

# Elements, compounds or mixtures? (1)

In science, it is important to know the difference between elements, compounds and mixtures. Try to explain what you think each of these words means:

## 1. An element is

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## 2. A compound is

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## 3. A mixture is

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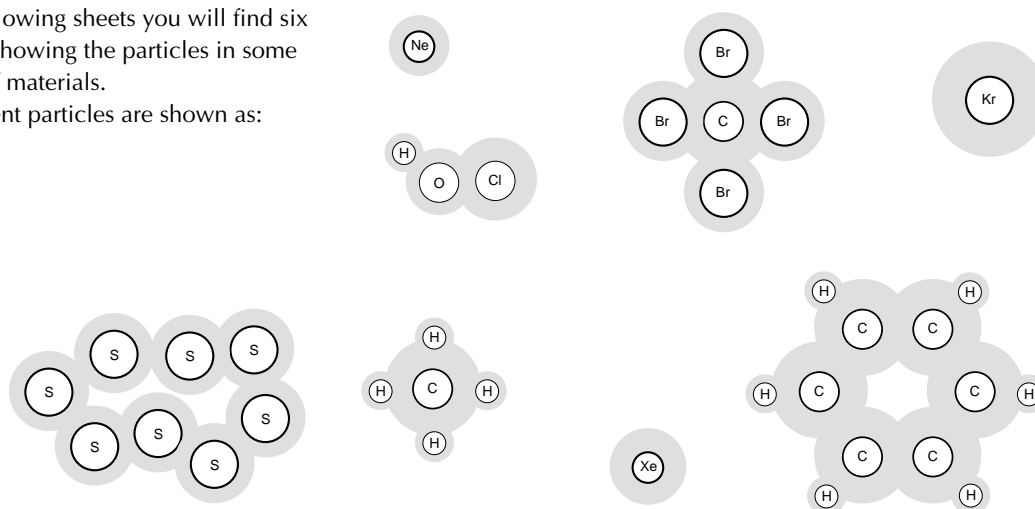
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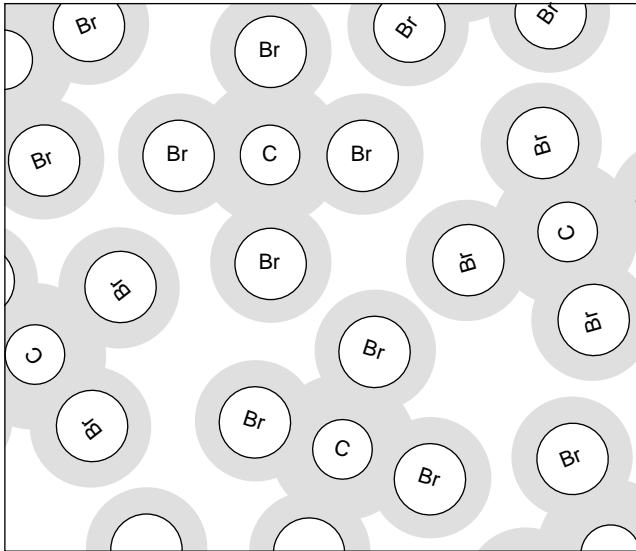
On the following sheets you will find six diagrams showing the particles in some samples of materials.

The different particles are shown as:



Each diagram is meant to show either an element, a compound or a mixture.

Decide whether each diagram represents an element, a compound, or a mixture, and explain your reasons.



4. This diagram shows particles in

\_\_\_\_\_

I think this because

\_\_\_\_\_

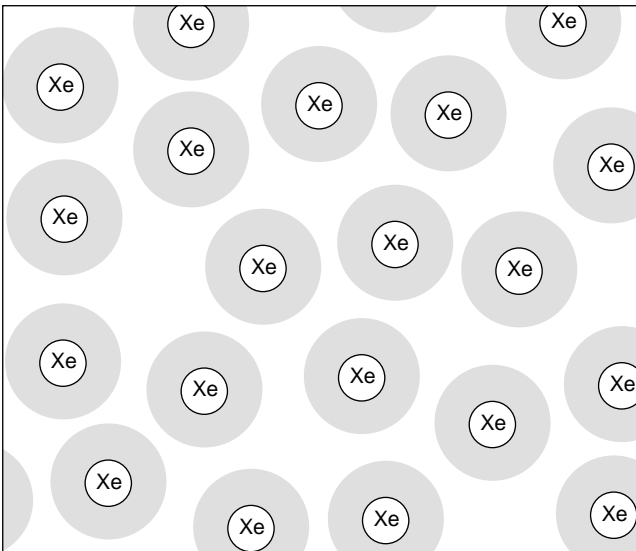
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5. This diagram shows particles in

\_\_\_\_\_

I think this because

\_\_\_\_\_

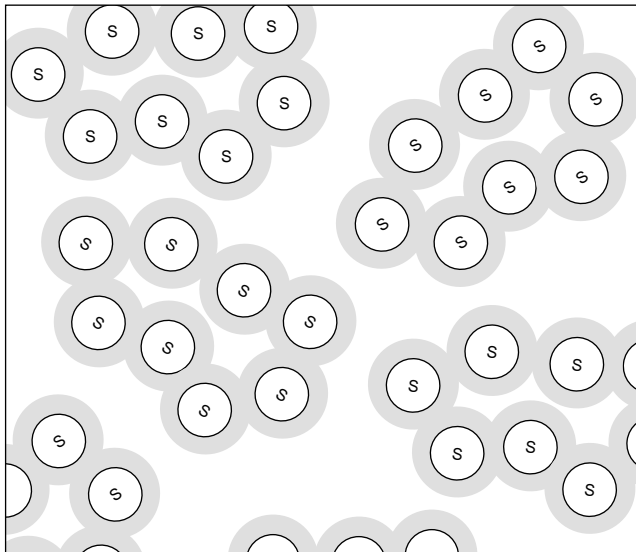
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6. This diagram shows particles in

\_\_\_\_\_

I think this because

\_\_\_\_\_

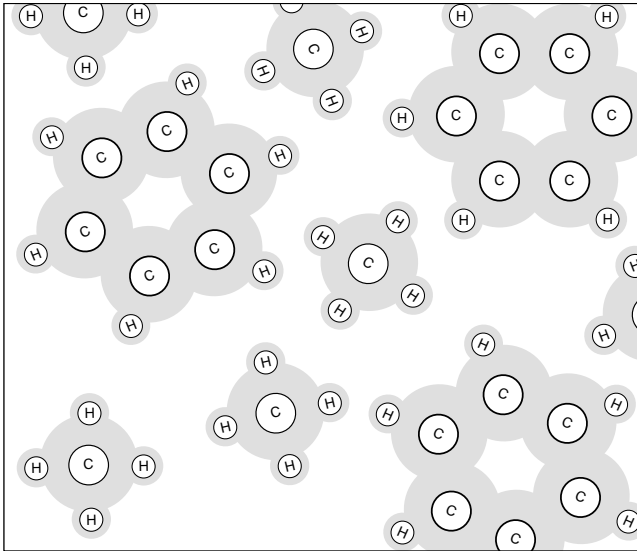
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\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



7. This diagram shows particles in

\_\_\_\_\_

I think this because

\_\_\_\_\_

\_\_\_\_\_

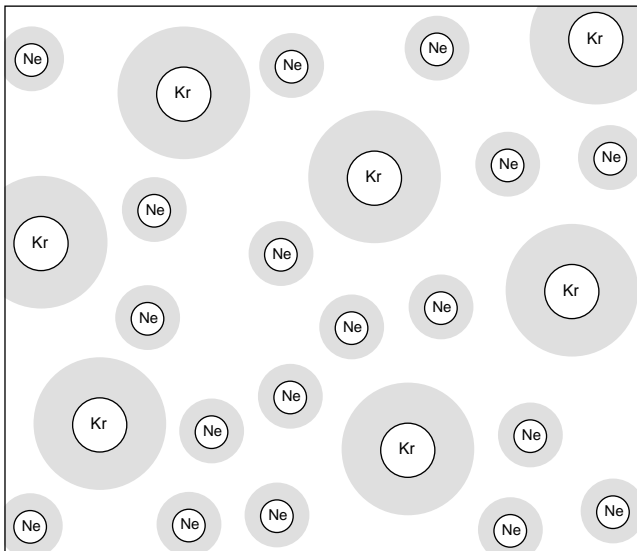
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8. This diagram shows particles in

\_\_\_\_\_

I think this because

\_\_\_\_\_

\_\_\_\_\_

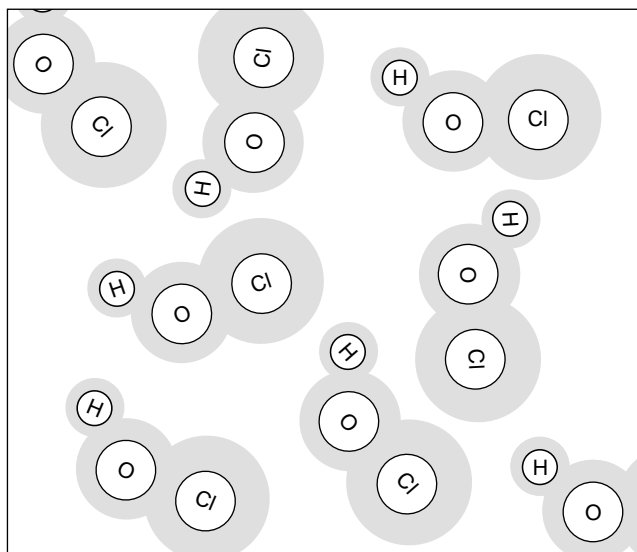
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\_\_\_\_\_



9. This diagram shows particles in

\_\_\_\_\_

I think this because

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

# Elements, compounds and mixtures (2)

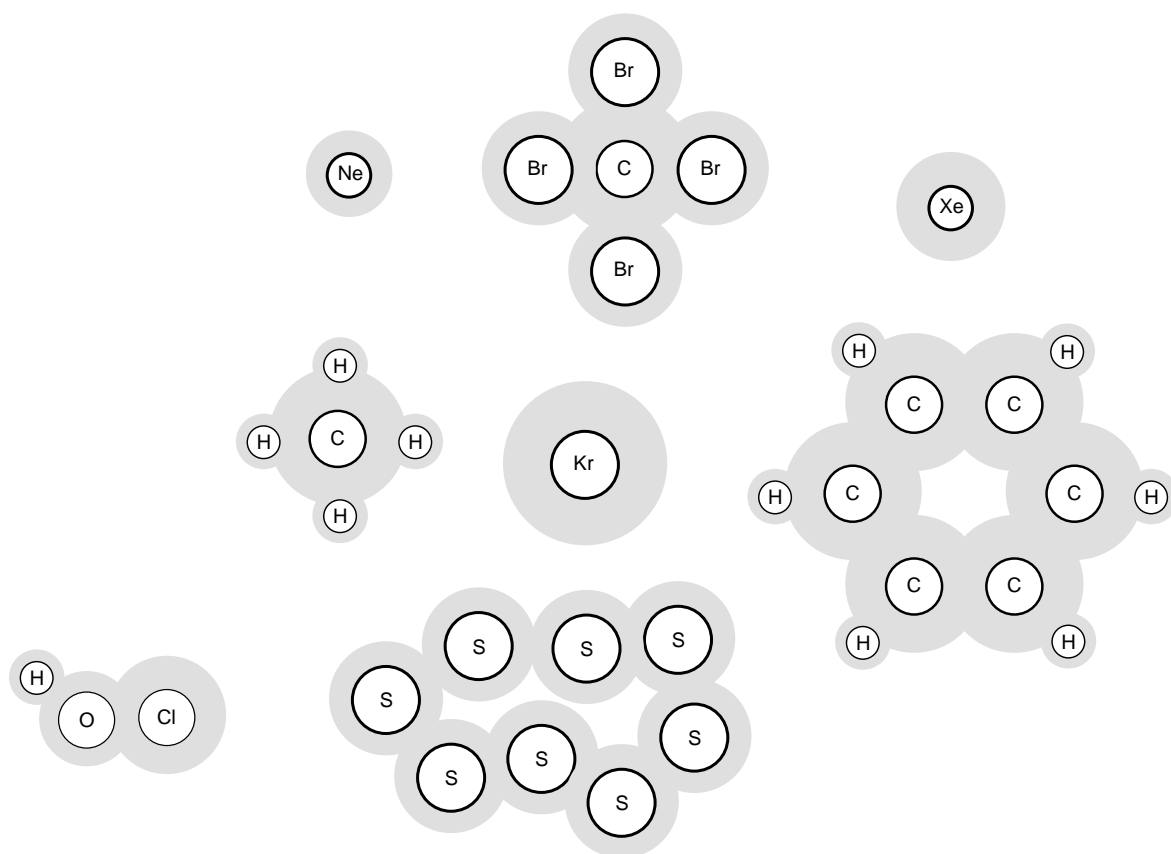
## Pure substances and mixtures

In science, it is important to know the difference between pure substances and mixtures of several substances. Scientists think about the differences in terms of the particles which are in the materials.

Scientists believe that all matter (all solids, liquids and gases) is made up from tiny particles that are much too small to be seen.

The tiniest particles are given names like 'electron' and 'proton'. These are arranged into slightly larger (but still very tiny) particles called atoms, ions and molecules. In many materials the particles are called molecules.

Here are some pictures that scientists use to represent atoms and molecules.



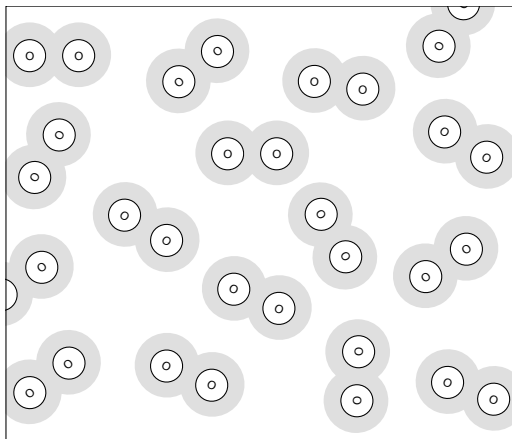
The letters are labels used by scientists to help identify the particles.

There are many different types of atoms and molecules, and these pictures just show a few examples.

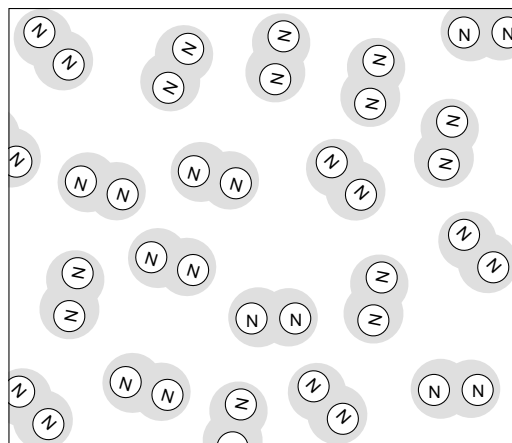
## Different substances contain different molecules

The three diagrams below show two different substances. Which two diagrams show the same substance?

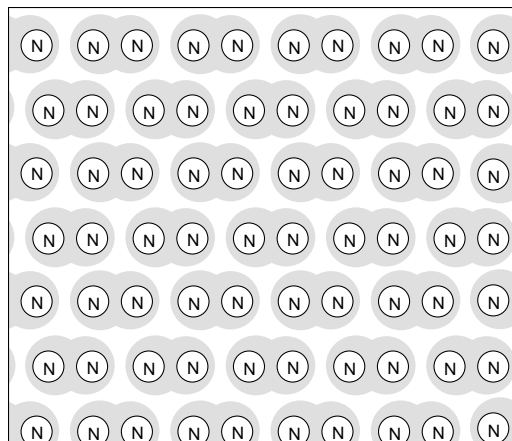
A



B



C

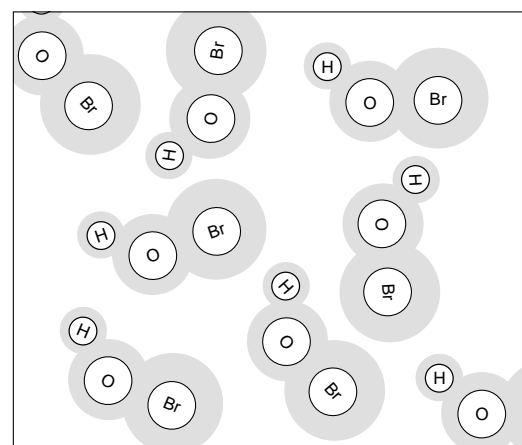
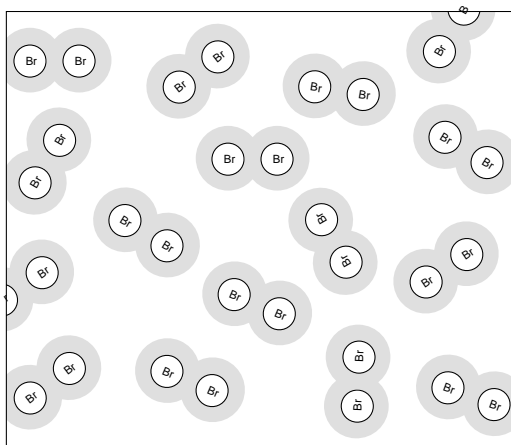
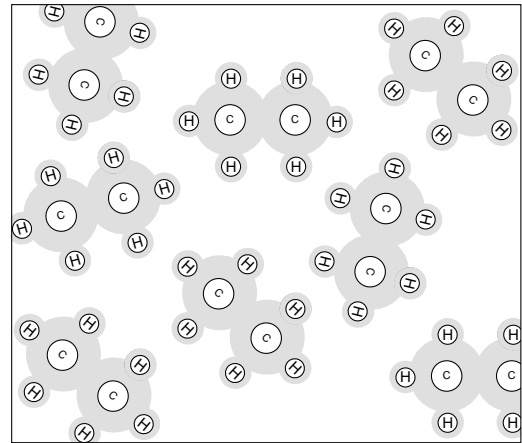
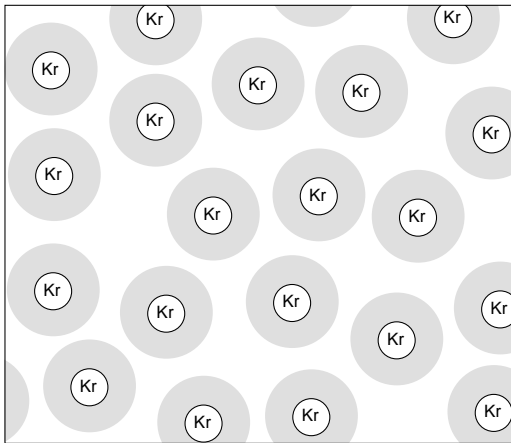
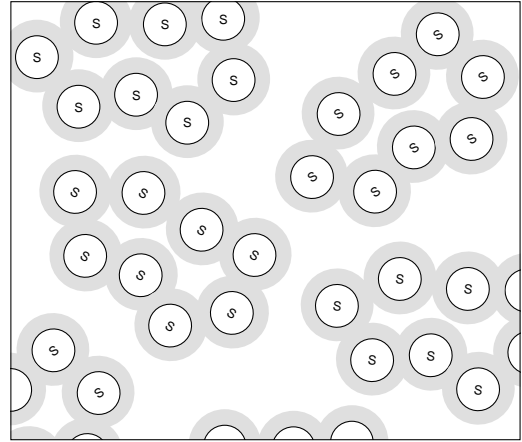
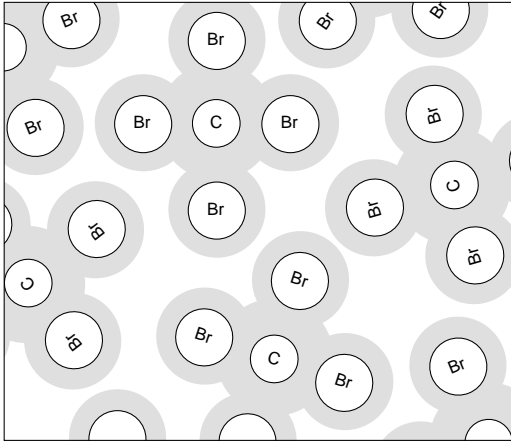


### Answer

B and C are the same substance because they contain the same molecules. They look different because they show how the molecules are arranged when the substance is a gas (B) and a solid (C). Diagram A shows a different substance, because it shows different molecules.

Some materials only contain one type of molecule or atom. These are called single substances (or pure substances).

The following diagrams show some single substances. They are each different substances because they have different types of molecules.

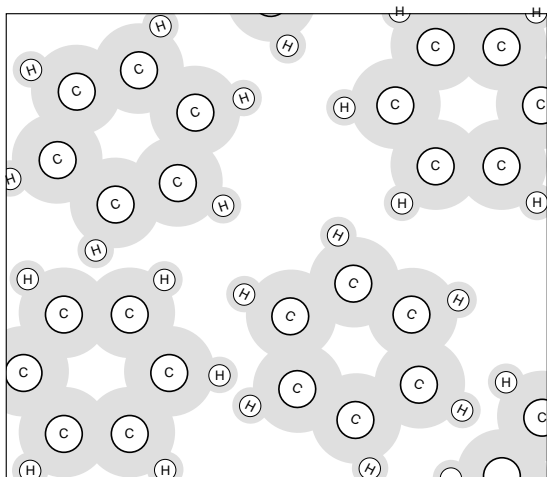


When substances are mixed, their molecules become mixed up. We call the new material a mixture.

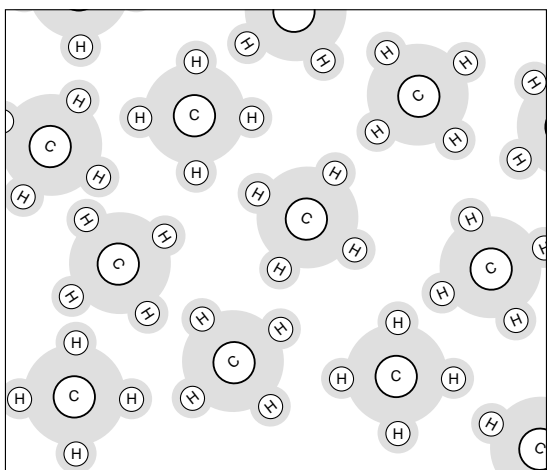
A mixture contains more than one type of atom or molecule.

The following diagrams show the molecules in two pure substances before mixing, and the mixture of molecules afterwards.

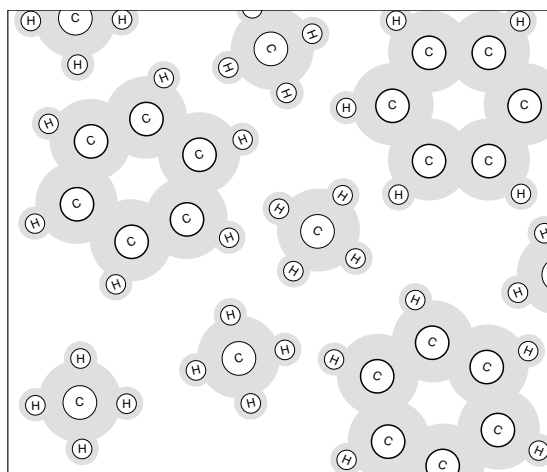
Look at the diagrams closely, and label each of them as either a single substance, or a mixture.



1. \_\_\_\_\_

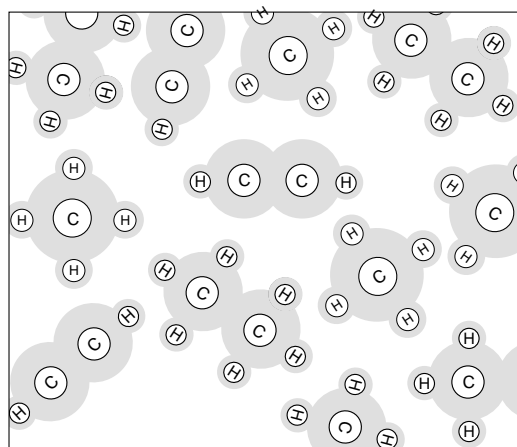
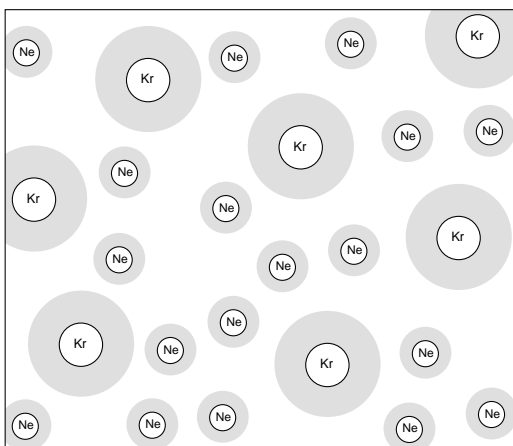


2. \_\_\_\_\_

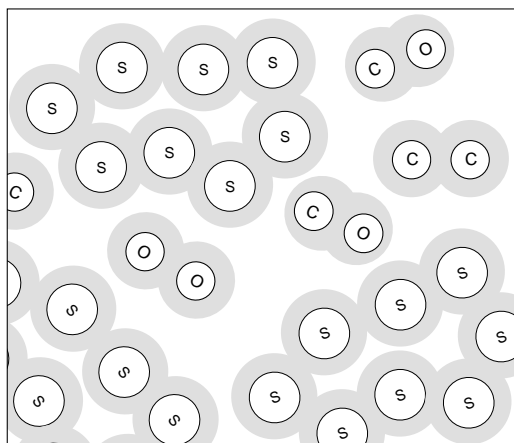


3. \_\_\_\_\_

Here are some other diagrams showing mixtures:



The following two diagrams show a single substance and a mixture. Complete the labels to show you know which is which:

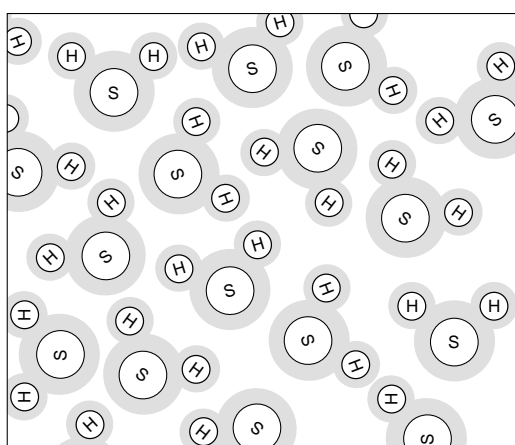


4. This diagram shows a

\_\_\_\_\_

because there is more than one type of

\_\_\_\_\_



5. This diagram shows a

\_\_\_\_\_

because there is only one type of

\_\_\_\_\_

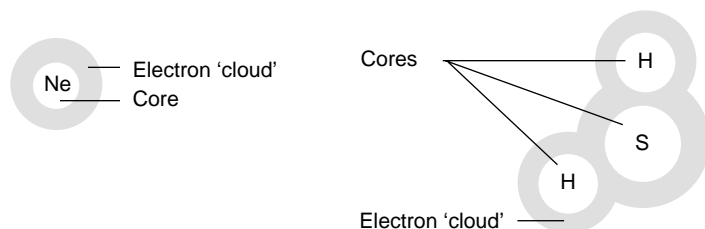


## Two types of substance - element and compounds

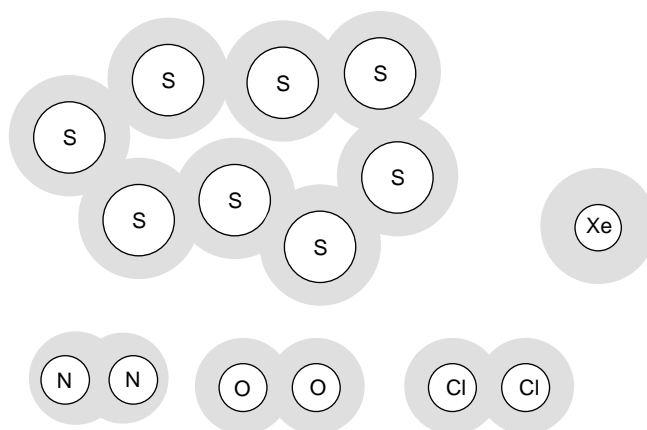
To tell the difference between single substances and mixtures you need to be able to recognise diagrams of different types of atoms and molecules.

But scientists divide single substances into two types: elements and compounds. To spot the difference between elements and compounds you have to look more closely at the atoms or molecules.

Atoms are made of one core surrounded by a 'cloud' of electrons. Molecules are made of two or more cores surrounded by a 'cloud' of electrons.

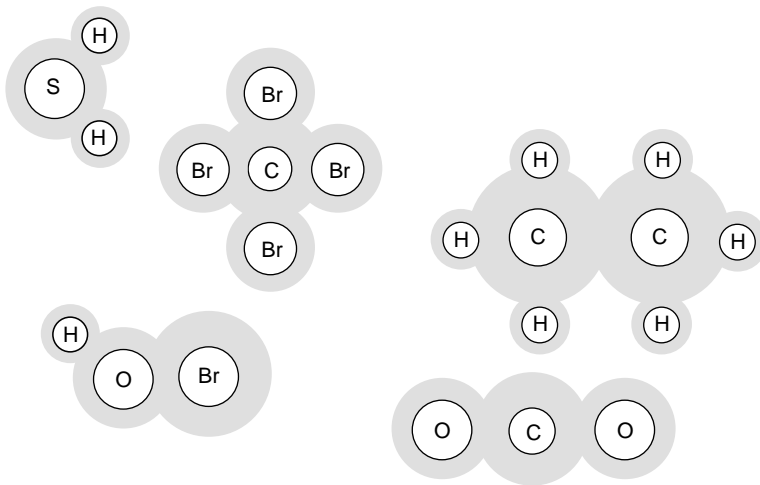


The atoms or molecules that form an element have only one type of core. (Scientists use different letters to represent the different elements).

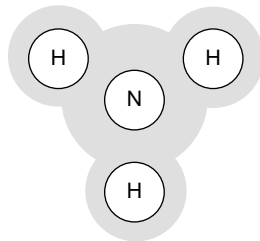


**Atoms or molecules that have one type of core**

In a compound the molecules have two or more different types of core.



The following two diagrams show a molecule of an element and a molecule of a compound. Complete the labels to show you know which is which:

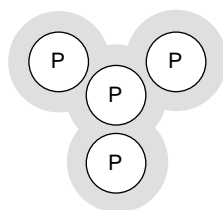


6. This diagram shows

\_\_\_\_\_

because there is more than one type of

\_\_\_\_\_



7 This diagram shows

\_\_\_\_\_

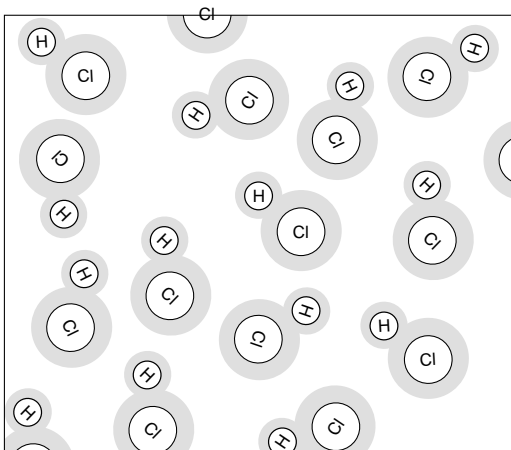
because there is only one type of

\_\_\_\_\_

To summarise:

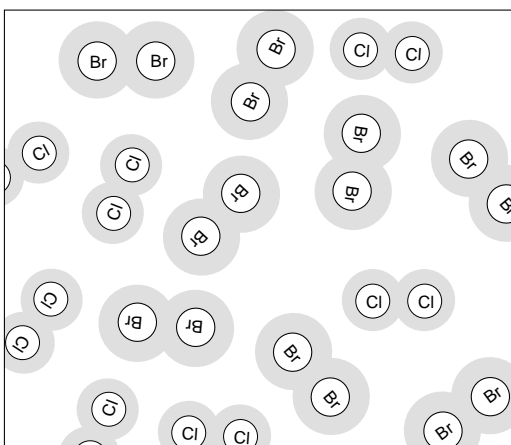
Looking at:	If the same:	If different:
The types of single uncombined atoms	A single substance	A mixture
The types of molecules	A single substance	A mixture
The types of cores in a single molecule	A molecule of an element	A molecule of a compound

The following diagrams show molecules in a mixture, element and compound. Complete the labels to show you know which is which:



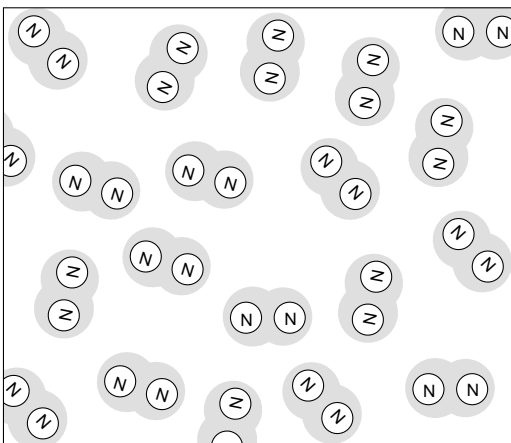
8.

\_\_\_\_\_



9.

\_\_\_\_\_

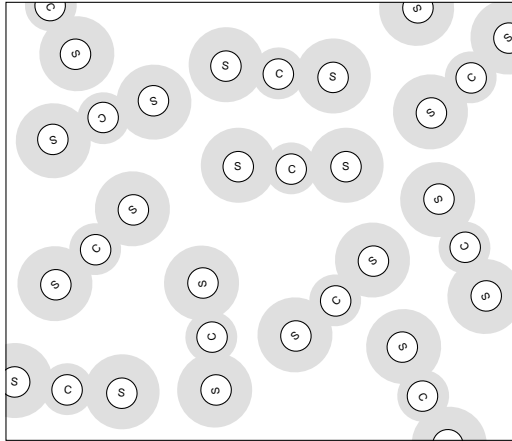


10.

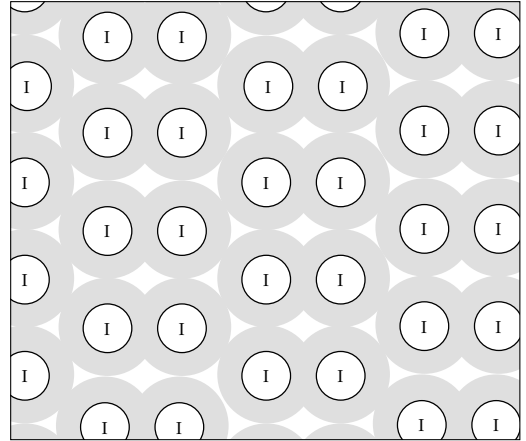
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# Elements, compounds or mixtures? (3)

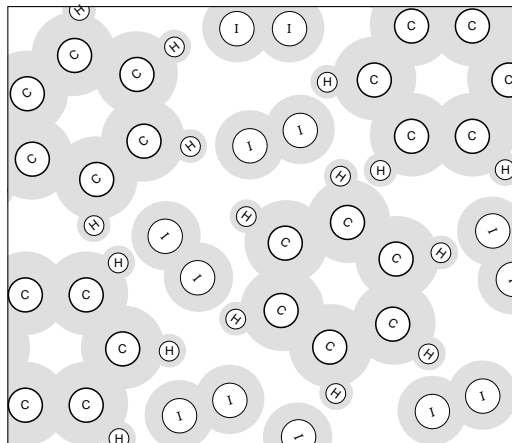
Each of the following diagrams show the particles in a material. For each diagram, write whether you think it represents an element, a compound or a mixture



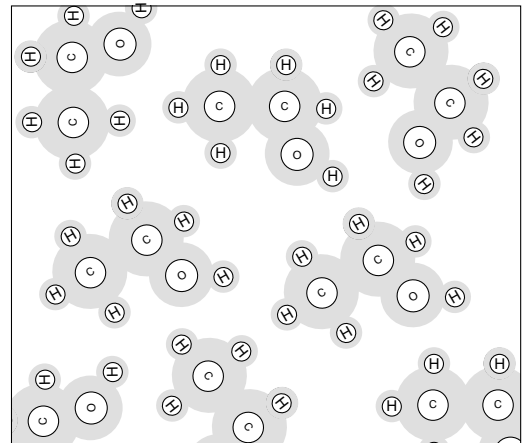
1. \_\_\_\_\_



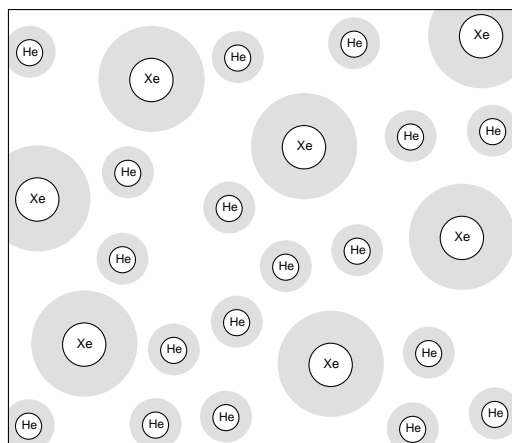
2. \_\_\_\_\_



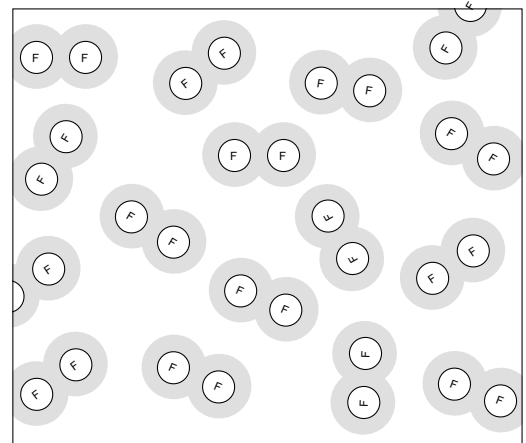
3. \_\_\_\_\_



4. \_\_\_\_\_



5. \_\_\_\_\_



6. \_\_\_\_\_