

Sorting Materials Into Groups

An exploration of Matter, Materials, and the physical properties that define our world. A comprehensive study for Science Olympiad preparation.

CLASS 6 | CHAPTER 2

Matter & Materials



What is Matter?

Anything that **occupies space** and has **mass** is called matter. From the massive sun to the invisible air, everything is matter.



What are Materials?

Materials are the "stuff" objects are made of. One object might be made of different materials, and one material can make many objects.



Scientific Observation

Objects like tables, TVs, and refrigerators are all around us. They differ in size, shape, and color because they are built from specific materials chosen for their properties.

Why Classify?

Classification is the process of sorting and organizing things into groups based on their properties.

- **Easy Study:** It is difficult to study objects one by one. Grouping makes learning systematic.
- **Compare:** Helps us understand similarities and differences easily.
- **Locate:** Organizing objects makes them easy to find (like in a library or kitchen).



Bases of Classification



Origin

Natural: Cotton, Silk.

Synthetic: Nylon, Plastic (Man-made).



Biology

Living: Plants, Animals.

Non-Living: Tables, Pens.



Visuals

Grouping based on **Size, Shape, Color**, or even **Usage**.

"Classification is usually based on similarities and differences in material properties."

Objects vs. Materials

Object	Possible Materials
Spoon	Steel, Metal, Plastic, Wood
Chair	Wood, Iron, Plastic, Cane
Book	Paper, Ink, Glue, Cardboard
Almirah	Wood, Steel, Glass, Brass

Key Takeaway

A single material like **Wood** can make many things: Furniture, Pencils, Doors, Boats, and more!

Did you know?

A metal spoon might have a plastic handle to keep your hand safe from heat.

Lustre: The Shine

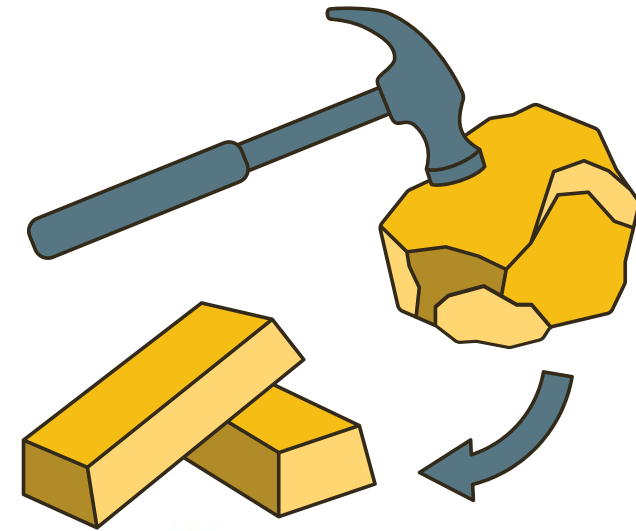
Lustre refers to the natural shine or glow of a material's surface.

- **Metals:** Usually have high lustre (Gold, Silver, Steel).
- **Non-Metals:** Usually dull (Wood, Rubber).
- **Colors:** Gold has a yellow shine; Silver and Steel have a white shine.



Metal Properties: Beyond Hardness

1. Malleability



The ability of a material to be hammered into **thin sheets** without breaking. Iron and Aluminum are highly malleable.

2. Ductility

The property where a solid can be stretched into **long, thin wires**.



Olympiad Fact

1 gram of Gold can be stretched into a **2-kilometer long wire** due to its extreme ductility.



2 KM

Wire from 1g Gold

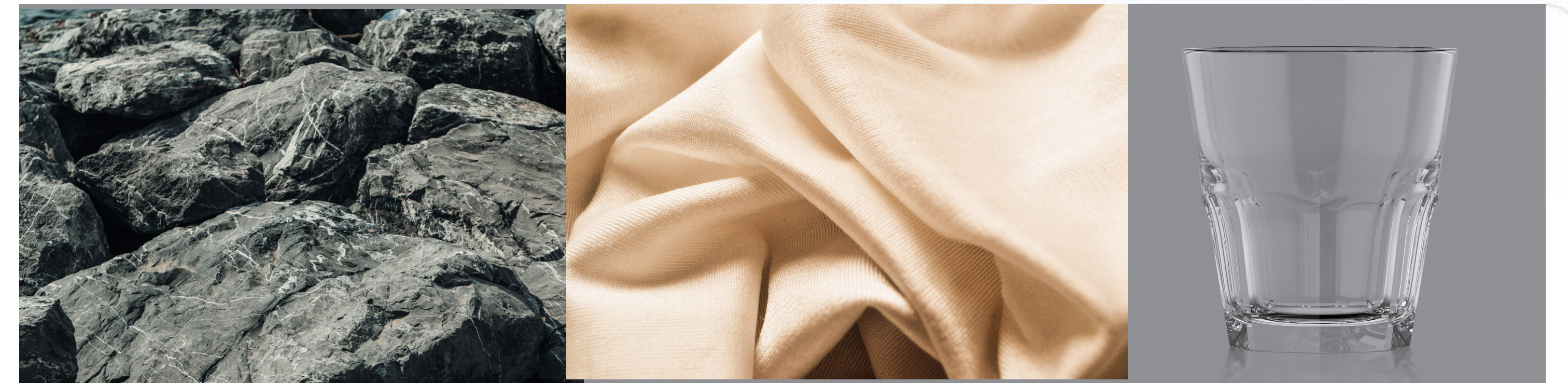
Hardness & Texture

Hard Materials: Difficult to compress (Iron, Stone, Wood).

Soft Materials: Easily compressed (Cotton, Sponge).

Brittle: Hard but breaks easily on hammering (Stone, Glass).

Texture: Smooth vs. Rough

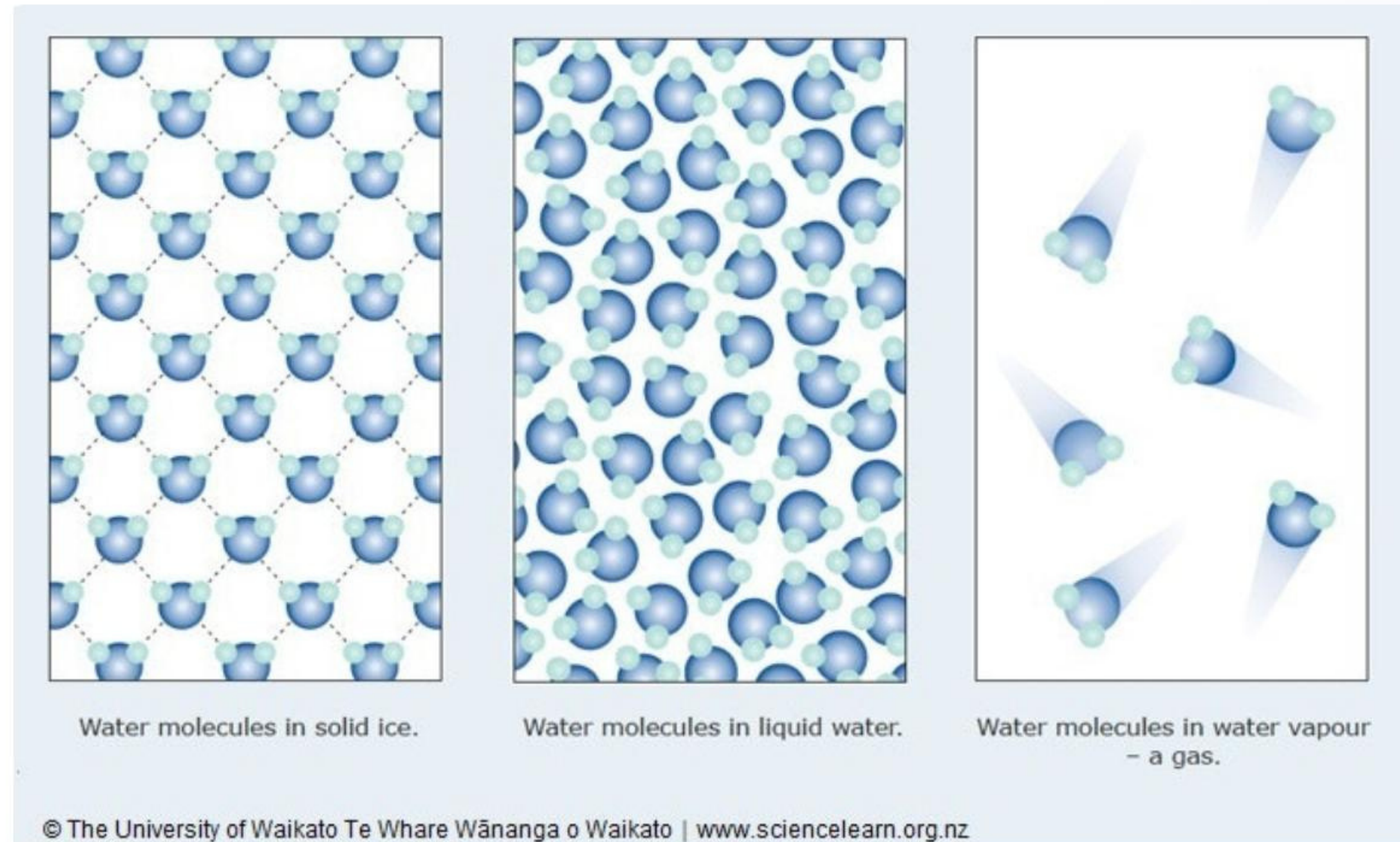


Smooth: Glass, Silk, Flower Petals.

Rough: Rocks, Tree Trunks, Sandpaper.

Diamond

is the hardest natural substance known. It is used for cutting glass and drilling!



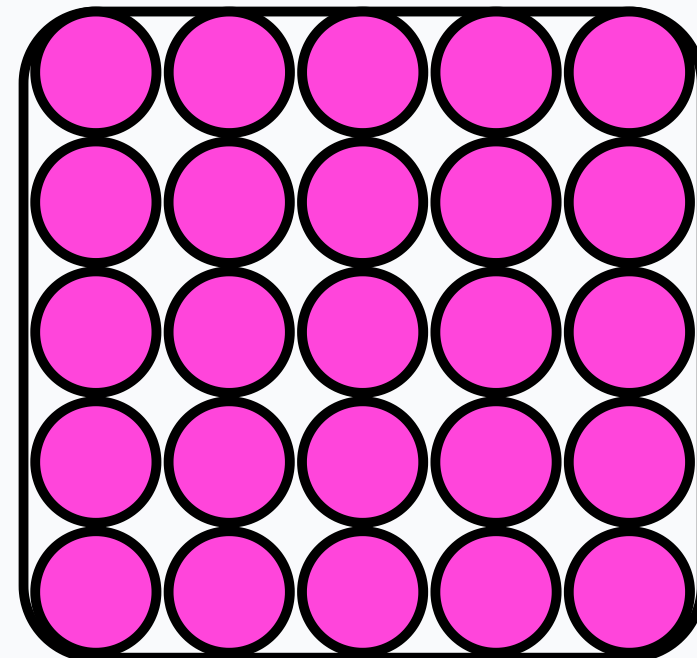
States of Matter

Exploring how molecules behave in Solids, Liquids, and Gases.

Molecular Arrangements



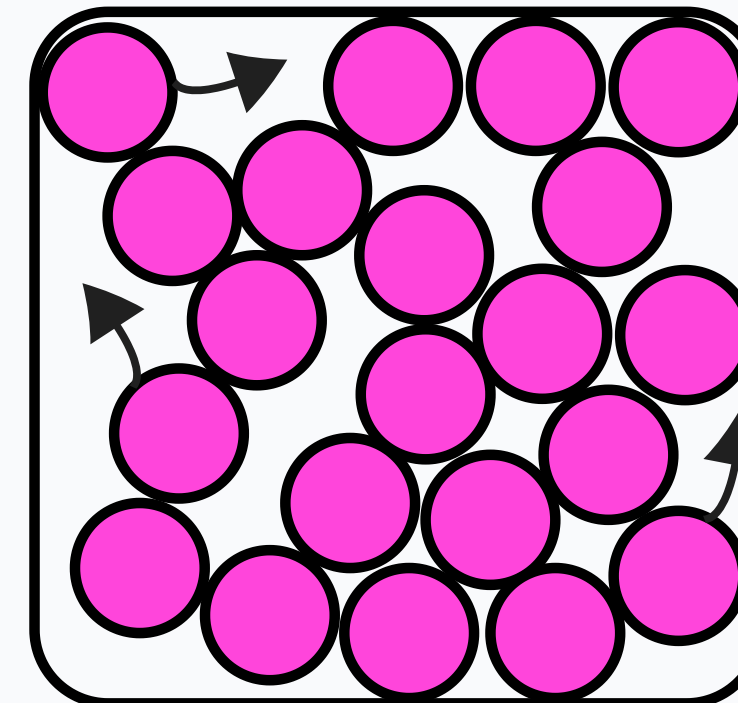
Solids



Molecules are **very tightly packed** with strong attraction. They only vibrate in fixed positions.



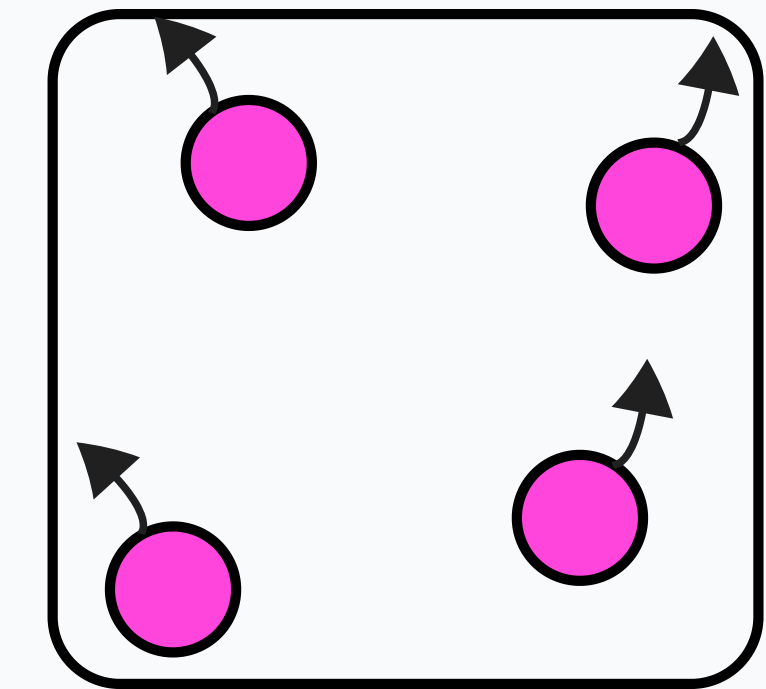
Liquids



Molecules are **less tightly packed**. They can move around freely within the liquid.



Gases



Molecules are **very far apart** with negligible attraction. They move independently.



Scientific Property

Gases fill up the **entire space** available to them. Liquids take the **shape of the container** they are in.

Comparing States of Matter

Property	Solid	Liquid	Gas
Shape	Definite (Fixed)	No Definite Shape	No Definite Shape
Volume	Definite (Fixed)	Definite (Fixed)	No Definite Volume
Attraction	Very Strong	Weak	Negligible
Rigidity	Very Rigid & Hard	Fluid / Not Rigid	Fluid / Not Rigid

Viscosity: Thick and sticky liquids (Honey, Tar).

Volatility: Liquids that evaporate easily (Acetone/Nail Polish Remover).