Science Year 8
Substances
Term 2 Week 2 (4th May to 8th May)
Note to Students: Hi everyone I hope you managed to get through the first week ok. This week I am going to give you a test on Substances. Last week you had to complete the revision questions. If you have not finished the revision questions, these need to be done before starting the test. There is also a few activities to be completed that will help you revise for the test. The test is open book as was the last one, which means that you are allowed the text and notes from last week. My email address is: lorraine.cave@education.wa.edu.au **Due date for this week's work: 15th May**

Lesson	Content
1	**Knowledge Preview 6.1** Use the text from the last package to answer these questions.
2	**Periodic Table Quiz 6.2**
3	**Identifying Elements 6.4** Complete the table by filling in the name and chemical symbol of each element.
4	**Literacy Review 6.9** Use the words in the box to fill in the blanks.
5	**Substances Test.**

CHAPTER 6

Substances

Lesson 1

6.1 Knowledge preview

Science understanding

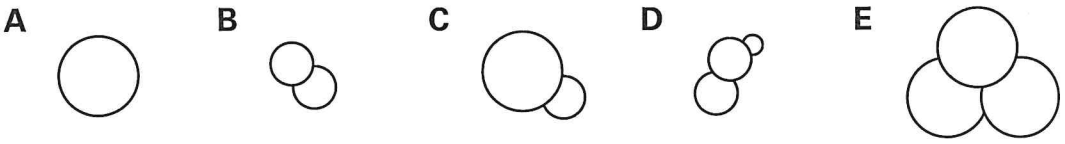
FOUNDATION	STANDARD	ADVANCED

1 Iron is a metal that is used to build bridges and other structures. You use things made of iron every day. List three things about iron which tell you that iron is a metal.

_____

_____

2 Diagrams A to E show different substances. Some are elements and some are compounds. They are all made of atoms. Atoms come in different sizes. Atoms of the same element are the same size.



(a) What is an element?

_____

_____

(b) What is a compound?

_____

_____

(c) Identify the three different atoms in the diagrams A to E. Use three different colours—one for each type of atom—and colour in all of the atoms.

(d) Which atom diagrams fit the following terms? Write the atom diagram letters (A, B, C, D or E) in the spaces provided. There may be more than one diagram that fits each description.

(i) an element _____ **(iii)** a molecule _____

(ii) a compound _____ **(iv)** an atom _____

3 Scientists sometimes use prefixes to describe the number of atoms. They may use a prefix when describing substances made of more than one atom. Match the prefix with the number it represents. Complete the table using numbers 1 to 6.

Prefix	pent	di	hex	mono	tetra	tri
Number of atoms						

prefix (*n*) an affix that is added to the front of a word which changes its meaning, e.g. happy, unhappy

6.2 Periodic table quiz

Science understanding

FOUNDATION | STANDARD | ADVANCED

Scientists organise the elements in order of increasing atomic number on a grid called the periodic table (Figure 6.2.1). The periodic table helps scientists to understand some of the physical and chemical properties of elements.

H hydrogen 1																	He helium 2
Li lithium 3	Be beryllium 4											B boron 5	C carbon 6	N nitrogen 7	O oxygen 8	F fluorine 9	Ne neon 10
Na sodium 11	Mg magnesium 12											Al aluminium 13	Si silicon 14	P phosphorus 15	S sulfur 16	Cl chlorine 17	Ar argon 18
K potassium 19	Ca calcium 20	Sc scandium 21	Ti titanium 22	V vanadium 23	Cr chromium 24	Mn manganese 25	Fe iron 26	Co cobalt 27	Ni nickel 28	Cu copper 29	Zn zinc 30	Ga gallium 31	Ge germanium 32	As arsenic 33	Se selenium 34	Br bromine 35	Kr krypton 36
Rb rubidium 37	Sr strontium 38	Y yttrium 39	Zr zirconium 40	Nb niobium 41	Mo molybdenum 42	Tc technetium 43	Ru ruthenium 44	Rh rhodium 45	Pd palladium 46	Ag silver 47	Cd cadmium 48	In indium 49	Sn tin 50	Sb antimony 51	Te tellurium 52	I iodine 53	Xe xenon 54
Cs caesium 55	Ba barium 56	La lanthanum 57	Hf hafnium 72	Ta tantalum 73	W tungsten 74	Re rhenium 75	Os osmium 76	Ir iridium 77	Pt platinum 78	Au gold 79	Hg mercury 80	Tl thallium 81	Pb lead 82	Bi bismuth 83	Po polonium 84	At astatine 85	Rn radon 86
Fr francium 87	Ra radium 88	Ac actinium 89	Rf rutherfordium 104	Db dubnium 105	Sg seaborgium 106	Bh bohrium 107	Hs hassium 108	Mt meitnerium 109	Ds darmstadtium 110	Rg roentgenium 111	Cn copernicium 112	Uut ununtrium 113	Uuq ununquadium 114	Uup ununpentium 115	Uuh ununhexium 116	Uus ununseptium 117	Uuo ununoctium 118

Lanthanoids	Ce cerium 58	Pr praseodymium 59	Nd neodymium 60	Pm promethium 61	Sm samarium 62	Eu europium 63	Gd gadolinium 64	Tb terbium 65	Dy dysprosium 66	Ho holmium 67	Er erbium 68	Tm thulium 69	Yb ytterbium 70	Lu lutetium 71
Actinoids	Th thorium 90	Pa protactinium 91	U uranium 92	Np neptunium 93	Pu plutonium 94	Am americium 95	Cm curium 96	Bk berkelium 97	Cf californium 98	Es einsteinium 99	Fm fermium 100	Md mendelevium 101	No nobelium 102	Lr lawrencium 103

Figure 6.2.1 The periodic table

H — symbol
hydrogen — name
1 — atomic number

Use the periodic table to answer the following questions.

1 State the total number of elements listed on the periodic table. _____

2 Identify the chemical symbol of the following elements.

hydrogen _____ helium _____

carbon _____ oxygen _____

nitrogen _____ aluminium _____

calcium _____ iron _____

6.2 Periodic table quiz

3 Name the elements with the following chemical symbols.

Li _____ B _____

Na _____ Si _____

P _____ Cl _____

Cr _____ Cu _____

4 List the names and symbols of all the elements whose names start with the letter 'C'.

_____

_____

_____

5 Identify three elements named after famous scientists.

_____

6 Identify three elements named after a place, country, continent or planet.

_____

7 Some chemical symbols do not appear to correspond to their chemical names in English. For example, the chemical symbol for silver is Ag. List the name and symbol of five other elements whose chemical symbols do not correspond with the names of the elements.

_____

_____

_____

8 In the table below, list five elements that you might use in your everyday life and identify where they might be used.

Element	Uses

RATE MY UNDERSTANDING
Shade the face that shows your rating

Lesson 3

3.4 Identifying elements

Science understanding

FOUNDATION	STANDARD	ADVANCED

1 Match the elements below to the properties listed in the table. Use what you know about the elements in the box to help you do the matching.

aluminium Al	carbon C	chlorine Cl	copper Cu	gold Au
helium He	iron Fe	nitrogen N	oxygen O	sulfur S

Elements and their properties		
Description of properties	**Chemical name**	**Chemical symbol**
(a) I am lightweight and shiny and conduct electricity very well. For these reasons, I am used in overhead power lines. I am also used in soft-drink cans because I can be recycled.		
(b) At room temperature I am a solid, bright yellow powder. I am a typical non-metal. I don't conduct electricity and I crumble easily. I can be found under oxygen on the periodic table.		
(c) I can be found in many different forms. Sometimes I am a black crumbly solid called charcoal. However, I can also form very hard, beautiful and expensive crystal lattices called diamond.		
(d) I am a colourless, odourless gas that makes up most of the air you breathe but I am not oxygen. I am one of the first 10 elements listed in the periodic table.		
(e) I am a yellow gas with a pungent smell. Don't breathe me in or I will damage your lungs. I am also used in swimming pools to kill bacteria. I am between elements 10 and 20 on the periodic table.		
(f) I am yellow and shiny. I conduct electricity very well so am sometimes used for wiring in electrical equipment. However, I am more commonly used in jewellery because I am rare and expensive.		
(g) I am strong and hard and can be bent into many different shapes. That is why I am used in construction. However, I am often mixed with metals and carbon to prvent me rusting.		
(h) I am a very light and non-toxic gas. I do not react with other substances so I am often used to make party balloons that float.		
(i) I am an invisible, non-toxic gas. I am one of the most important elements on Earth. I am in water, sand and air. You need me to breathe and stay alive. Plants produce me through photosynthesis.		
(j) I am shiny and orange-brown in colour. I can be drawn into wires or hammered into sheets. I conduct electricity very well, which makes me perfect for household wiring and electrical equipment.		

0.5 Literacy review

Science understanding

FOUNDATION	STANDARD	ADVANCED

Recall your knowledge of substances by choosing words from the box to complete the statements below. Some words may be used more than once. Some words may not be used at all. Two have been completed for you.

monatomic (*adj*) made up of single atoms

atoms ✓	bauxite	break	compounds	conduct	diamond
elements	gas	hardness	lattices	liquid	mixtures
molecules ✓	nucleus	ores	solid	talc	

1. Atoms are the smallest building blocks that make up all the substances around you. Substances made up of just one type of atom are known as _____.
2. Metallic elements are shiny, _____ electricity and heat, and can be drawn into wires or hammered into sheets. They are usually _____ at room temperature.
3. Non-metallic elements are usually dull, do not conduct electricity or heat and _____ when a force is applied. Most non-metals are solid or _____ at room temperature.
4. The atoms that make up the elements can be monatomic, in clusters called molecules or in large crystal _____.
5. Pure substances made up of more than one type of atom are known as _____. These substances can be made up of atoms in crystal lattices.
6. Substances that are made up of a combination of different elements and compounds are known as _____.
7. Minerals can be identified by their colour, lustre and _____.
8. Rocks that contain valuable minerals such as _____ are called _____.
9. Mohs hardness scale lists _____ as the softest mineral and _____ as the hardest mineral.

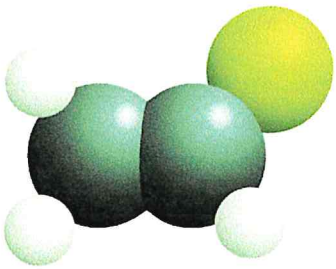
RATE MY UNDERSTANDING
Shade the face that shows your rating ☺ 😐 ☹

Chapter 6 Test Substances

Name: _____ Class: _____ Date: _____

Instructions: Write answers in the right-hand column. Score: _____ / 58 marks

Section A—Multiple choice (10 marks)

1	Chemists use symbols to identify each element. Recall which feature is true of these symbols. **A** They mostly contain one or two letters. **B** They always use the first letter of the element name. **C** They are arranged in the periodic table alphabetically. **D** They must use only capital letters.		1
2	Identify the correct statement about the properties of compounds. **A** The properties of compounds are impossible to describe. **B** The properties of compounds are different to those of the elements they are made from. **C** The properties of compounds are the average properties of the elements that make them up. **D** The properties of compounds are the same as the elements they are made from.		1
3	Identify what the chemical structure shown here represents.  **A** a molecular element **B** a lattice element **C** a molecular compound **D** a lattice compound		1

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4	Recall which element has the chemical symbol K. **A** copper **B** cobalt **C** polonium **D** potassium		1
5	Tap water is best described as: **A** an element **B** a compound **C** a mixture **D** an alloy		1
6	Determine which of the following statements about molecular compounds is *not* true. **A** the molecules are identical **B** the molecules contain the same types of atoms but may have different numbers of each type. **C** the molecules contain more than one type of atom **D** the molecules can be broken down into their elements		1
7	Identify which list contains only properties of metals. **A** brittle, conduct heat, conduct electricity **B** malleable, electrical insulator, ductile **C** dull appearance, crumble, gas at room temperature **D** ductile, malleable, conduct electricity		1
8	A seismic survey works by: **A** setting an explosive charge in the rocks and collecting the rocks blasted out. **B** drilling out a core of rock and chemically testing it for mineral content. **C** creating a shock wave in the rock and seeing how much it makes the ground shake. **D** sending a shock wave into the Earth and watching for how it reflects off rock layers below.		1
9	Choose a suitable definition of an ore. **A** a mineral that is particularly valuable and worth mining **B** a rock that contains a high level of a valuable mineral **C** a deposit in the crust that is economically valuable **D** a rock that contains valuable metals that can be extracted		1

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10	Identify which of the following is the best definition of a mineral. **A** a naturally occurring liquid or solid in the Earth's crust, excluding petroleum and coal **B** a chemical compound found in the Earth's crust **C** a compound that forms crystals as it cools **D** a rock that contains a high level of a particular valuable chemical compound		1

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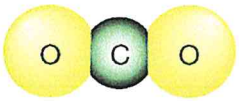
Section B—Short answer (39 marks)

1	Define each of the following. **a** *element* **b** atom **c** molecule **d** compound		4
2	**a** Sketch a molecule of NH_3. **b** Determine the chemical formula for the molecule shown below.  carbon dioxide		2
3	Identify and name the elements whose symbols are given below. **a** Al **b** Ca **c** Au **d** He **e** O **f** Mg **g** Kr **h** Pb **i** S **j** Zn		5

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4	Identify the symbol for each of the following. **a** hydrogen **b** chlorine **c** silver **d** neon **e** lithium **f** boron **g** iodine **h** iron **i** tin **j** carbon		5
5	Define a mixture.		1
6	List the only two elements that are liquid at room temperature (hint: one is a metal and the other is a non-metal).		2
7	List three properties of: **a** metals **b** non-metals		6
8	Contrast iron and steel.		2
9	Propanol has the molecular formula C_3H_7OH. Determine the type of atoms in each molecule and the number of each type of atom.		3
10	Imagine you are given two large black crystals. Describe three different tests you could do to compare these two crystals to decide if they are different minerals or the same mineral.		6
11	Compare a rock, a mineral and an ore.		3

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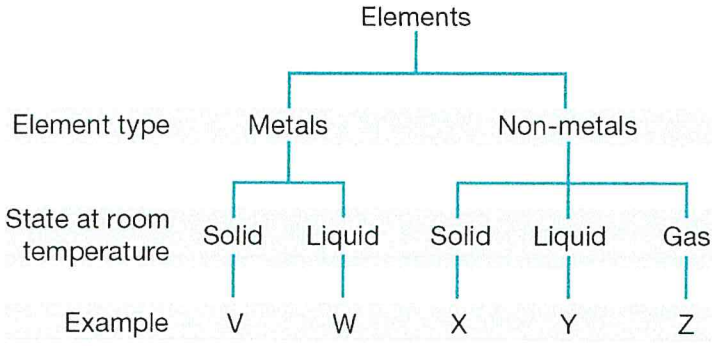
Section C—Thinking scientifically (9 marks)

1	The chart below divides elements into 5 groups where the letters V, W, X, Y and Z represent an example of each.  Given that bromine is the only non-metal liquid at room temperature, it can be inferred that bromine could be: **A** Y only **B** W or Y **C** W only **D** X, Y or Z		1

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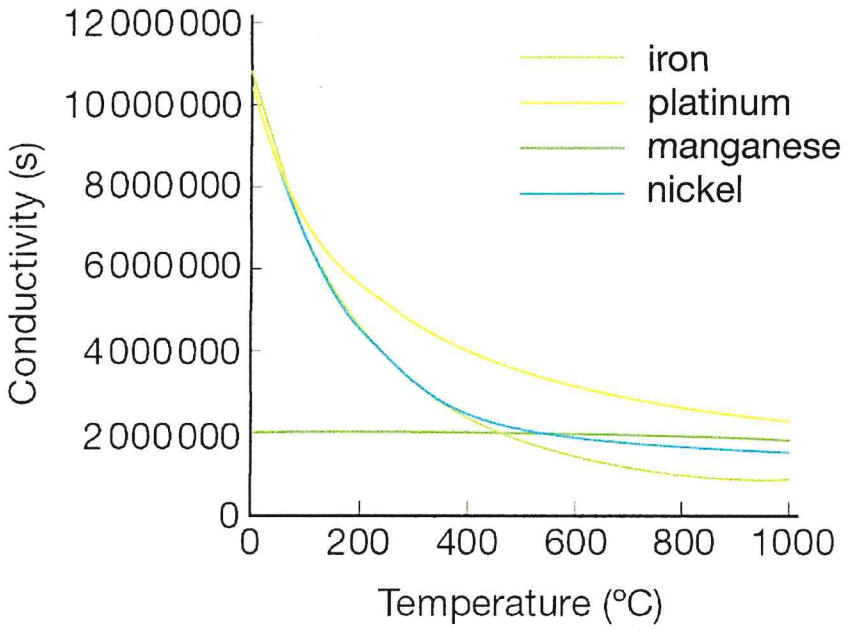
2	The conductivity of a metal is a measure of how well the metal transmits an electrical current. Usually, the conductivity will change with temperature as shown for four metals in the graph below.  According to this graph, the best conductor at 700°C is: **A** iron **B** platinum **C** manganese **D** nickel		1

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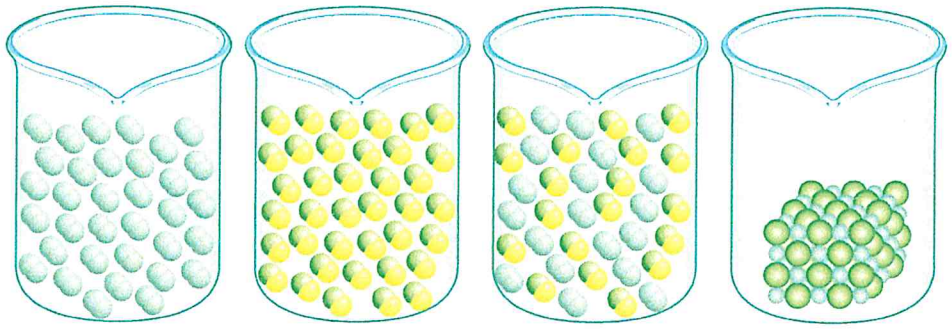
3	A molecular compound is a pure substance that is made up of identical particles where each particle contains atoms from two or more elements. Which of the following is the best representation of a molecular A B C D  compound?		1

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4 When two substances are combined to form a mixture, the substance that makes up most of the mixture is called the dispersion medium. The substance that is mixed into the dispersion medium is called the dispersed phase.

Different types of mixtures are given different names depending on whether the dispersion medium and the dispersed phase are solids, liquids or gases. The table below shows some of the names given to different types of mixtures.

		Dispersion medium		
Dispersed phase		**Solid**	**Liquid**	**Gas**
	Solid	solid solution alloy (for metals) solid sol	solution sol suspension	solid aerosol
	Liquid	solution gel	liquid solution emulsion	aerosol
	Gas	solid foam	solution foam	gas solution

From this table, the scientific term for a fog on a cold winter's morning would be:

A emulsion
B gel
C aerosol
D sol

1

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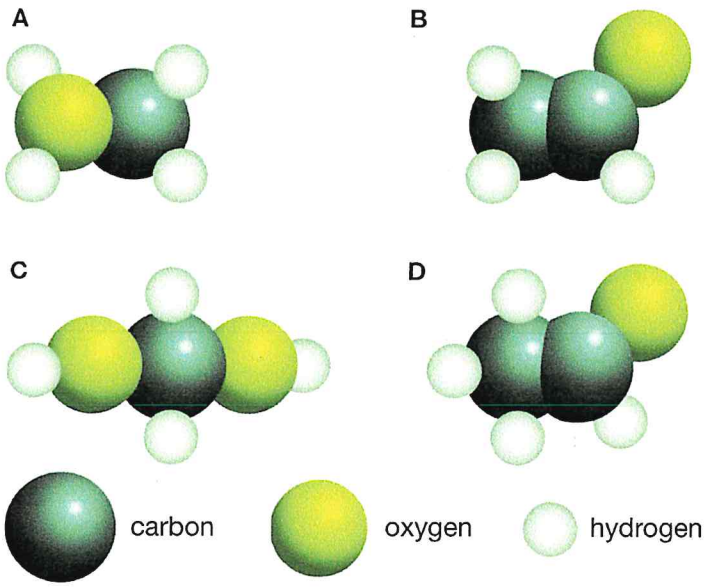
5	The following statements about elements are all true: • Elements are substances made up of just one type of atom. • The atoms in elements can form molecules or crystal lattices. • Elements can be metallic or non-metallic. • Solid, non-metallic elements can be made up of molecules or crystal lattices. • All solid, metallic elements are made up of crystal lattices. From this information you can deduce: **A** A crystal lattice is always metallic. **B** A solid, non-metal element is always made up of molecules. **C** A solid element made up of molecules cannot be metallic. **D** A solid, non-metal is never made up of a crystal lattice.		1
6	An engineer is researching different types of cables to be used on a new type of aircraft. The cables must be very strong to withstand the force of the wind as the plane travels very fast through the atmosphere. However, the cables must also be very light so the plane can take off quickly. The engineer has narrowed it down to the four options shown in the graph below.  Which of these types of cables would be the engineer's best option? **A** fibre glass **B** aluminium alloy **C** carbon fibre **D** steel		1

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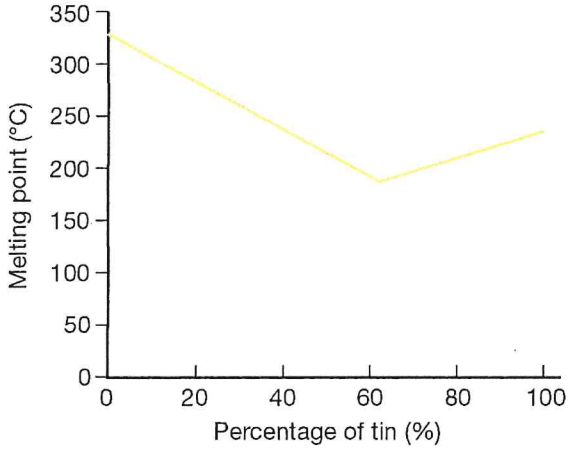
7	Solder is an alloy (metal mixture) of tin and lead. It is used to connect electrical wiring together because it conducts electricity well and has a low melting point, but sets hard once it's cooled. The melting point of the solder alloy depends on the proportions of tin and lead in the solder. Mark wants to use solder to connect some copper wires to a very sensitive electrical circuit. It is important that the electrical circuit does not get too hot so Mark must find the solder alloy with the lowest melting point. Use the graph below to determine what type of solder Mark should use to protect his electrical circuit.  **A** 0% tin and 100% lead **B** 50% tin and 50% lead **C** 60% tin and 40% lead **D** 100% tin and 0% lead		1

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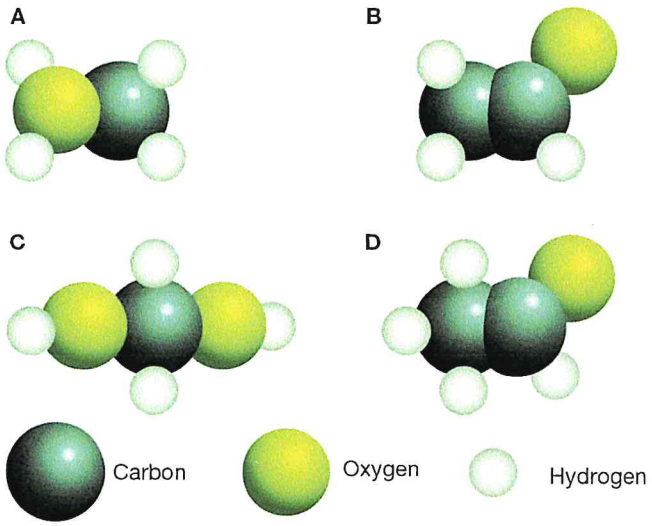
8	The molecular formula for a compound tells you what type of atoms are in the molecules and how many of each. For example, the molecular formula for water H_2O tells you that there are two hydrogen atoms (H) and one oxygen atom (O) in each molecule of water. A common compound found in coffee, bread and ripe fruit is acetaldehyde, which has the molecular formula C_2H_4O. Which of the following diagrams would best represent a molecule of acetaldehyde?  		1
9	Fool's gold (iron pyrites) and gold are a similar colour, and many people are often fooled by the appearance. However, when a streak test is done, fool's gold has a greenish black streak and gold has the same colour streak as the lump of gold. What can be concluded from this example? **A** gold and fool's gold are the same mineral but with a different structure **B** the streak test did not prove these two minerals were the same **C** streak tests are very unreliable to use as a means of deciding if two minerals are different **D** the streak test can show that two minerals are different		1

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