

## MODULE: *Matter 1*

### Activity Sheet 1.10: Questions/ quiz about atoms with answers

1. What is the difference between a material, matter and a pure substance?

*Answer*

*Matter is the word for the stuff which everything is made from.*

*A material is the name given to the stuff – e.g. steel, concrete, stone – that a particular object is made from.*

*A pure substance is a material that contains only one type of molecule e.g. oxygen or water or copper.*

2. What is the smallest particle of matter that can exist on its own?

*Answer*

*An atom*

3. Look at Activity Sheet 1.8 that shows the Periodic Table.

The Periodic Table is a list of all currently known elements.

- a. What is an element?
- b. How many elements do we currently know exist?

*Answers*

- a. *An element is a pure substance whose atoms are of the same type.*
- b. *There are currently 118 known elements.*

4.

a. Decide if the diagrams below show a mixture, a compound or an element.

*A is a compound*

*B is an element*

*C is a mixture*

*D is an element*

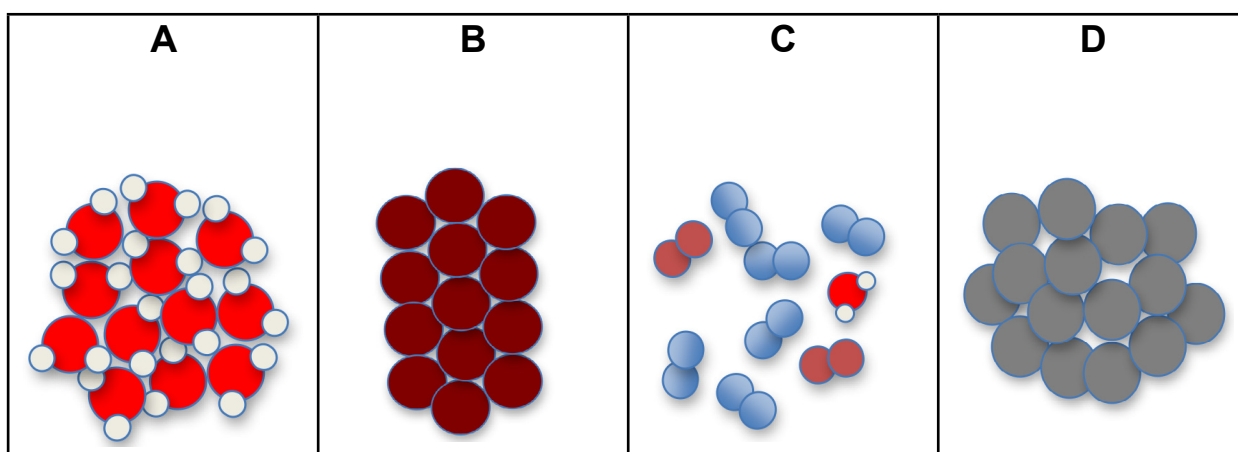
b. Decide which diagram shows a solid, a liquid or a gas.

*A is a liquid*

*B is a solid*

*C is a gas*

*D is a liquid*



5.

a. What is the name for a small group of atoms that have bonded together?

b. Draw a group of atoms like that.

*Answers*

*a. A molecule.*

*b. 2, 3 or 4 coloured circles joined together.*

6. Atoms are made up of tiny sub-atomic particles that cannot exist on their own.

Describe the central nucleus of an atom, and explain what particles are found there.

*Answer: The nucleus is very, very small compared to the size of the whole atom, and it contains nearly all the mass of the atom.*

*The nucleus consists of protons and neutrons. Protons have a positive electrical charge and neutrons have no overall charge.*

7. Describe the other parts of the atom.

*Answer: The rest of the atom is made up of electrons. Electrons are very, very small – much smaller than a proton or a neutron. They have a tiny mass, much less than a proton or neutron. Electrons move round the nucleus very, very fast – so fast that they seem to make complete shells round the nucleus.*

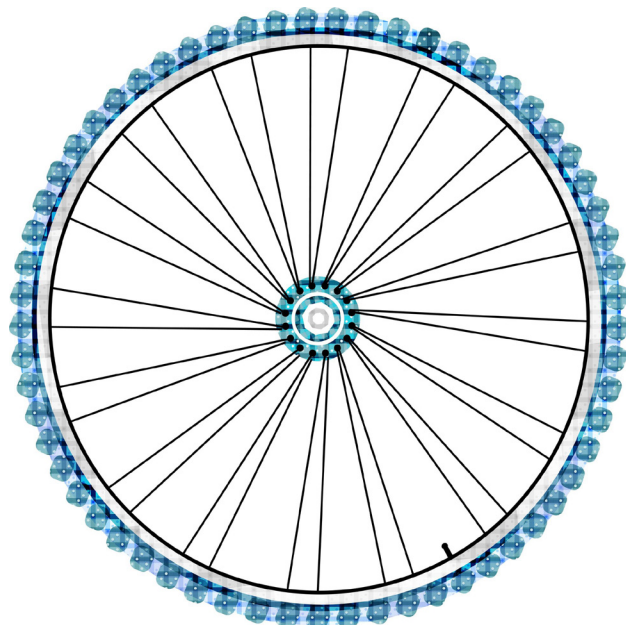
8. Sometimes an atom gains or loses an electron, forming a new type of particle. What is that type of particle called?

*Answer: An ion*

9. A small number of electrons moving quickly can make a shell that goes completely around the nucleus of an atom. Write an explanation, using a simple thinking model, about how this is possible.

Write this as if you were explaining this idea to an eight-year-old child.

The picture gives a clue to an idea you can use.



*Answer: It is the speed of the electrons that makes them seem to make a complete shell around each nucleus. They move much faster than the time it takes for one atom to collide with another atom, so nothing can get past them.*

*A thinking model for this is the spokes of a bicycle wheel. When the wheel is turning fast, the spokes move so fast they seem to make a complete disc. Objects moving at normal speed bounce off the spokes rather than passing through them.*

10.

- a. In chemical reactions, or in physical changes like melting, are atoms changed into other atoms?
- b. How are new atoms made?

*Answer*

- a. *No; atoms cannot be changed into other atoms in chemical reactions or in physical changes. The number, type and total mass of atoms present after the reaction or change has taken place remain the same as before.*

*But in chemical reactions, the atoms get rearranged into different groups, or separated from one another. This makes new substances.*

- b. *New atoms are made in the intense gravity field inside a star. And to make heavier atoms, the huge energy of a supernova is required, to bind them together.*

11.

- a. In a stable atom, why is there one orbiting electron for every proton in the nucleus?
- b. Why are there neutrons as well as protons in the nucleus of an atom?

*Answers*

- a. *Each proton has a single positive charge. Each electron has a single negative charge. The atom has no overall charge, so the number of orbiting electrons must balance the number of protons.*

- b. *Like charges repel each other, so protons repel each other. The neutrons in the nucleus, with no charge, buffer that repulsion and help stop that happening.*

*The energy holding the nucleus together is called the nuclear force or strong force. If there is more than one proton, there must be at least as many neutrons as there are protons, to help keep the protons together.*

12. The number of protons in the nucleus decides the properties of the atom.

Use your Periodic Table sheet for information. Which atoms have:

*Answers*

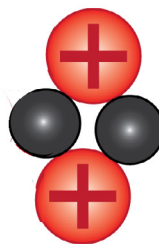
3 protons	<i>lithium</i>
12 protons	<i>magnesium</i>
6 protons	<i>carbon</i>
2 protons	<i>helium</i>
82 protons	<i>lead</i>

13. Draw the nucleus of:

a. helium atom

*red = proton*

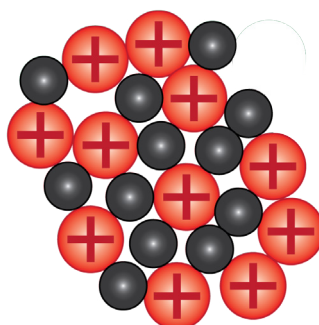
*grey = neutron*



b. sodium atom

*11 protons and*

*12 neutrons*



14. Combining powers' show how elements can fit together in a compound.

Sodium (Na) = 1      Hydrogen (H) = 1

Chlorine (Cl) = 1      Magnesium (Mg) = 2

Calcium (Ca) = 2      Oxygen (O) = 2

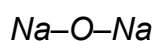
For example, as calcium has a combining power of 2, and chlorine has a combining power of 1, two chlorine atoms can combine with one calcium atom.

Another way of representing that compound is like this:



Write a similar representation of compounds of:

a. sodium and oxygen



b. magnesium and chlorine



15. Iodine is a solid element with a combining power of 1.

Write a representation of these compounds:

a. Iodine and sodium



b. Iodine and magnesium



c. Iodine and calcium



d. Iodine and hydrogen.

