

Unit 2 Matter – Lessons 7-9 Study Guide

Unit 2 VOCABULARY: Lessons 7-9

Unit 2 Lesson:	WORD	DEFINITION
7	atom	tiny particles that are the fundamental building blocks of all matter
7	matter	anything that takes up space and has mass; the three usual forms of matter are solid, liquid, and gas
7	element	a pure substance with only one type of atom throughout (they are all the SAME)
7	chemical properties	properties of a substance relating to the chemical nature and reactivity of the substance
7	physical properties	the properties of a substance that can be observed without changing the chemical makeup of the substance
7	melting point	the temperature at which a solid becomes a liquid
7	boiling point	the temperature at which a liquid becomes a gas
7	density	the mass per unit volume of a substance
7	solubility	How much solute can be dissolved in a solvent at a given temperature. The solubility of the sugar increased when we raised the temperature.
7	malleability	able to be hammered out. Aluminum is so malleable that it can be hammered out into a thin foil.
7	Thermal conduction	the passing of heat energy through a solid, liquid, or gas by collisions of molecules. When I touched the hot water pipe, thermal conduction allowed me to feel heat energy from the hot water inside.
8	solid	something with a definite shape that is not easily changed
8	liquid	something that flows freely and takes the shape of its container.
8	gas	matter with no definite shape, but that takes the shape of its container and fills it completely; usually invisible
9	Chemical changes	changes in matter that involve changes in the types of molecules present, in which bonds between atoms are broken and/or formed
9	Nuclear changes	changes in the nuclei of atoms that change elements to one or more other elements
9	Physical changes	changes in matter that involve changes in the relationships among the molecules and/or in their motions, but not in the compounds or elements present

Unit 2 Lesson 7: Properties of Matter

Same Periodic Table Group = Same Chemical Properties

- Elements in the same _____ (column) have the **same number** of outer shell **electrons**.
 - Elements in the same group have similar _____ properties precisely because they have the same number of _____ **electrons**.
- **Chemical properties:** properties of a substance relating to the chemical nature and reactivity of the substance. (Help! What does this MEAN?)
 - It means....the way atoms will _____ to one another by **gaining, losing, or sharing electrons** to form _____ which are **combinations** of different elements.
 - Atoms with the **same number of outer shell electrons** tend to **bond** in the **same way**.
 - **Examples of Chemical Properties Include:**
 1. **flammability** (ability to _____)
 2. **decomposition** (ability to _____ into simpler substances)
 3. **rusting** (creating a **new** _____ by iron bonding with oxygen)

Physical Properties of Matter

- **Physical properties:** the properties of a substance that can be observed **without** changing the chemical makeup of the substance. In other words, **no chemical _____ are made or broken**.
- **Physical properties** means **no new substances are created**. The original substance may change shape or form, but it **remains** the _____ substance.
- **Examples of physical properties** include:
 - **Mass:** measures the amount of _____ in an object
 - **Volume:** measures the amount of _____ an object takes up
 - **Melting point:** temperature at which a solid becomes a _____
 - **Boiling point:** temperature at which a liquid becomes a _____
 - **Density:** mass per unit of volume
 - **Solubility:** How much solute can be _____ in a solvent at a given temperature
 - **Malleability:** Able to be hammered out, or _____
 - **Thermal conduction:** the passing of _____ energy through a solid, liquid, or gas by collisions of molecules.

How Are Chemical and Physical Properties Different?

- **Chemical** properties are determined by the way atoms to **each other**
- **Physical** properties are determined by how atoms behave **on their own** (without bonding to anything else, so we are talking **atoms** here)
 - **Example: Density** – tells us **how far apart** individual atoms are, from each other, within a substance
 - The farther apart individual atoms are, the dense the substance is
 - The closer they are, the dense the substance is.

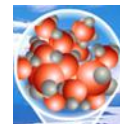
Unit 2 Lesson 8: States of Matter

States of Matter:

- **Three common states of matter: solid, liquid, and gas:**
Example: Water can be solid ice, liquid water, or water vapor (clouds or steam)
- Matter behaves differently in different states
 - **Solid:** has a fixed volume and shape.
Example: **Ice** (solid) maintains its shape (a cube) while frozen
 - **Liquid:** has a fixed volume but will take the **shape** of whatever container it is in
Example: Water (liquid) will take the shape of its container – the **same amount of water** will be “shorter” in a wider glass, but “taller” in a narrow vase.
 - **Gas:** Has **no fixed volume** or shape
Example: Water vapor will expand to fill whatever container it is in completely

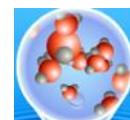
Solids:

- Have fixed volume and
 - **Example:** Break off an and it’s shape does not change (you can wave it around)



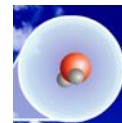
Liquids:

- Have a **fixed volume** but will the **shape** of whatever container it is in
- Volume stays the SAME. (It does **NOT expand**)
 - **Example:** You can push on the plunger of a syringe containing a liquid, but the liquid's volume will stay the same.



Gases:

- Have **no fixed volume** or shape; will expand to fill whatever container it is in
Example: if a balloon breaks, the gas particles _____ out into the surrounding air



Particles In Motion:

- All particles (atoms/molecules) in every state of matter are in constant _____.
- When a substance undergoes a change in state, the atoms and molecules change their motion.

Unit 2 Lesson 9: Physical and Chemical Changes

How Matter Changes:

- **Chemical** changes – occur when atoms form or break _____ with each other
- **Physical** changes – occur when only the **speed** or **spacing** of particles (molecules and atoms) changes – no changes in bonding occur
- **Nuclear** changes – occur when the nuclei of atom change and produce **new** _____

Physical Changes:

- **Physical changes:** changes in matter that involve changes in the speed and motion of _____ in a substance, but not in the compounds or elements present
 - **Examples** of physical changes:
 - **Dropping a glass:** the glass breaks, but the broken pieces are still made of glass
 - **Ice melting:** the molecules are still water molecules – they just move more freely in liquid form than in ice
 - **Sugar in Water:** Sugar dissolves, but no bonds of sugar molecules are broken – the molecules just spread out through the water

Chemical Changes:

- **Chemical** changes: _____ between atoms are broken or formed to create new substances
 - Breaking bonds releases energy
 - Forming bonds absorbs energy

Nuclear Changes

- **Nuclear changes:** changes in the nuclei of atoms that change elements to one or more other elements
 - Example of nuclear change:
 - **Nuclear _____**: When two or more atoms are forced together under extreme pressure and temperature.
 - **Nuclear _____**: when too many neutrons are forced into an atom, the nucleus becomes **unstable**