

## Warm-Up

## States of Matter

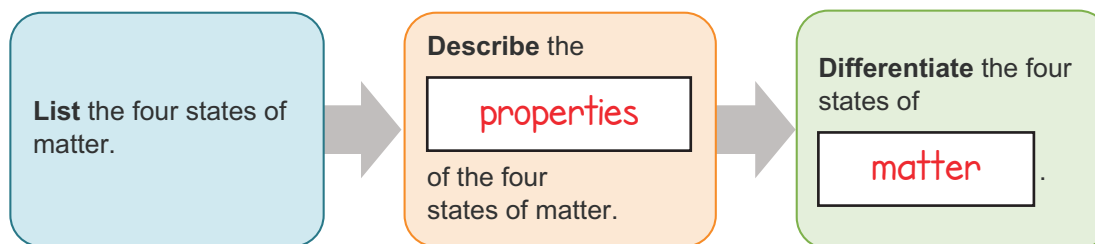


## Lesson Question

How can the four states of matter be identified?



## Lesson Goals



## Words to Know

Write the letter of the definition next to the matching word as you work through the lesson. You may use the glossary to help you.

- |                            |   |
|----------------------------|---|
| <u>  B  </u> primary       | A. atom or molecule with a net charge, due to the loss or gain of electrons |
| <u>  C  </u> plasma        | B. most important; fundamental  |
| <u>  D  </u> differentiate | C. state of matter consisting of freely moving ions and electrons           |
| <u>  A  </u> ion           | D. to distinguish between two or more objects, organisms, etc.              |



- All **matter** around us, whether it's ice, water, oxygen, or even the Sun, exists in different states.
- There are four **states** of matter.

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### States of Matter

- Solid
- Liquid
- Gas
- Plasma
  - Not as common on Earth, but very common in space

### States of Matter: Particle Motion

The **primary** way to **differentiate** between states of matter is to look at the amount of particle (atom or molecule) motion in the matter.

- In solids, atoms can **vibrate** or wiggle, but are locked in place.
- In liquids, atoms have some freedom to move.
- In gases and plasma, atoms or molecules can move **freely**.

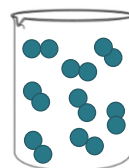
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### States of Matter: Shape

States of matter can be differentiated by shape, or how well matter keeps its shape.

- Solids have a relatively **rigid** shape.
- Liquids take the shape of their container.
- Gases have no **definite** shape.
  - Gases expand to fill space.

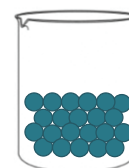
Gas



Liquid



Solid



# Instruction

## States of Matter

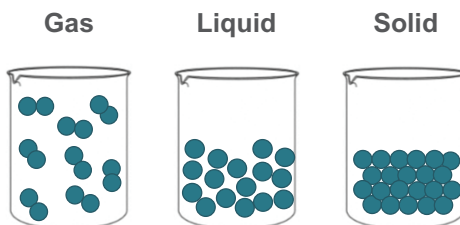
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### States of Matter: Compression

States of matter can be differentiated by ease of compression.

- Solids and **liquids** can compress, but the amount of compression is relatively small.
- Gases can compress a lot due to **space** between atoms.
  - Compressed gas has many uses, such as in spray paint and other aerosols.



### States of Matter

	Solid	Liquid	Gas
<b>Particle motion</b>	Atoms vibrate or wiggle, but are locked in place.	Atoms have some freedom to move.	Atoms move freely.
<b>Shape</b>	<b>Rigid</b> shape	Takes shape of container	No definite shape
<b>Compression</b>	Hard to compress	Hard to compress	<b>Easy</b> to compress

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### Properties of Plasma

- Plasma:
  - contains **ions** and free electrons.
  - can conduct electricity.
- Plasmas are created when a lot of energy is applied to a **gas** to create ions and free electrons.
  - Energy can come from high pressure, high temperature, or a strong **electric** field.

### Examples of Plasma

- The Sun and other **stars**
- Early universe
- Lightning
- Fluorescent lights and **neon** signs

## Summary

## States of Matter

?

## Lesson Question

How can the four states of matter be identified?

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## Answer

(Sample answer) Solids, liquids, gases, and plasmas can be identified using properties such as particle motion, shape, compressibility, and electric charge.

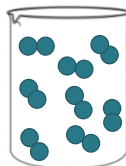
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## Review: Key Concepts

- Four states
  - Solid, liquid, gas, plasma
- Properties
  - Particle motion
  - Shape
  - Compressibility
- Plasma
  - Ions
  - Electrons

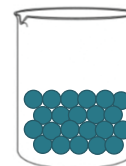
Gas



Liquid



Solid





# Summary

## States of Matter

*Use this space to write any questions or thoughts about this lesson.*