

# SNC1D CHEMISTRY

ATOMS, ELEMENTS, & COMPOUNDS

☛ Classifying Matter  
(P.141-143)

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## Classifying Matter

*All matter is made up of different types and combinations of particles which gives them particular characteristics, or properties. A **property** is a characteristic that describes a substance. For example, gold and iron are both metals, but they have very different properties.*



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## Classifying Matter

### PROPERTY

- ❖ characteristic that describes a substance



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**Classifying Matter**

Matter may be classified as pure substances or mixtures, depending on how their particles are arranged. A **pure substance** is made up of only one kind of matter and has a unique set of properties, such as colour, hardness, and boiling/melting point. A pure substance is either an element or a compound.



April 12, 2016 1DCHEM - Classifying Matter 3

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**Classifying Matter**

**PURE SUBSTANCE**

- ❖ made up of only one kind of particle
- ❖ is either an element or a compound



April 12, 2016 1DCHEM - Classifying Matter 4

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**Classifying Matter**

An **element** is a pure substance that cannot be broken down into any simpler substance by chemical means. For example, gold is an element. Its symbol is Au and it cannot be broken down into anything simpler. Silver (Ag) and the oxygen we breath ( $O_2$ ) are more examples of elements.



April 12, 2016 1DCHEM - Classifying Matter 5

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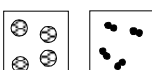
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**Classifying Matter**

**ELEMENT**

- ❖ pure substance that cannot be broken down
- ❖ gold (Au), oxygen (O<sub>2</sub>), ...





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**Classifying Matter**

A **compound** is a pure substance that is made from two or more elements that are combined together chemically. For example, water (H<sub>2</sub>O) is a compound containing the elements hydrogen and oxygen in a fixed ratio. Sugar is another example of a compound.



April 12, 2016 1DCHEM - Classifying Matter 7

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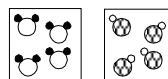
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**Classifying Matter**

**COMPOUND**

- ❖ pure substance made from two or more elements that combine together chemically
- ❖ can be broken down into smaller particles
- ❖ water (H<sub>2</sub>O), salt (NaCl), ...





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**Classifying Matter**

A **mixture** is a combination of pure substances. However, the substances in a mixture do not combine chemically. Instead, each substance remains in its original pure form, although each is not always easy to see distinctly once the mixture is made. There are three main types of mixtures.



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**Classifying Matter**

**MIXTURE**

- ❖ combination of pure substances
- ❖ do not combine chemically – remain separate

April 12, 2016 1DCHEM - Classifying Matter 10

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**Classifying Matter**

**NOTE!**

There are three main types of mixtures.

- In a **mechanical mixture**, the different substances that make up the mixture are visible. A chocolate chip cookie is an example of a mechanical mixture – different parts of the mixture are visible. So is a mixture of salt and pepper. A mixture in which the different parts are visible is called **heterogeneous**.



April 12, 2016 1DCHEM - Classifying Matter 11

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**Classifying Matter**

**MECHANICAL MIXTURE**

- ❖ different substances that make up the mixture are visible
- ❖ also known as a heterogeneous mixture
- ❖ chocolate chip cookie, ...



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**Classifying Matter**

**NOTE!**

There are three main types of mixtures.

- A **suspension** is a cloudy mixture in which tiny particles of one substance are held within another. Tomato juice is an example of a suspension – the particles can be separated when the mixture is poured through filter paper. A salad vinaigrette is a mixture of oil, vinegar, and spices. When shaken, they form a suspension but after a while the components will separate.



April 12, 2016 1DCHEM - Classifying Matter 13

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**Classifying Matter**

**SUSPENSION**

- ❖ cloudy mixture – particles of one substance are suspended in another (i.e. heterogeneous)
- ❖ salad dressing, ...



April 12, 2016 1DCHEM - Classifying Matter 14

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**Classifying Matter**

**NOTE!**  
 There are three main types of mixtures.

- In a **solution**, the different substances that make it the solution are not individually visible. One substance is dissolved in another, creating a **homogeneous mixture**. Examples are sugar dissolved in coffee or clear apple juice – you cannot distinguish between the different types of particles in it.



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**Classifying Matter**

**SOLUTION**

- different substances that make up the mixture are not visible – one substance is dissolved in the other
- also known as a homogeneous mixture
- apple juice, ...



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**Classifying Matter**

**PRACTICE**

- Identify each of the following as either a mechanical mixture or a solution.
 

(a) a pane of clear glass	S
(b) chocolate chip ice cream	MM
(c) clear apple juice	S
(d) garbage in a garbage can	MM
(e) a garden salad	MM
(f) tea	S

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### Classifying Matter

**PRACTICE**

2. Using the words outlined below, make a flow chart summarizing how matter can be organized. Start your chart with the word, "MATTER".

- element
- compound
- heterogeneous mixture
- homogeneous mixture
- mechanical mixture
- mixture
- pure substance
- solution
- suspension

April 12, 2016 1DCHEM - Classifying Matter 18

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### Classifying Matter – A Summary

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    graph TD
      matter[matter] --> pure_substances[pure substances]
      matter --> mixtures[mixtures]
      pure_substances --> elements[elements]
      pure_substances --> compounds[compounds]
      mixtures --> heterogeneous_mixtures[heterogeneous mixtures]
      mixtures --> homogeneous_mixtures[homogeneous mixtures]
      heterogeneous_mixtures --> mechanical_mixtures[mechanical mixtures]
      heterogeneous_mixtures --> suspensions[suspensions]
      homogeneous_mixtures --> solutions[solutions]
    
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April 12, 2016 1DCHEM - Classifying Matter 19

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### Classifying Matter

**PRACTICE**

3. Classify each of the following as either a pure substance or a mixture. If it is a pure substance, is it an element or a compound? If it is a mixture, is it heterogeneous (i.e. a mechanical mixture/suspension) or homogeneous (i.e. a solution)?

(a) sand – white & black grains of sand	M, HE
(b) water – hydrogen & oxygen atoms chemically combined	P, C
(c) pop – water, sugar, & carbon dioxide	M, HO
(d) pencil lead – carbon atoms	P, E
(e) pizza – pepperoni, cheese, & sauce	M, HE
(f) silver – silver atoms	P, E
(g) salt – sodium & chlorine atoms chemically combined	P, C

April 12, 2016 1DCHEM - Classifying Matter 20

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
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
**Classifying Matter**


**PRACTICE**


4. Do the following diagrams represent an element, compound or mixture?


(a)  **E**


(b)  **E**


(c)  **C**

(d)  **M**

(e)  **C**

(f)  **M**

(g)  **E**

(h)  **M**

April 12, 2016 1DCHEM - Classifying Matter 21

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**Classifying Matter**

**PRACTICE**

5. Is a compound, such as water from the tap, a pure substance or a mixture? Explain.

water from the tap is a mixture because it contains various minerals and, in some cases, particulates (i.e. shine a laser light through water to see the particulates, if there are any)



April 12, 2016 1DCHEM - Classifying Matter 22

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**Classifying Matter**

**PRACTICE**

6. Lead is not often used in solder anymore. Explain why not.

Before the toxic effects of lead were understood, the seams of metal cans for preserving food were sealed using lead solder. When the cans were heated, a high level of lead leached into the food, particularly if the contents were acidic, such as tomatoes or citrus fruits. It is likely that sailors suffered from lead poisoning on long trips. Fresh meat and vegetables were not available, so sailors ate mostly canned foods. Even today, you should never drink hot water directly from the tap, in case there is lead solder in the plumbing that may be absorbed into the hot water.

April 12, 2016 1DCHEM - Classifying Matter 23

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 **Classifying Matter**

**PRACTICE**

7. There are numerous ways to separate a mixture. List six of them.

- sorting (used when substances are large)
- floating & settling (used for substances that float/sink)
- centrifuge (used for suspensions)
- magnet (used for magnetic/nonmagnetic substances)
- sieves & filters (used for different sized substances)
- dissolving (used when a substance dissolves easily in a solvent)

April 12, 2016 1DCHEM - Classifying Matter 24

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 **Classifying Matter**

**PRACTICE**

8. Describe one way to separate the following mechanical mixtures.

(a) metals in a scrap yard	magnet
(b) salt and sand	salt dissolves in water
(c) sand and gravel	sieve
(d) sand and water	filter

April 12, 2016 1DCHEM - Classifying Matter 25

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 **Classifying Matter**

**PRACTICE**

9. Some air purification systems include filters. What is the difference between a filter and a sieve?

sieve device used to separate the components of a mixture, with many visible holes that allow smaller solid pieces and liquids to pass through while blocking the larger solid pieces

filter device with many small holes that trap solid pieces of a mixture but allow liquids and gases to pass through

April 12, 2016 1DCHEM - Classifying Matter 26

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 ✓ Check Your Learning

**TEXTBOOK**  
P.143 Q.1-4

April 12, 2016 1DCHEM - Classifying Matter 27

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