4 Scientific discovery

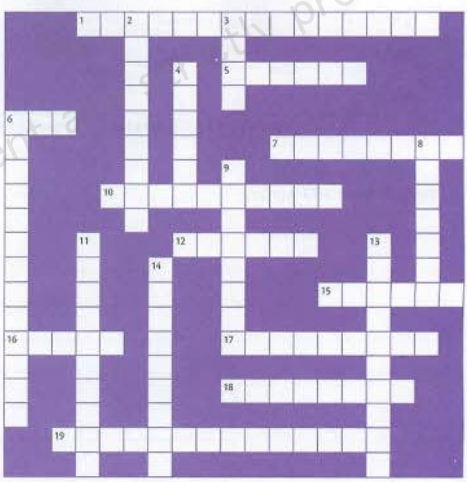
Chemistry, medicine

Chemistry

1.1 How much do you know about chemistry?

1 Can you name at least three common chemicals?
2 What do we call a scientist who studies or works with chemicals?
3 What kinds of household products contain harmful chemicals?
4 What does H_2O stand for?
5 What kind of chemicals do farmers use?

1.2 Complete the crossword.



Across

1 the kind of industry which produces medicines
5 a chemical found in diamonds and coal
6 The gas we breathe out is _____.
7 Mixing chemicals may cause a chemical _____.
10 a natural or chemical material used by farmers to help grow crops
12 Plants _____ water through their roots and sunlight through their leaves.
15 a household chemical product used to disinfect
16 another word for *poisonous*
17 a way of describing a material with particular physical characteristics
18 the release of a gas
19 the chemicals derived from petrol or natural gas

Down

2 The chemicals added to food are called *food* _____.
3 an abbreviation for the gases which have now been removed from aerosols to protect the ozone layer
4 See 13 down.
6 A nuclear accident may cause _____ of the surrounding area.
8 the opposite of *synthetic*
9 the different types of synthetic material which can be moulded and shaped to make many products
11 chemicals used to kill unwanted insects
13 and 4 an increase of gases in the atmosphere leading to global warming
14 a form of energy from nuclear power which is dangerous to humans and animals

2.1 **Read the passage and work out what the numbered words mean. Use the words on either side of the numbered words to give you a clue.**

Test tip

You are not expected to know more than the common chemical terms. Technical words will usually be explained in the text or in footnotes.

Many of us are exposed to a range of toxic substances in our daily lives. According to Professor Jack Ng of the University of Queensland: 'We are seldom exposed only to a single contaminant in the environment – but more often than not to a cocktail of chemical mixtures. Exposure can take place at a contaminated site or via the food chain. Examples include mixtures of petroleum [1]hydrocarbons, metals and [2]metalloids in mining and pesticides on or in the food we consume.'

Dr Ng cautions that health risk assessment of chemical mixtures can be complex and it is often very expensive to get sufficient evidence-based data for proper evaluation. He asserts that the notion that a single exposure to a chemical mixture automatically places a person into a higher risk category is an [3]urban myth that has no foundation. He states that: 'The facts about toxicity remain the same for either a single chemical or a mixture of chemicals: it is the [4]dosage that makes them poisonous.' When assessing the toxicity of a substance, it is important to have a good understanding of how the different contaminants in the mix may interact both with one another and inside any creature which absorbs them. Sometimes these reactions can make a substance more, or less, toxic. Professor Ng said the cost of analysing all the possible interactions and effects of any [5]compound mixture would be immense.

2.2 **Match the numbered words in the passage with the following extracts from footnotes to it.**

- a commonly told story not based on fact
- a mixture of carbon and hydrogen
- a chemical that combines two or more elements
- the amount of medicine you should take
- something that can act like a metal

2.3 **Answer the questions. Use *NO MORE THAN THREE WORDS* from the passage.**

1 Apart from a *polluted location, through* which other means can humans *come into contact with* toxic chemicals?

2 According to Professor Ng, what substance may be present on *what we eat*?

3 What does Professor Ng call *the idea* that being exposed to chemicals once can put us in danger?

4 What does Professor Ng say is the most important factor when judging how *toxic* a chemical mixture is?

5 According to Professor Ng, what stops us from *examining* all the *potential consequences* of mixing chemicals?

2.4 PARAPHRASE **Now find words and phrases in the passage with a similar meaning to the words in italics in 2.3.**

2.5 **Try to answer the following questions. Remember you need to show a wide range of vocabulary to achieve a good IELTS Band Score, so use some of the vocabulary from the exercises above.**

1 Do you think there is enough control of the use of chemicals in our society? (Why? / Why not?)

2 Do you think we are too dependent on chemicals nowadays? (Why? / Why not?)

3 Have chemicals improved our life or made it more dangerous?

4 Who do you think should be responsible for chemical spills which damage our environment?

5 How will our attitude to chemicals change in the future?

Medicine

3 ▶09 **Listen to a talk about natural medicine and complete the summary. Write *NO MORE THAN TWO WORDS* for each answer.**

Ancient cultures made medicines from plants and animals. Modern scientists are studying the [1]_____ found in the [2]_____ of crocodiles. They believe it may help to fight [3]_____. The field of medical science is taking an interest in phytochemicals (i.e. chemical [4]_____ found naturally in plants). Scientists have already been able to show the health benefits of drinking green tea. Those who provide funding for medical research are now more supportive of [5]_____ therapies. As a result, scientists are studying how antioxidants may help with Alzheimer's disease. They are attempting to find the exact [6]_____ (i.e. without any harmful [7]_____).

Researchers have discovered that when phytochemicals are in a [8]_____ state, the body cannot [9]_____ them easily. They are using nanotechnology to make a [10]_____ that will slowly release the medicine.

Hospitals around the world are having problems with [11]_____ which cannot be treated with antibiotics. [12]_____ are now using [13]_____ such as tea tree oil.

4.1 COLLOCATION **We use adverbs to qualify adjectives, but you need to be careful which adverb you use. Modify the adjectives in the following sentences with a suitable adverb from the box, using the words in bold to help you.**

absolutely completely extremely highly slightly

1 It's _____ **impossible** for governments to control our diet.
2 When I was diagnosed with diabetes, they told me I couldn't eat chocolate, which I found _____ **difficult**.
3 Patients with diseases that are _____ **contagious** are isolated in a special area.
4 The coastline has been spoiled by the illegal dumping of _____ **toxic** industrial waste.
5 Pesticides can be _____ **harmful** to any creature living in the vicinity of where they are used.
6 We found that the acidity of the soil was _____ **lower** than the week before.

V *Vocabulary note*

Extreme adjectives (e.g. *impossible, starving, disastrous*) can only be used with extreme adverbs (e.g. *utterly, absolutely*). *Extremely* is used with the same kind of adjectives as *very* and so is not an extreme adverb. Most adjectives which can be used with *very* can also be used with *highly, slightly* and *extremely*.

4.2 COLLOCATION **Decide if the adjectives in the box collocate with the adverb *highly, absolutely* or *extremely*. Some of the adjectives can collocate with more than one adverb.**

essential terrible probable skilled anxious valued necessary addictive controversial unusual crucial useless recommended disappointing overweight vital educated difficult awful

highly: _____

absolutely: _____

extremely: _____

Reading

*You should spend about 20 minutes on **Questions 1–13**, which are based on the Reading Passage below.*

Selling the health benefits of enriched 'phoods'

A The introduction of iodine to Morton Salt in 1924 was instrumental in eradicating a dangerous thyroid condition called goiter from the U.S. population. It was also the first time a food company purposely added a medically beneficial ingredient to food to help market that product. Eighty years later, the food industry is intensively researching all kinds of other healthful ingredients it hopes to use to help sell otherwise everyday foods. Functional foods, or 'phoods' as they're sometimes called to connote the intersection of food and pharmaceuticals, have been trickling into supermarkets over the past several years – think of calcium-enhanced orange juice and cholesterol lowering margarine, for example. But they met with mixed success at first because consumers didn't know or care enough about the new ingredients.

B Now, though, consumers' growing awareness of health and nutrition, and new regulatory rulings that will make it easier for manufacturers to make health claims on packaging, are re-energizing the 'phood' business. Once again, food companies see functional foods as a way to boost sales in a highly competitive market. 'It's definitely a big deal,' said David Lockwood, editor of a recent report on functional foods by market research giant Mintel International Group Ltd. 'We expect [the functional foods business] to grow about 7.6 percent annually – that's about twice as fast as the overall food market is going to be growing.' At the recent annual meeting of the Food Marketing Institute, fully half of the 75 new products one major food company introduced had a 'health and wellness' focus, the company said. That's up from 15 percent of its new products the year before.

C Many of these products have added vitamins and minerals, such as a new juice drink that provides 100 percent of a child's daily vitamin C requirement, and a smoothie boosted with calcium. Lutein, linked to vision health, is now added to prune juice. Soy protein, which can help prevent heart disease, is being added to new breakfast cereals. Major food giants are actively unveiling products overseas, including yogurt with probiotic bacteria, to aid digestion. These nutritionally oriented products make up just 8 percent of company sales but account for 20 percent of its research budget, according to company spokesman Hans-Joerg Renk.

D 'There's a lot of research and development going on into what kinds of products people want, what kinds of products we can produce to meet the demand – that taste good and will be successful in the marketplace – and how we communicate the benefits,' said Michael E. Diegel, a spokesman for the Grocery Manufacturers of America. Vitamin water drinks, spiked with nutrients such as taurine, vitamin C, calcium and potassium, can be found on shelves of gourmet shops and supermarkets. Officials at privately owned Energy Brands Inc. attribute much of the dramatic growth in sales to consumers' rising interest in nutrition and wellness.

E Food marketing professor Nancy Childs, of St. Joseph's University in Philadelphia, said the widespread awareness of the low-carb phenomenon has led many consumers to check food labels while trying to lose weight. 'It starts to make them think about their food in terms of its nutritional components,' she said, which makes it easier to introduce other ingredients such as soy, fiber and many lesser-known compounds. Although more consumers may be ready to try the new products, the real driver behind the reborn interest of food manufacturers comes from science and the government. Government labs, universities and private companies are doing more research on the health effects of many nutrients, food scientists say, but much of it falls short of the full-scale clinical trials that the Food and Drug Administration has required for use in marketing.

F Beginning this spring, the FDA started allowing 'qualified health claims' on foods, telling consumers about ingredients that current science 'suggests' might be helpful in preventing certain diseases and medical conditions. 'FDA feels that this does provide more information to the consumer,' said Kathleen C. Ellwood, director of the agency's division of Nutrition Programs and Labeling. 'It's more to empower the consumer, to make them more aware of possible health benefits in these foods.'

That allowance has opened the floodgates. Dozens of petitions have been filed with the agency seeking permission for such claims: sports drink maker American Longevity wants to claim that lycopene reduces the risk of cancer; coral calcium producer Marine Bio USA has petitioned for a claim that calcium can reduce the risk of kidney stones; and the North American Olive Oil Association wants permission to use a claim that monounsaturated fatty acids can reduce the risk of heart disease. Consumers will start seeing these claims on packages soon, though some nutritionists and scientists are worried that the findings aren't rock solid. The non-profit Center for Science in the Public Interest has filed suit against the FDA, arguing that the new program violates the 1990 Nutrition Labeling and Education Act, which mandated a higher level of scientific agreement for marketing the health benefits of ingredients.

G Others fear there will be so many claims they will just become more noise to already bewildered consumers. 'I'm concerned that too many such claims will cause consumers to tune out and make all of them ineffective,' said Clare Hasler, executive director of the Robert Mondavi Institute for Wine and Food Science at the University of California at Davis. So far, the FDA has approved only a handful of qualified health claims, and they show the limitations that this new system may have, for consumers and food companies. The California Walnut Commission, for example, wanted permission to put this claim on packages of walnuts, which are high in Omega-3 polyunsaturated fatty acids: 'Diets including walnuts can reduce the risk of heart disease.' The agency approved wording that is not quite as snappy for package design: 'Supportive but not conclusive research shows that eating 1.5 oz. of walnuts per day, as part of a low saturated fat and low cholesterol diet, and not resulting in increased caloric intake, may reduce the risk of coronary heart disease.'

Questions 1–8

The Reading Passage has seven sections, **A–G.** Which section contains the following information?

Write the correct letter, ***A–G****, next to questions 1–8 below.*

NB *You may use any letter more than once.*

1 the significance of the link between consumers reading food labels and functional foods

2 a mention of large companies that are marketing functional foods in several countries

3 a reference to the success of one functional food in eliminating a disease

4 the reason why the FDA's new 'qualified health claims' may not benefit manufacturers

5 a prediction of the future sales figures for functional foods

6 a mention of the diet that caused consumers to focus on the ingredients in food

7 concern about the limitations of research being carried out into the health benefits of functional foods

8 the questions regarding functional foods that researchers are concentrating on

Questions 9–13

*Complete each sentence with the correct ending **A–G** below.*

*Write the correct letter, **A–G**, next to 9–13.*

***NB** You may use any letter more than once.*

9 Early attempts to produce functional foods were not very successful because

10 People are now buying more functional foods because

11 The FDA has decided to allow health claims on foods because

12 The Center for Science in the Public Interest has taken legal action against the FDA because

13 The Mondavi Institute for Wine and Food Science is worried because

A	consumers did not like the taste of the extra ingredients.
B	it wants more researchers to support health claims before food is advertised.
C	it wants consumers to know that certain foods can improve their health.
D	consumers were ignorant of the benefits of the added ingredients.
E	it thinks the abundance of health claims will confuse consumers.
F	they are more concerned about their health.
G	they are attracted by the design of the packaging.

Test tip

Remember to stick to the 20 minute time limit for each section. It's very easy to spend 50 minutes on the first two sections and then only have 10 minutes left for the last one.