

The Castner process produces this metal via the electrolysis of its hydroxide, and the Solvay process produces soda ash, this element's carbonate. This metal reacts violently with water, sometimes explosively bursting in flames upon contact. Lye is the caustic hydroxide of this element, and this element burns bright yellow in the flame test. Baking soda is its bicarbonate, while common table salt is its chloride. For 10 points, name this chemical element symbolized Na.

ANSWER: **sodium** [accept **Na** before mentioned]

This element was once isolated via reduction by potassium in the Wohler process, while its hydroxide was found in the second stage of the Deville process. Alkoxides of this element are used in the MPV reduction and Oppenauer oxidation. Processing ores of this element can produce cryolite. Modern techniques for its isolation include using the Bayer process followed by the electrolytic procedure developed by Hall and Heroult, and its oxide is found in nature as corundum. For 10 points, name this ductile metal extracted from bauxite ore.

ANSWER: **aluminum**

One substance containing this element catalyzes the oxidation of primary and secondary alcohols to carboxylic acids and ketones, and is called the Jones reagent. Uvarovite garnet contains this element, and stichtite is an alteration product from serpentine that bears this element. With potassium, its hexavalent ion forms a potent oxidizing agent, sometimes used to clean glassware. Two atoms of this element can form a quintuple covalent bond. Stainless steel contains this element, and metal things are plated with it to make them shiny. For 10 points, name this namesake of some green and yellow pigments, with atomic number 24 and symbol Cr.

ANSWER: **Chromium** (accept **Cr** before mentioned, prompt on "chrome") [S]/DU]

This metal is found in Mohr's salt and in the first discovered metallocene. One isotope of this metal has an extremely high nuclear binding energy and is thus the heaviest element formed in stellar nuclear fusion processes. In the body, it is found at the center of porphyrin molecules. When bound to cyanide this element forms the pigment Prussian Blue and adding thiocyanate to a solution is one method of detecting this element. This metal is typically found as magnetite and hematite and in the body is responsible for the color of red blood cells. For 10 points, name this transition metal whose oxides are typically referred to as rust.

ANSWER: **iron**

An enzyme containing molybdenum is used to cleave a strong bond that this element forms. Nanotubes similar to carbon nanotubes uses a compound containing boron and this element. When bonded to carbon, it forms a complex with iron known as Prussian blue. When bonded to oxygen, it forms a powerful vasodilator popular among bodybuilders. Two atoms of this element are found in laughing gas and a diatomic molecule composed of this element reacts with hydrogen gas in the Haber process. For 10 points, name this compound bonded to three hydrogen atoms in ammonia.

ANSWER: **nitrogen** (prompt on "N")

As a micronutrient, this element interacts with calcium in plants and helps maintain their cell walls. In an alloy with neodymium and iron, atoms of this element form the strongest permanent magnets. Found in colemanite and the optically bizarre ore ulexite, this element's [\*] hydride contains 'banana bonds' and is a Lewis acid. Its oxide is found with silica in labware made of Pyrex glass, and this lightest element with electrons in a p-shell usually requires six valence electrons to be stable, violating the octet rule. For 10 points, name this nonmetal element with atomic number 5 and symbol B.

ANSWER: **boron** [M]

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Uranium was first isolated from a compound with an element from this family, and an element belonging to this group bonded with xenon to form the first known compound of a noble gas. Another member of this family bonds to four oxygen atoms to form an anion in which it has a +7 oxidation state, the only nonmetal to do so. One member of this family, astatine, does not occur naturally. Located between the chalcogens and noble gases on the periodic table, for 10 points, name this family whose members include iodine, bromine, and fluorine.

ANSWER: **halogens**

Eutrophic lakes are typically described by their high concentration of this element. This element typically exists in two different allotropes, one consisting of a four atom pyramid and the other a long repeating chain structure. Those two forms are the red and white forms; the white form is used as a chemical weapon. When bonded to four oxygen atoms, this element is found in the polar section of a certain class of lipids seen in the lipid bilayer of the cell membrane and it also found in a diester bond forming the backbone of DNA. For 10 points, name this element found below nitrogen on the periodic table.

ANSWER: **phosphorous**

This element forms the most common anion used in the Castner-Kellner process, which synthesizes alkali metal hydroxides. This element was first isolated using manganese dioxide as an oxidizing agent, and though it's not iodine, the only insoluble ionic compounds it forms are with lead, mercury, and silver. First isolated by Carl Scheele, a mixture of nitric acid and an acid of this element form aqua regia. Having the highest electron affinity of any element, for 10 points, name this second-lightest halogen, an ion of which, along with sodium, forms table salt.

ANSWER: **chlorine**

The imidazole ring has two atoms of this element, and a benzene analogue called borazine contains alternating atoms of boron and this element. In one context, the single bond from a carbonyl carbon to an atom of this element is called a peptide bond. One class of phase transfer catalysts is quaternary amines, which contain this element. This element's diatomic form has a triple bond that is broken in the "fixation" of it performed by bacteria. For 10 points, name this element whose diatomic form makes up the majority of the air we breathe.

ANSWER: **nitrogen**

Atoms of sulfur are bonded to atoms of this element in the central ring of Lawesson's reagent, and one rhodium atom is bonded to three atoms of it in Wilkinson's catalyst. Discovered by Hennig Brand, who was attempting to turn urine into gold, this element is also the central atom in the toxic nerve gases soman and sarin. A reaction that converts aldehydes or ketones into alkenes uses an ylide [ILL-id] containing this element, and is named for Wittig. This element's red allotrope is used in matches, and its white allotrope ignites spontaneously when exposed to air. For 10 points, name this element located below nitrogen on the periodic table, and symbolized P.

ANSWER: **phosphorus**

The two naturally occurring isotopes of this element possess nuclear spins of 3 and 3/2 and thus may be used for NMR. It is a component of the naturally occurring mineral, ulexite, in which parallel fibers transmit light, creating a fiberoptic effect. In organic chemistry, a compound of this element is used in an addition reaction to an alkene in anti-Markovnikov orientation as opposed to oxymercuration. In forming trigonal planar molecules with the halogens, this element disobeys the octet rule. This is because it possesses only three valence electrons and thus forms only three bonds. For 10 points, identify this lightest metalloid with atomic number 5 and symbol B.

ANSWER: **boron** [accept **B** before mentioned]

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This element forms a red solution when it complexes with thiocyanate, and although it is not aluminum, a chloride of this element catalyzes a Friedel-Crafts alkylation. The oxide of this element is used industrially to produce ammonia in the Haber-Bosch process, and this element exists in a solid solution with carbon in its gamma variety austenite. This element is derived from the ore hematite, and its brass-colored pyrite is commonly known as "fool's gold". For 10 points, name this transition metal with chemical symbol Fe.

ANSWER: **Iron**

Peru's export economy has boomed in the past decade partly because of the new Antamina Mine to produce this mineral and zinc. The mining of this mineral is the major industry of Lubumbashi, which is the historic center of the Congolese Katanga region, and the TanZam Road was built largely to transport this mineral, which is by far the leading export of Zambia. Along with gold, this mineral was the target of the Copiapó mine in which thirty-three miners were trapped in August 2010. Because of reserves in the Atacama Desert, Chile is the world's leading producer of this mineral. For 10 points, name this mineral used to make wire, pipes, and the Statue of Liberty.

ANSWER: **copper** (be nice and accept **zinc** before it is mentioned)

Cadherins and selectins are cell-attachment proteins that are dependent on this substance, although integrins are not, and synaptotagmin senses the levels of this substance in order to allow the attachment of v-SNAREs and t-SNAREs. Parafollicular cells of the thyroid release a hormone that counters the effects of parathyroid hormone, which elevates serum levels of this substance, and vitamin D also helps regulate its blood level. This substance, which is stored in the sarcoplasmic reticulum of muscle cells, is incorporated into hydroxyapatite, and its deficiency can lead to osteoporosis. For 10 points, name this substance that is incorporated into teeth and bones, symbolized Ca.

ANSWER: **calcium** [or **Ca** before mention]

This element detected via the Kjeldahl method is double-bonded to carbon in certain compounds which react with dienes in the Aza Diels-Alder reaction. Found in products of the Gabriel synthesis, three atoms of this element form a double-bonded chain in the explosive sodium azide. Its dioxide is a toxic brown gas. Diazotroph bacteria can "fix" this element. Hydrazine and laughing gas both contain this element found in imines, amides, and amines, as well as ammonia. For 10 points, name this gaseous element which comprises about 80% of the atmosphere.

ANSWER: **nitrogen** [prompt on N]

This element reacts with titanium tetrachloride in the Kroll process. Certain compounds containing it exist in a Schlenk equilibrium; those compounds consist of this element and an alkyl or aryl halide, Grignard reagents. Active ATP molecules must be bound to this metal's 2+ ion. It is able to burn even when encased in dry ice, and when burning in air it produces a brilliant white light. Its hydroxide has a milky-white appearance and is used as an antacid, while its sulfate is called Epsom salt. For 10 points, name this alkaline earth metal with symbol Mg.

ANSWER: **magnesium** [prompt on Mg before mentioned]

A compound containing this element in plant walls binds two RG-II monomers in pectin. Compounds containing this element react in the Suzuki Coupling. One ore containing this element, ulexite, has natural fiber optical properties, and other ores include raxorite and rasorite. This element's hydride dimerizes to form three-center banana bonds, and closo nido and arachno are three configurations predicted by (\*) Wade's rules. This element, which is used in nuclear reactor control rods, is used to provide a green color in fireworks and its nitride is isoelectric with diamond. For 10 points, name this element with atomic number five and symbol B.

ANSWER: **Boron** [accept **B** before giveaway]

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This substance's spectrum displays the D3 Fraunhofer line. When this substance accretes to the surface of a white dwarf or ceases to be degenerate in contracting stars, its namesake flash occurs. Hans Bethe discovered its production by the CNO cycle, and three units of it combine in a namesake exergonic process that occurs mainly in red giants. This first element to be detected extraterrestrially is the heaviest and last product of the proton-proton chain, the fusion reaction in most stars. For 10 points, identify this second-most abundant element in the universe, named for its abundance in our sun.

ANSWER: **helium** [nucleus or atom; prompt on "He"; accept **alpha particles** until "element" is read]

It was recently shown that eight, and not four, atoms of it make up its solid "red" allotrope; that solid, and this element's liquid form, are highly paramagnetic. The only non-carbon atom in the rings of furan, one form of it absorbs ultraviolet light and is depleted by free radicals. This element is the primary nonmetallic component of rust. For 10 points, name this element discovered by Priestley, whose triatomic form is called ozone and which makes up 20% of the atmosphere.

ANSWER: **oxygen** [prompt "O"; do not prompt "O2" or "O3" or silly things like that]

In industry, the Elsner equation governs the MacArthur-Forrest process producing a cyanide of this substance, which has one 6s valence electron and filled 4f and 5d orbitals. In one experiment, this material was surrounded by a circular ring of zinc sulfide by Marsden and Geiger. Its 3-plus ion bonds to chlorine when it dissolves in aqua regia, and with mercury it forms amalgams. A sheet of this element had alpha particles shot at it in the Rutherford experiment. The most ductile and malleable of all metals, it is often mistaken for pyrite. For 10 points, name this elemental metal with atomic number 79, symbol Au, and a distinctive color.

ANSWER: **gold** [accept **Au** or **aurum** until mentioned; do not accept "platinum" at any point since the 3+ ion clue is specific to gold]

In the process used to generate this element, the poisonous tetracarbonyl compound of this element, dubbed "Liquid Death", is vaporized and then condensed and heated to remove Carbon Monoxide. That is the Mond process used to derive this element. In a solid alloy with aluminum, the "Raney" form of this metal is generally used as a catalyst in hydrogenation reactions, which convert alkynes and alkenes to alkanes. Only generally found in its +2 oxidation state, the oxide of this element is used as an electrode in a common battery along with Cadmium. For ten points, name this d-block ferromagnetic metal with atomic number 28 and symbol Ni.

ANSWER: **Nickel**

The anti variety of this element can be produced by shooting antiprotons at clusters of xenon atoms. It can also be produced through the serpentinization process, and was the gas used in the (\*) Hindenburg. Isotopes of this element include protium, tritium, and deuterium. 75 percent of the universe is made of, for ten points, which diatomic element that only has one proton and electron, the first element on the periodic table?

ANSWER: **Hydrogen**

An acid made from oxygen and this element is combined with hydrochloric acid to form aqua regia, which can dissolve platinum and gold. It condenses to its liquid form at 77 degrees Kelvin, and that liquid form is very commonly used in (\*) cryopreservation or as a coolant. The Haber-Bosch process makes a useful product out of this element, the most common gas in the atmosphere. Fertilizers and ammonia contains, for ten points, which element with atomic number 7 and symbol "N"?

ANSWER: **Nitrogen**

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