More Elementary Riddles

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Riddles highlighting various elements and some of their significant properties have appeared in this *Journal (1, 2)*. To these fine examples I wish to add the following:

Riddle 1

Most copious of elements, ethereal art I,
In stars am fused, as man doth try,
Spark me in air and feel a peal of thunder,
Apply then a current and see the product sunder.

Riddle 2

Of I and tired tatting, Joe Kesselring did write,
Kill, save, or preserve, when applied, I just might,
Black, yellow, and gray—colored forms I may take,
Avoidance is futile, for in all foods I wait.

Riddle 3

Luna in my name, lunacy in a weed,
A diet with me is what you all need.
But ingest too much, fetid from all pores,
Light up my life and I will electrify yours.

Riddle 4

Candy on the tongue, blanket in the lung,
Prized may be the ore from which it is wrung.
The only light metal that is difficult to melt,
The Wizard's city, in part, from it was built.

Solutions to More Elementary Riddles can be found on page 540.

Solutions to More Elementary Riddles

Riddle 1

Hydrogen is the most abundant element in the universe. It is also the lightest. Under the enormous pressures and temperatures found within stellar bodies, hydrogen undergoes nuclear fusion, producing helium and releasing enormous quantities of energy in the process. The United States triggered the first artificial, uncontrolled fusion reaction with the detonation of the first hydrogen bomb in 1952. Since that time, research projects worldwide have attempted to create conditions that would allow a sustained fusion reaction to be controlled as a source of clean and virtually limitless energy. None have yet been successful. Hydrogen reacts with oxygen (which makes up about 21% of the earth's atmosphere) if a spark or other source of ignition is applied to a mixture containing sufficient quantities of each gas. This event is particularly violent if a significant quantity of hydrogen and oxygen is thoroughly mixed and present in a stoichiometric, two-to-one ratio. The product of the reaction is water, which may in turn be decomposed to reproduce hydrogen and oxygen through the application of an electric current.

Riddle 2

Arsenic has been immortalized on stage and screen by Joseph Kesselring, author of the play *Arsenic and Old Lace*, in which two charitable spinsters murder lonely old men with their homemade elderberry wine laced with arsenic. At one time, arsenic was the poison of choice for those with murderous intentions, for the victim would develop pneumonia-like symptoms and then perish without any identifiable trace of residual toxin in the body. Techniques for detecting arsenic during an autopsy have since been developed *(3)*. Arsenic compounds have been used to treat asthma, malaria, tuberculosis, diabetes, sleeping sickness, skin diseases, syphilis, leukemia, and chronic fatigue syndrome *(4–6)*. Today, the majority of all arsenic used in the United States is applied as a wood preservative, although its use in lumber destined for the consumer market is being phased out over concerns with the exposure to a potential toxin such products may pose *(7, 8)*. Arsenic may exist in three allotropic forms. The principal allotrope is gray; the other two, yellow and black, are unstable *(3)*. Arsenic is found in almost all soils; therefore, all food contains at least trace quantities of the element. Normal intake is about 0.007–0.600 mg per kg of body mass per day. Fortunately, there appears to be a level of intake below which the body is capable of excreting all the arsenic ingested *(9)*.

Riddle 3

Selenium was discovered in 1817 by Jons Jacob Berzelius, who named it after *selene*, the Greek word for the Moon *(10)*. Vetch growing in high-selenium soils may concentrate up to 1.4% of its weight as selenium *(10)*. Animals grazing on this plant material may suffer permanent neurological damage as a result of ingesting excessive quantities of selenium *(11)*. Cowboys of the Old West, unaware of the specific cause but well acquainted with the likely outcome, named the vetch *locoweed*, derived from the Spanish for crazy, a reference that remains in use to this day. Selenium is an essential dietary element, but too much can result in selenium poisoning, the most detectable symptom of which is bad breath and body odor. The smell is the result of dimethyl selenide, produced by the body as it rids itself of the selenium it does not need *(10)*. Perhaps the most significant physical characteristic of selenium is the degree to which its electrical conductivity increases when exposed to light; from darkness to bright light, the conductivity of pure selenium can grow by a thousandfold *(3)*.

Riddle 4

Beryllium and many of its compounds have a sugary taste *(3)*. Excessive exposure to these substances can produce a condition known as berylliosis in which the lungs of victims are inflamed, leaving them breathless *(10)*. Emeralds are a form of beryl, and beryl is a beryllium ore *(3)*. Besides its worth as the principal constituent of such gemstones, beryllium is valued because it is the only low-density metal with a high melting point (1278 °C) *(10)*. Finally, "the Wizard" refers to the great Oz, ruler of the Emerald City.

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