

Matter Lesson 1



Learning Goal 1: I can compare and contrast the particle structures and physical properties of solids, liquids, and gases.

Vocabulary!

Chemistry is the study of matter.

Matter is anything that has mass and volume.

Matter is composed of small particles.

👉 Ask your teacher for the card set that accompanies this lesson.

The card set contains five cards. Each card illustrates the properties of solid, liquid, and gas particles.

👉 Find the card titled "Particle Arrangement and Shape".

👁️ Compare the particle arrangements of the solid, liquid, and gas substances on the "Particle Arrangement and Shape" card.

? How is the spacing between the particles different for solids, liquids, and gases? Record your observations in the table below.

Particle Arrangement		
Solid	Liquid	Gas


👁️ Return to card titled "Particle Arrangement and Shape". Observe whether the particles are able to take the shape of the entire container, able to take the shape of part of the container, or are unable to take the shape of the container.

? Record your observations about how the particles of solids, liquids,

and gases interact with their container in the table below.

Shape		
Solid	Liquid	Gas

 Find the card titled "Volume".

 Compare the volumes of solid, liquid, and gas substances when they are moved to different sized containers.

? Does the volume of the solid, liquid, or gas substance change when size of the container changes? Record your observations in the table below.

Volume		
Solid	Liquid	Gas

 Find the card titled "Compressibility".

 Observe how adding pressure affects the particles of solids, liquids, and gases.

? Can solids, liquids, or gases be compressed into a smaller space? Record your observations in the table below.

Compressibility		
Solid	Liquid	Gas

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Vocabulary!

Attractive Forces are forces that hold particles of matter together.

- 🔍 Compare the strengths of the attractive forces between the particles of solids, liquids, and gases.
- ? How are the strengths of the attractive forces between particles different in solids, liquids, and gases? Record your observations in the table below.

Attractive Forces		
Solid	Liquid	Gas

👉 Find the card titled "***Particle Movement and Energy***".

- 🔍 Compare the movement of the particles in solid, liquid, and gas substances.
- ? How are the speed and motion of the particles in solid, liquid, and gas substances different? Record your observations in the table below.

Particle Movement		
Solid	Liquid	Gas

- 🔍 Return to the card titled "***Particle Movement and Energy***". Observe the effect of increasing heat on the particle arrangement

and temperature of the solid, liquid, and gas substances.

Vocabulary!

The temperature of a substance is a reflection of the amount of energy in the particles of a substance.

? What is the relationship between the energy of particle motion and the movement and arrangement of the particles in solid, liquid, and gas substances? Record your observations in the table below.

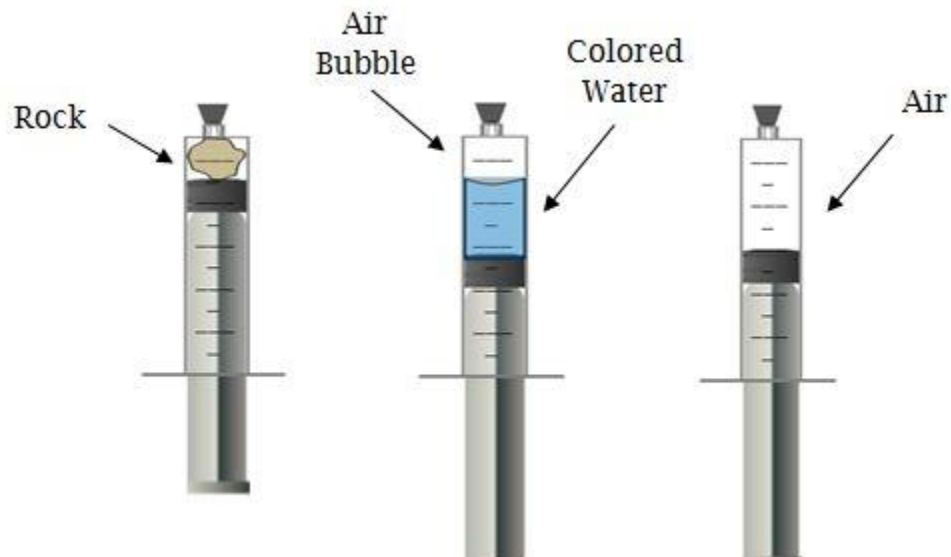
Particle Energy		
Solid	Liquid	Gas




Ask your teacher for a bag of syringes.

There are three syringes in the bag. One syringe contains a solid rock; one syringe contains colored liquid water; and one syringe contains a mixture of clear gases (air).


👁️ Make sure the syringes are set up as shown below. Do not remove the syringe caps unless instructed to do so!



 *Compare the two syringes which contain the rock and the water.*

Notice that the water flows and takes the shape of the syringe, while the rock is unable to flow and maintains its shape in the syringe.

? Use what you have learned about the particles of solids and liquids to explain the above observation.

 *Compare the two syringes which contain the rock and the air.*
Try to compress the plunger of each syringe.

Notice that you are able to compress the air, but not the rock.

? Use what you have learned about the particles of solids and gases to explain the above observation.


? *Use your understanding of the particle nature of matter and the observations you made with the syringes, to predict the particle arrangement in the rock, water, and air.*

Illustrate your predictions in the boxes below.

Rock

Water

Air

 *Ask your teacher for the set of task cards titled “Matter - Set 1”. You will also need a copy of the “Matter - Set 1 Task Card Answer Sheet”.*

? Record your answers on the Task Card Answer Sheet. Be sure that you indicate the color of your task cards.

States of Matter Study Sheet

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Vocabulary

Chemistry: the study of matter

Matter: anything with mass and volume; matter is composed of small particles

Particle: very small substances that compose matter

Compressibility: the ability to press something together into a smaller volume

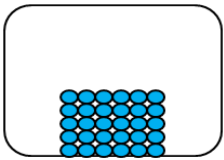
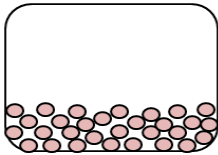
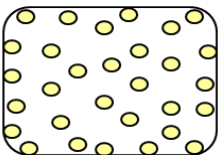
Attractive Forces: forces that hold particles of matter together

Temperature: a reflection of the amount of energy in the

States of Matter Study Sheet

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State	Solid		
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		Liquid 	Gas 
Particle Arrangement	Tightly packed	Closely packed	Far apart
Shape	Defined - does not take the shape of the container	Partially takes the shape of the container	Takes the shape of the container
Volume	Remains the same	Remains the same	Changes with different containers
Compressible	No	No	Yes
Attractive Force Strength	Strong	Medium	Weak
Particle Motion	Particles vibrate	Particles move past one another	Particles move fast and collide with the container walls
Particle Energy	Low	Medium	High