AN ELEMENTAL CROSSWORD

Textbooks tell us that a chemical element is a form of matter, with a unique combination of physical and chemical properties, that cannot be decomposed into simpler substances by ordinary chemical processes. At present, we know of 118 chemical elements (as recognised by the International Union of Pure and Applied Chemistry). These are arranged in the modern periodic table in order of increasing atomic number. Ninety of these have been observed to occur naturally on Earth, although some are found in extremely small amounts. Two of these elements are the extremely unstable byproducts of reactions in nuclear reactors. The remaining elements have been artificially synthesised by physicists by smashing atoms of different elements together at very high speeds in high-energy accelerators.

Here is a crossword puzzle with 19 of these elements. How many of them can you identify from their clues?

Down clues:

1. This is the first element discovered by Marie and Pierre Curie. Named after Marie Curie's homeland, it may have contributed to the death of their daughter Irène Joliot-Curie. It is suspected to have been used in killing the Palestinian leader Yasser Arafat in 2004. In 2006, a trace amount of an isotope of this element was used to poison a cup of tea served to Alexander Litvinenko, a former Russian spy who had sought asylum in London. Litvinenko died 23 days later.

2. This colourless, odourless, and tasteless gas was accidentally discovered by the Scottish chemist William Ramsay and English chemist Morris Travers, both of whom had also discovered helium, argon, xenon, and neon. They named it after the Greek word for 'hidden'. It shares its name with the home planet of the fictional superhero of a comic book series created by the writer Jerry Siegel and the artist Joe Shuster.

4. The name of this silvery-white metalloid comes from the Latin word for 'earth'. First discovered from Dracula's homeland. You can tell if someone has been exposed to high levels of it by their breath—it will have a pungent garlic-like smell.

6. The French chemist Paul Émile Lecoq de Boisbaudran was only able to isolate this soft metallic element from its oxide after more than 30 attempts at a procedure he had developed for this purpose. He named it after an ancient Greek word that means 'hard to get'. Because it is highly magnetic, this rare element is now in demand for use in electric motors, especially in wind turbines and electric vehicles.

10. This element was first discovered in 1939 by the physicist Marguerite Perey, who was a prodigy of Marie Curie. Named after Perey's homeland, it has an incredibly short half-life of 22 minutes. Scientists predict that it may be a silvery-grey metal. But no one really knows what it looks like because it is so rare that it has never been seen by the naked eye.

11. An oxide of this element was first isolated from a gemstone that gets its name from a Persian word for 'gold colour'. Its dioxide is often used as a substitute for diamond. Because of its strength, very low toxicity, and high resistance to corrosion, it is also used in prosthetics.

12. This silvery-white metal is named after a continent. Small amounts of this metal are now included as an anti-counterfeiting measure in the banknotes of the official currency of about 20 countries in the same continent. Without the robust red colour it produces, all the other colours (whites, blues, and yellows) on your television screen would have to be muted to duller and dingier shades to maintain some balance.

Across clues:

3. The lightest known metal. Can also lighten your mood. Its salts are used to treat mania and depression. They are known to stabilise the wild mood swings associated with bipolar disorder. Research shows that when this treatment is given to sticklebacks parasitised by tapeworms, it helps

restore the natural shyness of the fish. Unlike other diseased fish, ones given this treatment spend less time alone and near the water surface. This reduces the risk of their being eaten by birds. It has a calming effect on worms too, but acts in a way that inhibits their ability to avoid harmful bacteria.

5. This greenish-yellow gas is one of the components of the most common table condiments. It was first isolated in 1774 by the Swedish pharmacist Carl Wilhelm Scheele, who wondered if it was an oxide of a new element. It was identified as a pure element in 1810 by the British chemist Sir Humphrey Davy, who named it after an ancient Greek word for 'pale green'.

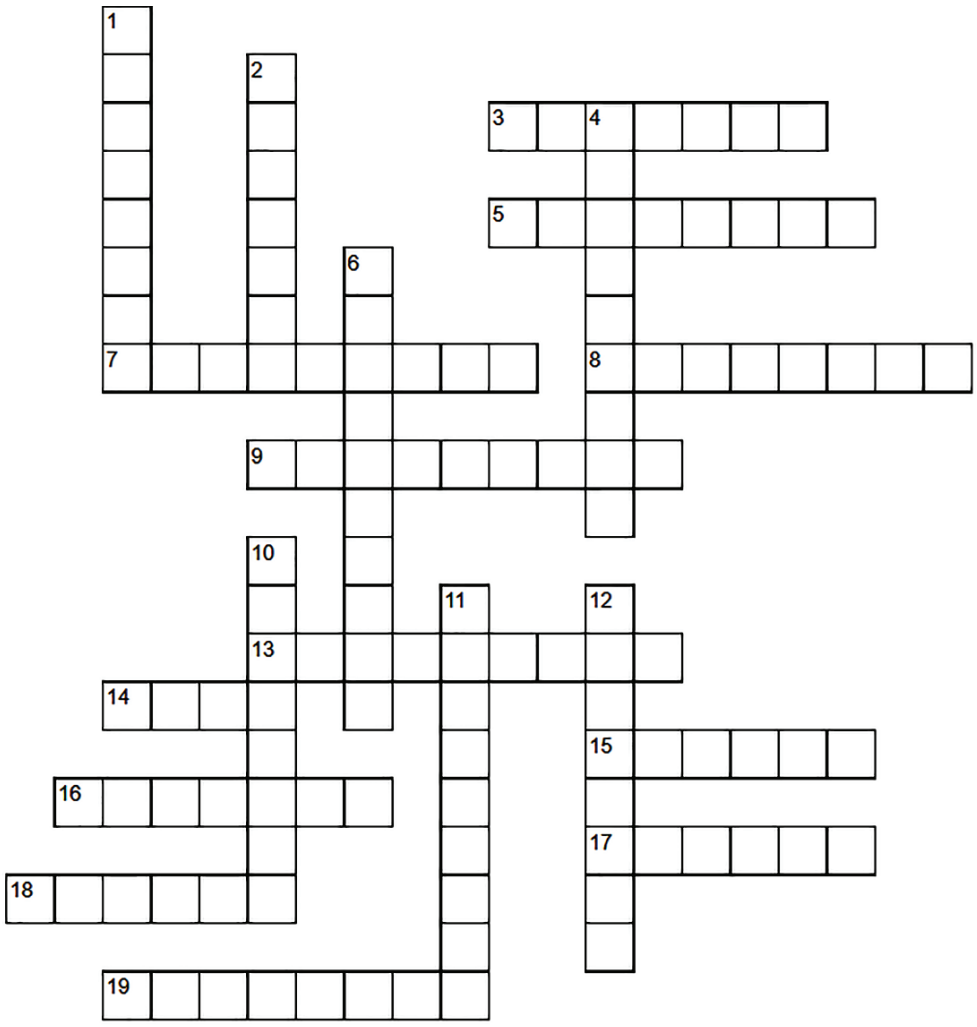
7. Part of chlorophyll, this element is also needed for more than 300 biochemical reactions in our bodies. Good natural sources of this element include fruits, vegetables, nuts, legumes, and whole grains. Supplements of this element are sometimes recommended for medical conditions like premenstrual syndrome and high blood pressure. They can also help reduce tension headaches and migraines.

8. Because this very soft, silvery-white metal reacts violently with water, it needs to be stored in mineral oil. Its name comes from a Latin word meaning 'deepest red'. Can be used in fireworks to give explosions a purple-red colour.

9. This brittle, steel-grey metal combines with trace amounts of the element chromium to form the beautiful green-hued gemstone 'emerald'. It is believed to have pushed all the colonists on the planet 'Junior' in Isaac Asimov's science fiction story 'Sucker Bait' to cough, shiver (from fever), sweat (night sweats), and tire (fatigue) their way into slow deaths.

13. For decades, this silvery-white metal was more highly priced than gold. Lightweight and resistant to corrosion, it is easy to fold, mould, and recycle. Oxygen causes this metal to lose electrons by the same kind of reaction that causes iron to turn to rust. Unlike iron oxide though, the oxide of this metal forms a thin hard film that sticks to the original metal and shields it from further decay.

14. This colourless, odourless, and largely nonreactive gas gets its name from a Greek word that means 'new'. When filled into a clear glass tube and connected to an electrode, it lights up to produce a warm reddish-orange colour. This was first demonstrated in December 1910 in the Paris Motor Show by the French engineer Georges Claude. In 1912, it was used in an advertising sign outside a barber's shop in Paris. Since then, it has been used in signages across the world.



15. This bluish-white metal is one of the densest elements in the world. Its name comes from a Greek word meaning 'smell' or 'odour'. Its oxide has a very strong, acrid, and unpleasant smell at room temperature.

16. Magicians would carry spoons made of this soft, silvery metal for a popular 'melting spoons' trick. The spoons look solid and 'normal' at room temperature. If you were to dip one of them into a cup of hot tea, it would instantly dissolve. If you were to warm one of them by holding them in the palm of your hand for a few minutes, it would melt. If you set the melting spoon down, it would solidify again.

17. This lustrous, soft, silvery metal was first discovered by the German chemist Ferdinand Reich. Because Reich was colour blind, he asked the German chemist Hieronymous T. Richter

to observe the element's spectrum. Richter found that it produced a spectral line that was a brilliant violet in colour and did not match the spectral line of any known element. The two scientists worked together to isolate the element and announce its discovery. They named it after a Latin word meaning 'violet'. However, this collaboration turned sour when Reich learned that Richter had claimed this discovery as his own.

18. You could use this low-density gas for a party trick. Inhale a bit of it from a party balloon and your voice will become squeakier. In fact, you could be mistaken for the Walt Disney character Donald Duck! But be careful to do this in moderation—this gas replaces oxygen in your lungs. Inhaling too much can kill you.

19. The existence and properties of this soft silvery metal were predicted by the Russian chemist Dmitri Mendeleev a decade before it was discovered. Mendeleev called it 'ekaboron'. It is now named after a region in Northern Europe that includes Denmark, Sweden, and Norway. When added in small amounts to aluminium, it forms an alloy that is stronger yet lighter and more flexible. This alloy is used in military and civilian aircrafts as well as in sporting equipment. Interestingly, the US does not announce how much of this element it produces. This remains a well-guarded 'trade secret'.

Want to check your answers? Please turn to page 69 of this issue.

Notes:

1. Source of the image used in the background of the article title: Jigsaw pieces. Credits: Wounds_and_Cracks, Pixabay. URL: https://pixabay.com/photos/puzzle-piece-tile-jig-jigsaw-game-3306859/. License: CC0.
2. The image for the crossword was generated using the free crossword puzzle maker: WhenWe Crosswords. This site can be accessed at the URL: http://www.whenwecrosswords.com/.

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