UNIT 1 THE BUILDING BRICKS OF THE WORLD

A. MATTER

EVERYTHING IN AND AROUND US

Matter, anything that has mass and occupies space, exists in three phases: solids, liquids, and gases.
Atoms are the smallest particles of an element that retain the chemical properties of the element. Each atom consists of a tiny cored called nucleus surrounded by moving positively charged electrons. The nucleus contains positively charged particles called protons. It may also contain electrically neutral atoms called neutrons.
An element is matter that consists of only one kind of atom, either individually or combined into larger units.
Molecules are units of matter consisting of two or more atoms combined in a definite ratio. A compound is a matter that consists of atoms of different elements combined in specific ratios. The salt and sugar on your dinner table, and the carbon dioxide of the air, are chemical compounds. A great deal of the research done in chemistry involves the study of transformations of one or more compounds into others, so you will spend most of your time examining molecules: their shapes, the forces holding them together, and their chemical and physical properties.
A compound is different from a mixture. The elements in a compound lose their individual chemical characteristics, and the compound has new characteristics. In a mixture each of the constituents retains its identity.
Mixtures can be homogeneous or heterogeneous. A homogeneous mixture has the same composition throughout the mixture. If you stir sugar into a glass of water, the sugar dissolves and sugar molecules are distributed uniformly, that is, homogeneously, throughout the water. This is an example of a solution, a homogeneous mixture of two or more substances. The material dissolved is the solute, and the medium in which it is dissolved is the solvent. In a sugar/water solution, sugar is the solute and water the solvent. In contrast, a mixture of solid grains of sand and salt is heterogeneous, since particles of each component of the mixture remain separate and can be observed as individual substances.
In either a homogeneous or a heterogeneous mixture, the components can be separated into pure substances by physical means, that is, without changing the specific atom ratios within the particles.
The components of a mixture can also be separated by chemical means, but this involves changing the chemical nature of one or more of the constituents. This is often done in chemical analysis, where the components of a mixture are transformed into new substances that can be observed or separated by physical means.
Each chemical substance has a set of physical properties, properties that can be measured and observed without changing the atom ratios within the substance. Such properties include colour, the temperature at which a substance melts or boils, density, and physical state at room temperature.
In contrast with physical properties, the chemical properties of a substance are those that it exhibits when it undergoes a change in atom arrangements or in atoms ratios. This change is often brought about by contact with another substance. When gasoline burns in an automobile engine ▶

or metals rust and corrode, their chemical composition changes.

The physical or chemical properties of substances can be classified further as extensive or intensive. Extensive properties depend on the amount of matter present, intensive properties are the same regardless of sample size. The temperature at which a pure substance melts and the colour of a material are both intensive properties. Water is colourless and freezes at 0°C (32°F), whether you have a spoonful or a ton.

No two pure substances have the same combination of chemical and physical properties under the same conditions, so we can use these differences to identify substances. Many of the physical properties of oxygen and nitrogen are very similar; both are colourless gases at room temperature, for example. However, a burning match will go out if it is put into a flask of nitrogen gas, but it will burn brightly in pure oxygen. The two gases clearly have different chemical properties.

(from: Kotz & Purcel, *Chemistry and Chemical Reactivity*, Hartcourt Brace Jovanovich College Publishers.)

1 *In what state of matter do you normally find the following substances?*

a. the oxygen you breathe **b.** petrol (BE) / gasoline (AE) **c.** limestone

2 *Are the underlined characteristics physical or chemical properties?*

a. The normal colour of bromine is red-orange. • **b.** Iron is transformed into rust in the presence of air and water. • **c.** Dynamite can explode when it interacts with oxygen. • **d.** The density of uranium metal is 19.07 g/cm^3. • **e.** Aluminium metal, the "foil" you use in the kitchen, melts at 660°C.

3 *For each of the words below decide which meaning best applies to the context of the passage* 'Everything in and around us'.

a. sensitive: *sensibile / impressionabile* • **b.** ultimately: *alla fine / fondamentalmente* • **c.** ratio: *rapporto / ragione* • **d.** soft (drink): *morbido / analcolico* • **e.** medium: *mezzo / elemento (solvente)* • **f.** to undergo: *subire / sopportare*

4 *Use either* how *or* what *to complete the questions below, then answer them.*

a. .... are the three phases of matter? • **b.** .... does an atom consist of? • **c.** .... does a compound differ from a mixture? • **d.** .... is a solution? • **e.** .... are mixtures divided? • **f.** .... is the material dissolved in a solution called? • **g.** .... is the solvent? • **h.** .... can the components of a mixture be separated? • **i.** .... characteristics do chemical properties include? • **j.** .... are the chemical properties of a substance?

5 *Match words* a-j *with their synonyms* 1-10. *Tip: copy the pairs in your indexed book.*

a. concrete	☐	**1.**	all over
b. core	☐	**2.**	amount
c. height	☐	**3.**	cement
d. quantity	☐	**4.**	centre
e. ratio	☐	**5.**	degree of heat or cold
f. shape	☐	**6.**	form
g. temperature	☐	**7.**	heaviness
h. throughout	☐	**8.**	proportion
i. tiny	☐	**9.**	tallness
j. weight	☐	**10.**	very small

B. THE BUILDING BLOCKS OF MATTER

ELEMENTS AND COMPOUNDS: SYMBOLS AND FORMULAE

Elements are single pure substances that cannot be split into anything simpler by chemical means. There are just over 100 different elements of which about 30 are fairly common.
Scientists throughout the world use the same symbols for the same elements.
Most substances we come across are compounds. A compound is formed when two or more elements join together. The new substances formed are often very different form the elements from which they are made.

Compounds have the following characteristics:

a. they have properties of their own and not the properties of the elements from which they are made;
b. they contain fixed amounts of the elements in them;
c. they are formed by a chemical reaction;
d. they are difficult to split up and cannot easily be made back into the elements from which they were formed.

The formula of a compound is made using the symbols of the elements in the compound. It tells you which elements the compound is made from and how much of each element there is. Some simple rules are used when deciding how to name a compound. The most important ones are these:

a. if a compound contains a metal, the name of the metal comes first, e.g. iron sulphide;
b. the name of a simple compound containing two elements ends in the letters *-ide*, e.g. aluminium iodide;
c. a compound of two elements and oxygen often ends in the letters *-ate*, and oxygen does not appear in the name, e.g. copper sulphate.

(from: Stone-Andrews-Williams, *Examining GCSE-Science*, Stanley Thornes Ltd.)

Chemistry teacher: Now, Ronald, tell me, what's the substance whose formula is H_2SO_4?
Ronald: Er...hem... I've got it here on the tip of my tongue...
Chemistry teacher: You'd better spit it, then, because it's sulphuric acid!

6 *Match these words with the definitions below: compound, element, formula, reaction, symbol. Tip: copy the definitions in your indexed book.*

a. A substance that consists of only one type of atom is called ....

b. The letter(s) representing a chemical substance is/are called ....

c. A substance consisting of two or more elements chemically combined is called ....

d. The set of letters and numbers showing the elements that a substance is made of is called ....

e. The chemical change caused in a substance when it combines with another is called ....

7 *Match words* a-h, *as they are used in the passage* Elements and compounds: symbols and formulae, *with their synonyms* 1-8. *Tip: copy the pairs in your indexed book.*

a. single	☐	**1.**	canons
b. means	☐	**2.**	distinct
c. over	☐	**3.**	features
d. fairly	☐	**4.**	methods
e. most	☐	**5.**	more than
f. characteristics	☐	**6.**	nearly all
g. as	☐	**7.**	quite
h. rules	☐	**8.**	while

8 *Match verbs* a-e, *as they are used in the passage* Elements and compounds: symbols and formulae, *with their synonyms* 1-5. *Tip: copy the pairs in your indexed book.*

a. split (up)	☐	**1.**	call
b. come across	☐	**2.**	encounter
c. join	☐	**3.**	finish
d. name	☐	**4.**	separate
e. end	☐	**5.**	unite

9 *Decide which nouns the words underlined in the passage* Elements and compounds: symbols and formulae *refer to.*

a. "that" (cannot…) refers to ....

b. (of) "which" refers to ....

c. (from) "which" refers to ....

d. "they" (are made) refers to ....

e. (of) "their" (own) refers to ....

f. (in) "them" refers to ....

g. (as) "they" refers to ....

h. (the most important) "ones" refers to ....

10 *Which is the correct verb form in the sentences below?*

a. Elements *form / are formed from* compounds.

b. Chemists *gave / were given* symbols to elements.

c. Chemists all over the world *use / are used* the same chemical symbols.

d. Fixed amounts of elements *contain / are contained in* compounds.

e. Compounds *do not easily make back / are not easily made back into* their constituent elements.

f. Sodium *forms / is formed by* common salt.

11 *Read* Compounds and molecules *and replace the underlined words/expressions choosing among these:*

Nouns: characteristic, forms, manners, proportion, types
Adjectives: attracted, entire, huge, non-alcoholic, normal, remarkable,
Verbs: carrying, deals with, keeps,
Adverbs/conjunctions/prepositions: around, as well, except, in contrast, tightly, too,

The clothes you wear and the food you eat consist of many (1) kinds .... of chemical compounds. Cotton and wool fibres are composed of (2) giant .... molecules, as are the substances in polyester and nylon. All are composed of carbon, hydrogen, oxygen, and other elements, organized in particular (3) ways .... Aspartame, a substitute for sugar in diet (4) soft .... drinks, is a simple compound, also built of carbon, hydrogen, and oxygen, but nitrogen is an essential ingredient (5) as well .... (6) Common .... table salt is a compound composed of sodium and chlorine, and many rocks and minerals are giant molecules of silicon, oxygen, and various metals such as sodium, aluminium, beryllium, and iron. Limestone contains calcium, carbon, and oxygen.
Chemistry (7) is about .... the compounds you find all (8) about .... you: about their composition and their chemical and physical properties. But it is also about making new compounds with properties that no one has seen before. Chemists often became chemists because they were (9) fascinated .... by the colours of compounds and the (10) shapes .... of molecules and by what determines these properties.
John Dalton said that compounds form by the combination of atoms in the (11) ratio .... of small (12) whole .... numbers. Now we know that the smallest unit of a compound that (13) retains .... the chemical characteristics of the compound is a molecule. The composition of a molecule can be represented by a molecular formula, which expresses the number of atoms of each type within one molecule of the compound.
When compounds are formed directly from the elements or from other compounds, one (14) striking .... (15) feature .... is that the characteristics of the constituent elements are lost. The subscript to the right of the element's symbol indicates the number of atoms of that element in the molecule. If the subscript is omitted, it is understood to be one, for example, in the water molecule, H^2O, there is one atom of oxygen and two atoms of hydrogen. Molecular formulas are sometimes written with the elements listed in alphabetical order.
All (16) but .... the heaviest of the elements have been isolated in large amounts in pure form. Most elements are metals and most of these are solids. In the solid state, metals consist of atoms packed together as (17) closely .... as possible. (18) On the other hand ...., non-metals are often gases, liquids, or solids consisting of (19) discrete .... atoms or even molecules
Atoms of almost all the elements can gain or lose electrons in ordinary chemical reactions to form ions, an atom or group of atoms (20) bearing .... a net electrical charge. Indeed, a characteristic of metals is that metal atoms lose electrons to form ions with a positive electrical charge, ions commonly called cations.
In contrast with metals, non-metals frequently gain electrons to give ions with a negative electrical charge. Such ions are called anions.

(from: Kotz & Purcel, *Chemistry and Chemical Reactivity*, Hartcourt Brace Jovanovich College Publishers.)

C. THE PERIODIC TABLE

SOME PERIODIC TABLE HIGHLIGHTS

Carbon (Group 4A) is abundant and widely distributed on our planet. *In elementary form, carbon occurs as the allotropes diamond and graphite*.
Graphite melts at the extraordinarily high temperature of 3,550 °C, so it is used to make crucibles for casting metals and to line electrical furnaces. Since it is also a reasonably good conductor of electricity, it is used to make electrodes for industrial processes. It is also soft and marks paper, so it is the 'lead' in pencils. It is commonly used as a lubricant. There are high-strength materials made by mixing graphite fibres with various plastics. You may have seen them in tennis rackets or golf clubs, but they are also used in less common places such as space shuttles and the cockpits of race cars.
The diamond allotrope has fascinated people since ancient times. Tons of diamonds are used annually, mostly *as industrial abrasives*. Natural diamonds do not completely satisfy this demand, so some diamonds are made from graphite.

Nitrogen (Group 5A) makes most of the air around us. Elemental nitrogen, N_2, is a very useful material. *Because of its inertness*, the largest quantity of gas is used to provide a non-oxidizing atmosphere for packaged food and wine, for example, or to pressurize cables and wires. Nitrogen is also easily converted to a liquid that is convenient to handle. In this form it may be used to freeze soft materials *so they can be ground to a powder* or to preserve biological specimen (e.g. blood and semen).

Oxygen (Group 6A) is the most abundant element on our planet. However elemental oxygen, O_2, did not appear in the atmosphere of the earth until *about two billion years ago*, when it began to arise from photosynthesis occurring in the earliest green plants.
O_2 is the most common allotrope of oxygen; ozone, or O_3, is the other. *It is a blue gas with a strong odour*. The gas is unstable with respect to decomposition back to O_2, a reaction that is normally slow but can be speeded up by ultraviolet irradiation. These reactions occur in the stratosphere and serve not only to convert the sun's intense ultraviolet radiation to warm the earth's atmosphere but also to protect plants and animals from that radiation. *Its primary use is to produce oxygen-containing compounds in industry and to purify drinking water*.

12 *Ask questions to which the sentences in italics in* Some Periodic Table Highlights *are the answers.*

13 *Answer these questions about the passage* Some Periodic Table Highlights.

- **a.** Can you give some examples of the different uses of graphite?
- **b.** What are some artificial diamonds made from?
- **c.** What is nitrogen used for?
- **d.** Why is nitrogen often converted to a liquid?
- **e.** What did oxygen in the earth atmosphere derive from?
- **f.** What is the main function of ozone in the stratosphere?

D. CHEMICAL REACTIONS

D.1 THE ESSENCE OF CHEMISTRY

The essence of chemistry is the study of chemical reactions, the combination of the elements and their compounds to give new compounds. Chemists have used reactions to produce the materials – Teflon, nylon, polystyrene, and PVC, among others – so vital in our modern economy. Cancer chemotherapy agents and experimental drugs to treat AIDS are produced by chemical reactions. Plants and animals are chemical reaction factories.

There are certain principles that govern all chemical reactions. In any chemical change, matter is conserved. Although the atoms involved are re-arranged into different species in the course of a reaction and the number of molecules may change, the total number of atoms of each kind in the reactants and products must be the same. Thus a balanced chemical equation shows the relative amounts of products and reactants.

In combination reactions elements combine (a) with the halogens and (b) with oxygen. Combustion reactions involve the combination of a compound of C and H, or one of C, H, and some other element, to give CO_2, H_2O, and another oxide as appropriate. In decomposition reactions compounds break down into simpler compounds, usually by heating. The decomposition of metal carbonates to give metal oxides and CO_2 is an example.

Stoichiometry is the study of mass relations in chemical reactions, and its guiding principle is the conservation of matter.

Many important chemical reactions occur in water. Ionic compounds that contain certain ions can dissolve in water to a significant extent. In doing so, they break up or dissociate into their ions. The resulting solution conducts electricity, so the dissolved ionic compounds are called electrolytes.

Some ions do not enter directly into reactions involving ionic compounds and so are called spectator ions.

Since many reactions occur in solution, the concentration of material (the solute) in the reaction medium (the solvent) must be defined. A very convenient unit of concentration is molarity.

A titration is a way to carry out a reaction in a very precise manner and to use it for analysis. In an acid-base titration, acid of known concentration is added to a base of unknown concentration (or vice versa) until the number of moles of H_3O^+ that can be supplied by the acid is exactly equal to the number of moles of OH^- that can be supplied by the base. This is called the equivalence point. From the known stoichiometry of the reaction that occurs, one can find the amount of unknown acid or base.

Oxidation-reduction reactions (often called redox reactions) involve the transfer of electrons between compounds. A compound is said to be reduced if the oxidation number of one of its atoms is reduced by acquiring electrons from another species, the reducing agent. Conversely, a compound is oxidised if the oxidation number of one of its atoms is increased because that compound has transferred one or more electrons to an oxidising agent.

(from: Kotz & Purcel, *Chemistry and Chemical Reactivity*, Hartcourt Brace Jovanovich College Publishers)

14 *Answer these questions about* The essence of Chemistry.

a. When does a chemical reaction occur?
b. What information does a balanced chemical equation provide?
c. What happens to elements in combination reactions?
d. What happens to the substances involved in combustion reactions?
e. What happens to compounds in decomposition reactions?
f. What is stoichiometry?

15 *Using these verbs, join the 'heads'* a-h *and* 'tails' 1-8 *into meaningful sentences:* accepts, are not, are transferred, donates, include, is, to analyse, to measure.

a. Some ions are called 'spectator ions' because they ☐
b. Some fundamental chemical reactions ☐
c. Molarity is very useful ☐
d. Molarity ☐
e. Titration is a procedure used ☐
f. In redox reactions electrons ☐
g. The reducing agent is the substance that ☐
h. The oxidising agent is the substance that ☐

1. a substance by means of a reaction in solution with a reagent of known concentration.
2. between compounds.
3. directly involved in the reaction.
4. electrons.
5. electrons.
6. redox, acid-base and precipitation reactions.
7. the concentration of the solution in the solvent.
8. the number of moles of solute per litre of solution.

16 *Which of the words in brackets is the correct synonym for the words underlined in the following sentences?*

a. Many important chemical reactions <u>occur</u> (*are found / take place*) in water.
b. Ionic compounds can dissolve in water to a significant <u>extent</u> (*degree / length*).
c. Acids provide H^3O^+ ions in water <u>while</u> (*when / whereas*) bases provide OH^- ions.
d. A very <u>convenient</u> (*suitable / inexpensive*) unit of concentration is molarity.
e. This <u>allows</u> (*enables / gives permission*) us to find the new concentration.
f. A titration is a way to <u>carry out</u> (*transport / conduct*) a reaction in a very precise manner.

17 *Decide whether the words underlined in the following passage are* nouns, verbs, adjectives or adverbs *by putting a tick in the correct place in the chart below.*

The rates at which chemical reactions occur are just as important to you as they are to the (1) <u>industrialist</u> and the (2) <u>chemical</u> engineer.
At home you might be interested in the rate at which you can boil an egg or (3) <u>bake</u> a cake. (4) <u>Outdoors</u> you might be interested in the rate at which the car is (5) <u>rusting</u>, or the (6) <u>stone-work</u> of (7) <u>buildings</u> is being weathered by acidic gases in the atmosphere.
In industry, (8) <u>engineers</u> and other workers will be closely concerned with the rates of chemical reactions in industrial processes and in (9) <u>constructional</u> (10) <u>engineering</u>. These might include the rate at which ammonia can be obtained from nitrogen and hydrogen, the rate at which (11) <u>concrete</u> (12) <u>sets</u> or the rate of growth of a particular fruit or (13) <u>vegetable</u> crop. ▶

Industrialists and chemical engineers are not satisfied with (14) merely turning one substance into another. In most cases, they want to perform reactions and obtain products rapidly, easily and as cheaply as possible. Time and money are important in industry, and it is often necessary to accelerate reactions so that they are economically (15) worthwhile.
Reaction rates are also of (16) archaeological importance. Archaeologists can (17) estimate the age of rocks, fossils or prehistoric (18) remains by a process known as radio-active (19) dating in which they measure the concentration of a (20) decaying radioactive isotope such as 14C in the object under scrutiny.

WORD	NOUN	VERB	ADJ.	ADV.
1. industrialist				
2. chemical				
3. bake				
4. outdoors				
5. rusting				
6. stone-work				
7. buildings				
8. engineers				
9. constructional				
10. engineering				
11. concrete				
12. sets				
13. vegetable				
14. merely				
15. worthwhile				
16. rely				
17. archaeological				
18. estimate				
19. remains				
20. dating				
21. decaying				

D.2 HOW FAST?

In the laboratory we can study what changes affect the rate of a reaction. Some reactions you have already come across are so fast that they appear to be instantaneous, for example when an insoluble salt is prepared by mixing together two soluble salts, the solid appears immediately. Other reactions take a few seconds, for example burning a small length of magnesium ribbon, and some reactions seem to take a very long time, like the tarnishing of a silver tray or the rusting of iron.
In order to follow a reaction in the laboratory we need an observable or measurable change. Changes we can measure include:

a. a change in pH; b. a change in temperature; c. a change in colour; d. a change in mass; e. the disappearance of a reactant; f. the appearance of a precipitate; g. a volume of gas given off. Some of the easiest reactions to follow in the laboratory are those in which a gas is given off.
In order for substances to react they must collide with each other. If a collision is to cause a reaction to take place the collision must have enough energy and be in the right direction. Not all collisions result in a reaction: a certain energy threshold, called the activation energy, has to be reached. Each different reaction has its own activation energy.
In order to alter the rate of a reaction either the number or the energy of collisions must be changed. The more collisions there are, the faster the reaction. The harder the collisions are, the greater the proportion of collisions that will reach the activation energy. Both these facts lead to a faster reaction. Moreover, the higher the temperature, the quicker the reaction.
Pressure will have an effect only if the reaction involves gases. In a reaction between two gases an increased pressure will have the effect of forcing the gas particles closer together, i.e. increasing the concentration. This will lead to an increased rate of reaction.
In a reaction between a solid and a liquid or a solid and a gas, the smaller the pieces the solid is broken down into, the faster the rate of the reaction.
The rates of some reactions can be altered by adding other chemicals to the reaction mixture. A substance that can alter the rate of a reaction, without altering the reaction in any other way and without being used up during the reaction, is called a catalyst. Catalysts are very important in industry.
A large number of catalysts occurs in living cells. These are called enzymes. Many different chemical reactions happen inside each living cell. Without enzymes these reactions would happen so slowly the cells would die. An enzyme works by bringing the chemicals together at a particular location on its surface – the active site. Enzymes are specific to certain chemical reactions.
Unlike metal catalysts, enzymes are destroyed by high temperatures. They work best between 37°C and 40°C. Enzymes are also sensitive to acidity and alkalinity.
Some reactions can go in both directions, depending on the conditions. A balance is set up where the rate of the forward reaction is equal to the rate of the backward reaction. This is called a chemical equilibrium. When an equilibrium is set up the overall reaction appears to have stopped.

(from: Stone-Andrews-Williams, *Examining GCSE-Science*, Stanley Thornes Ltd.)

18 *Answer these questions about* How fast?

a. Why is it essential to be able to control the rates of chemical reactions in industrial chemistry? • **b.** Why is industry interested in speeding up chemical reactions? • **c.** Do all chemical reactions take place at the same rate? • **d.** What chemical changes can be observed and measured in a laboratory? • **e.** What is necessary for substances to react with one another? • **f.** What is meant by 'activation energy'? • **g.** How can the rate of a chemical reaction be changed? • **h.** How does temperature affect the rate of a chemical reaction? • **i.** Does pressure affect all chemical reactions? • **j.** How does the size of solid particles influence the rate of a chemical reaction? • **k.** How do enzymes act? • **l.** What is an 'active site'? • **m.** What are enzymes sensitive to? • **n.** What are reversible reactions?

19 *Match adjectives* a-h, *as they are used in the passage* How fast? *with their antonyms* 1-8. *Tip: copy the pairs in your indexed book.*

a. instantaneous	☐	**1.**	backward
b. observable	☐	**2.**	dead
c. measurable	☐	**3.**	gradual
d. right	☐	**4.**	imperceptible
e. increased	☐	**5.**	indeterminate
f. living	☐	**6.**	lesser
g. specific	☐	**7.**	vague
h. forward	☐	**8.**	wrong

20 *Give the comparative or superlative form of these adjectives to make antonyms of those from* How fast? *listed below:* big, difficult, low, slow, soft.

a. easiest ....
b. faster / quicker ....
c. harder ....
d. higher ....
e. smaller ....

21 *Match verbs* a-h, *as they are used in the passage* How fast?, *with their synonyms* 1-8. *Tip: copy the pairs in your indexed book.*

a. affect	☐	**1.**	function
b. appear	☐	**2.**	get to
c. follow	☐	**3.**	influence
d. need	☐	**4.**	intensify
e. reach	☐	**5.**	monitor
f. force	☐	**6.**	push
g. increase	☐	**7.**	require
h. work	☐	**8.**	seem

22 *Match phrasal verbs* a-h, *as they are used in the passage* How fast? *with their synonyms* 1-8. *Tip: copy the pairs in your indexed book.*

a. come across	☐	**1.**	be consumed
b. give off	☐	**2.**	collide
c. come into contact	☐	**3.**	combine
d. take place	☐	**4.**	emit
e. result in	☐	**5.**	encounter
f. break down	☐	**6.**	happen
g. be used up	☐	**7.**	lead to
h. bring together	☐	**8.**	separate