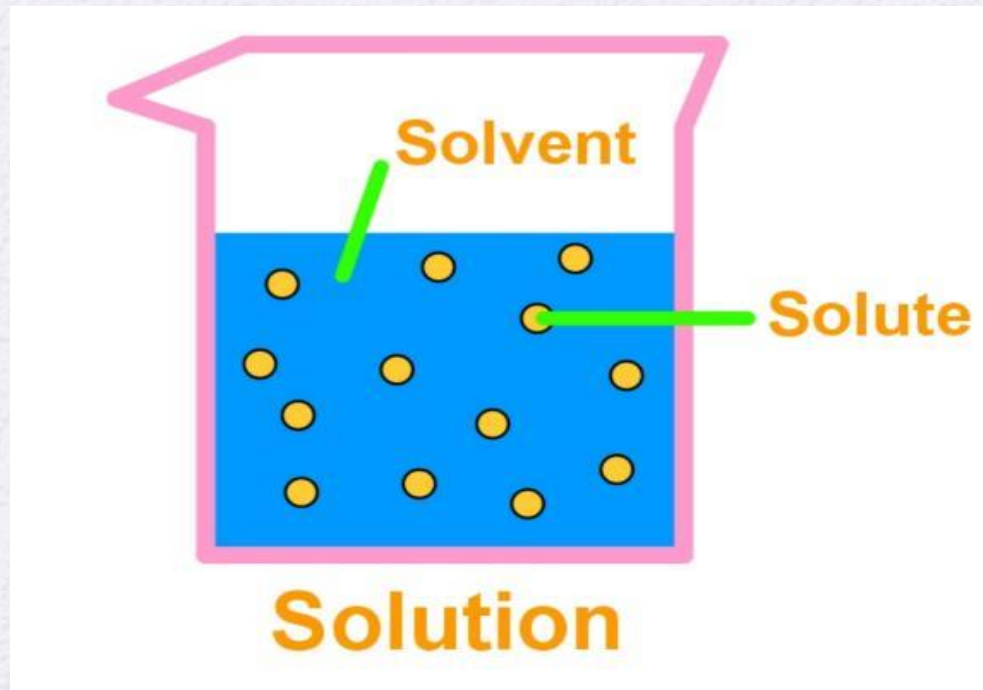
- The **solute** is the solid substance that is dissolved.
- The **solvent** is the liquid in which the solute dissolves.

Example:



Why can't we see the solute in a solution after it has dissolved?

We cannot see the solute in a solution after it has dissolved because the particles of the solute move between the solvent particles as they dissolve.



Solution appearance...

- When we no longer see the soluble substance in a solution we say that the solution has a **uniform appearance**.
- A **uniform appearance** means that the mixture looks the same throughout where as the solute particles spread out evenly in the solvent.

Is dissolving a reversible or an irreversible change?

Dissolving is a reversible change.

- We can get back the solute by evaporating the solvent.
- We can change the evaporated solvent back into a liquid by allowing it to condense on a cooler surface.

Can we make solids dissolve faster?

- Yes. Some factors make solids dissolve faster such as:
 - **Stirring**
 - **Temperature (Heated solvent)**

<https://www.youtube.com/watch?v=aBJuF6KoDbE>

Stirring

- A solute will dissolve faster if we stir the solution.
- Stirring causes the particles of the solute to spread out between the particles of the solvent quickly.
- Stirring increases the rate at which a solute dissolves.

Rate – how fast something happens.

Heated solvent

- When we increase the temperature of a substance, the heat adds energy to the particles causing them to move faster and spread out more.

Questions

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1. What does the rate of dissolving means?

- How fast a substance dissolves

2. Name two factors that affect the rate of dissolving?

- Stirring and temperature

3 a. How does heating affect the particles in a solution?

- Heating makes the particles of the solvent move faster and spread out more.
- When the solute is added to the heated solvent, the solute particles also gain heat energy and move faster.

3b. Explain how this affects dissolving?

- The solute particles spread out and move quickly into the spaces between the solvent particles. This makes the solute dissolve faster.

4. Explain why sugar will dissolve on its own in a cup of cold water if we leave it for long enough.

The sugar will eventually dissolve because the movement of the water particles and sugar particles will bring enough of them into contact with one another, so that the sugar particles can spread out between the water particles without stirring or heating the solution.

Chemical reactions

Pg. 56



Getting started pg. 56

1. Describe one reversible change you observe when the candle burns. Why does this change happen?

The candle wax melts. It is heated which makes it change from a solid to a liquid.

1. What happens to the candle wick? Is this change reversible?

The candle wick burns/becomes black. This is not reversible.

1. Did any new substances form? How do you know this?

A new black substance formed on the back of the spoon; smoke also forms.

Chemical reaction

- When some substances are mixed together, they change and form a new substance.
- We say that the substances **react** together.

Reactants and products

- In a chemical reaction, the substances that react together are called **reactants**.
- The new substances that form are called **products**.

Evidence for chemical reactions

- **Evidence**- the things that show us that something that happened or changed.
- Sometimes we can see that a product has formed in a chemical reaction from the evidences.
- **Example:** When vinegar and bicarbonate of soda react, a gas is produced. The **gas** is the **evidence** of the reaction.

Other evidences

There are other ways to tell if a chemical reaction has taken place

- **There is a change of colour**
- **There is a change in temperature.**

Identify reactants and products

Video

<https://www.youtube.com/watch?v=AwkJTOI>



Think like a scientist 1

(answer key)

2 b) The drawings should show gas bubbles coming out of the jar.

3) The bicarbonate of soda and vinegar reacted together to make a gas.

4) The bicarbonate of soda and vinegar

5) The gas

6 a & b) After a few minutes, a white substance forms in the jar.



Done!