PERIODIC TABLE OF THE ELEMENTS

1 PROTON
HYDROGEN
Hydrogen is the lightest element on the periodic table! There are 7 known isotopes of Hydrogen. It was the first element to form when the universe began, and is used as fuel to create light in stars through nuclear fusion.

2 PROTONS
HELIUM
Helium is the lightest noble gas; you may have used it to fill up balloons or make your voice higher. It also remains liquid at absolute zero (at 1 atm). There are two stable isotopes: 3 and 4, but 9 total isotopes have been studied, with 0-8 neutrons.

3 PROTONS
LITHIUM
Lithium has 3 protons and is a stable isotope with 3 or 4 neutrons. It may be small, but it plays an important role in society! Lithium is the basis for most of our rechargeable batteries and it is approved by the FDA to help treat bipolar disorder.

4 PROTONS
Beryllium
Beryllium is an alkaline-earth metal known for being strong and lightweight. With atomic number 4, it has 12 known isotopes, 1 stable and 11 exotic. Despite being toxic, its physical properties make it ideal for aerospace and medical materials.

5 PROTONS
BORON
Boron is a relatively rare element with the atomic number 5. It has only two stable isopes with mass 10 and 11, and has 13 radioisotopes with masses between 7 and 21. Boron compounds are used in glass and ceramics production for strength and hardness.

6 PROTONS
Carbon
Carbon is an element with atomic number 6, and it is the building block of known life. It is found on earth with 6, 7 or 8 neutrons, but was artificially produced with 2-16 neutrons. Carbon 14 is used for dating archeological findings.

7 PROTONS
Nitrogen
Nitrogen is the element that makes up most of our atmosphere. 2 out of its 16 known isotopes, 14N and 15N, are stable. With a boiling point of just 77 Kelvin, it's very useful in its liquid form to cool things down to cryogenic temperatures.

8 PROTONS
oxygen
Oxygen is an extremely important element for human life. We get it from the air that we breathe, and it's necessary for us to stay alive. It has 8 protons in the nucleus, and it has 17 known isotopes (3 stable), from oxygen-12 to oxygen-28.

9 PROTONS
fluorine
Element 9, fluorine, is a very reactive gas. Its compounds are used in non-stick surfaces for pans and to prevent tooth decay. With 1 proton more than oxygen, it can bind up to 6 more neutrons. Fluorine has 18 known isotopes.

10 PROTONS
NEON
Neon is a noble gas with atomic number 10. The 3 stable isotopes of neon have different numbers of neutrons: 10, 11, and 12. Other neon isotopes have been made in the lab with neutron numbers from 5 to 24. Neon is produced in giant stars through fusion.

11 PROTONS
SODIUM
Sodium is a highly reactive metal and a main component of salt (NaCl). Its atomic number is 11 (protons in its nucleus). Sodium has 20 known isotopes, only one of which is stable. Sodium-22 signatures from supernovae have been observed from space.

12 PROTONS
magnesium
Magnesium is the element with atomic number 12. Of the 22 known isotopes, there are 3 stable and 19 exotic. It is one of the most abundant elements found in the universe. Magnesium powder burns bright white and is used in pyrotechnics and flares.

13 PROTONS
ALUMINUM
Aluminum is element 13. It is the third most abundant element in earth's crust, but it can only be found in form of compounds. Before an industrial refinement process was found, it was worth more than gold. Al has 24 isotopes, but only one is stable.

14 protons
SILICON
Silicon, with atomic number 14, makes up about 28% of our planet's crust weight. It has 3 stable and 20 unstable isotopes. Hyperpure silicon (99.9999999% or "nine-nines") which is used in integrated circuits may cost up to $100/oz.

15 PROTONS
PHOSPHORUS
Phosphorus, with an atomic number of 15, is a very reactive element. It got its name when scientists noticed that phosphorus powder would glow when left in a container exposed to oxygen. This is because the powder was reacting with the oxygen in the air!

16 PROTONS
SULFUR
Sulfur, with 16 protons in the atom, is sometimes known as the smelly element! When sulfur reacts with hydrogen to create hydrogen sulfide, it produces the smell of rotten eggs. :P Sulfur can be found all over the world, from volcanoes to hot springs.

17 PROTONS
Chlorine
Chlorine is an element with 17 protons and 25 isotopes. It is the 21st most abundant element in Earth's crust and the third most abundant in Earth's oceans. You will probably find its compound sodium chloride in your kitchen under the name "salt".

18 protons
ARGON
Argon, element 18, is a noble gas. It is the third-most abundant gas in the atmosphere. Ar is used as a shielding gas, a preservative, and an active detection material in searches for dark-matter particles. Ar has 25 isotopes (3 of them stable).

19 PROTONS
POTASSIUM
The name of element 19 derives from the ashes of plants where it was first isolated: potassium (K). K has multiple functions in the human body. It has 25 known isotopes, two are stable. Long-lived K-40 is the main source of natural radioactivity in food.

20 protons
CALCIUM
An alkaline metal with the magic number of 20 protons, calcium is the lightest element with 6 natural isotopes and its stability could actually allow up to 52. Its oxides compose lime (calx in Latin) which has been extracted from limestone for millenia.

21 PROTONS
SCANDIUM
Scandium has one stable isotope and all its other 22 isotopes are radioactive. Its name derives from the Latin word Scandia for Scandinavia, the homeland of the element's discoverer L. Nilson. Scandium-aluminum alloys are used by the aerospace industry.

22 PROTONS
TITANIUM
Natural titanium comprises five stable isotopes, whereas 20 radioisotopes were characterized so far. The element's name derives from "Titans", the mythical Greek beings. It is a strong and light metal, thus being popularly used in air and spacecraft.

23 PROTONS
VANADIUM
Vanadium is a hard metal mainly used to strengthen steel and resist its corrosion. It has only two naturally occurring isotopes, and only mass 51 is stable. There are however 24 artificial radioisotopes, most with half-lives under an hour.

24 PROTONS
CHROMIUM
Chromium is mostly used as the key additive in stainless steel alloys. Rubies are given their vivid red color by trivalent chromium ion impurities in the gemstone. Chromium has 4 stable isotopes and 22 radioisotopes.

25 PROTONS
MANGANESE
Manganese can't be found in nature as a free element, but is found in minerals with iron, and is essential for the human body. Mn has 25 isotopes and only one stable isotope, however one of the isotopes has a half-life of 3.7 million years.

26 PROTONS
IRON
Iron has 28 isotopes, of which only 4 are stable. It is the fourth most abundant element in earth's crust. 56Fe is the most tightly bound nucleus with lowest mass per nucleon. Hence, it represents the end point of fusion reactions in stars.

27 PROTONS
COBALT
Cobalt has 28 known isotopes, only one of which is stable. Radioactive isotopes of this metal are used for industrial purposes such as the sterilization of medical supplies and radiography for measuring the integrity of welded joints.

28 PROTONS
NICKEL
Naturally occuring Nickel is composed of 5 stable isotopes, while 26 different radioisotopes of nickel have been discovered. It is used in a large number of alloys and superalloys due to its tensile strength and corrosion-resistant properties.

29 PROTONS
COPPER
Copper is one of the first metals used by humankind and today plays an important role in electronics. Its alloy with tin defined the era called Bronze Age. From 29 known isotopes only 2 are stable for this element produced in massive stars.

30 PROTONS
ZINC
The metal Zinc has atomic number 30. Coating Iron objects with Zinc helps prevent corrosion. The commonly used alloy brass is a mix with periodic neighbor copper. 5 stable and 24 radioactive isotopes with 10 meta states are known.

31 PROTONS
GALLIUM
Gallium is an element with atomic number 31. Of 32 known isotopes of gallium, the only stable isotopes have 38 and 40 neutrons. At room temperature, gallium is a silvery blue metal that melts at 85 degrees, so it will melt in your hands!

32 PROTONS
germanium
Germanium is a great example of the power of the periodic table, because its properties were predicted by D. Mendeleev two decades before its discovery by C. Winkler, who named it after his country. It has 5 natural isotopes and 27 synthetic.

33 PROTONS
ARSENIC
Arsenic is an element with atomic number 33 that occurs naturally in the Earth's crust. Of 30+ known isotopes, only one is stable. Arsenic is used with gallium to make semiconducting circuits that are faster than conventional silicon circuits!

34 PROTONS
Selenium
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Selenium, atomic number 34, has 6 stable isotopes out of 32 known. It was discovered in 1817 and named after the Greek word for Moon. Selenium compounds are used to give glass a red color or cancel the green and yellow tints from impurities.

35 PROTONS
BROMINE
Bromine is a halogen with 35 protons inside the nucleus. The element was discovered by two separate chemists in the 1820's and is used as a flame retardant because it inhibits the oxydation reaction that feeds fires in certain materials.

36 PROTONS
KRYPTON
Krypton is not just Superman's planet, it is a noble gas, present in the earth's atmosphere at very low concentrations. The element comprises 32 isotopes, out of which 5 are stable ones. It is admixed into the gas of energy efficient lamps.

37 PROTONS
Rubidium
Rubidium, atomic number 37, has 32 isotopes, but only two are stable. About 25% of the rubidium found in nature is radioactive and has a half-life of 50 billion years! It's used to create purple fireworks and highly precise atomic clocks.

38 PROTONS
STRONTIUM
Strontium, atomic number 38, has 4 stable isotopes and 31 unstable isotopes. Strontium is formed in explosive stellar environments and can be used to measure the age of minerals and rocks.

39 PROTONS
YTTRIUM
Yttrium, with atomic number 39, was named for the village of Ytterby, Sweden, where it was discovered in a quarry. It has 34 known isotopes and only one is stable. Yttrium is commonly used in LEDs and lasers.

40 PROTONS
ZIRCONIUM
Zirconium is the element with atomic number 40 and has 35 isotopes, 5 of which are stable. Zirconium is corrosion resistant and does not easily absorb neutrons making it an ideal metal for use in nuclear reactors.

41 PROTONS
Niobium
Niobium, atomic number 41, has 58 isotopes. It superconducts at 9K & is used to produce strong steel and heat resistant "superalloys" for nozzles of jet and rocket engines. The main nozzle of the Apollo Lunar Service Module was 89% niobium!

42 PROTONS
MOLYBDENUM
Molybdenum has atomic number 42. It has 38 known isotopes of which 7 are stable. The molybdenum isotopes are important for the intermediate-neutron-capture process that occurs in rapidly accreting white dwarf stars.

43 PROTONS
technetium
Technetium is element number 43, and it has 37 known isotopes. It is the lightest element with no stable isotopes. Technetium-99m has a half-life of 6 hours and emits gamma rays. This makes it useful for medical imaging.

44 PROTONS
RUTHENIUM
Ruthenium is element number 44 and has 7 stable isotopes and 27 unstable isotopes. Ruthenium is a rare metal that was discovered by a Russian scientist in 1944 who named it after his home country.

45 PROTONS
Rhodium
One of the rarest and most valuable elements on Earth, rhodium is used in jewelry to protect against corrosion, and in nuclear reactors to measure the flux of neutrons. There are 34 known isotopes of rhodium.

46 PROTONS
PALLADIUM
Made famous for its fictional use in the Iron Man arc reactor, palladium is *actually* used in catalytic converters to convert noxious automobile gases into less-harmful emissions. There are 39 known isotopes of palladium.

47 PROTONS
Silver
Silver (atomic number 47) is found on earth with 60 or 62 neutrons, but has 39 known isotopes. Silver was a precious metal throughout history, and is still valuable today due to its excellent electrical and thermal properties.

48 PROTONS
CADMIUM
Cadmium, atomic # 48 has up to 50 different isotopes including the metastable states. While it can have 47 to 84 neutrons, only 8 isotopes are naturally occuring. Although it is highly toxic, it is mainly used in cadmium telluride solar panels.

49 PROTONS
INDIUM
Indium is named after the indigo color it emits when burned. It is commonly used as indium tin oxide in touch screens, flat screen TVs, and solar panels. Indium has 41 known isotopes, only 2 of which occur naturally.

50 PROTONS
TIN
Tin, atomic # 50 has 10 stable isotopes, the highest for any element owing to the "magic" number of protons. In addition, 29 additional unstable isotopes of tin are known to exist. It is widely used to make bronze, an alloy of tin and copper.

51 PROTONS
ANTIMONY
Antimony is a pnictogen, meaning it is a member of the nitrogen family. Antimony oxides are used in flame retardants in a variety of products, including plastics, fabrics, and paints. Antimony has 38 known isotopes, two of which are stable.

52 PROTONS
TELLURIUM
There are 39 known isotopes of tellurium. It is considered a technology-critical element due to its use in solar panels and semiconductors. It is more abundant in the universe than on Earth due to its low affinity for oxygen.

53 PROTONS
Iodine
Iodine is the heaviest halogen with 38 known isotopes, among which I-127 is the most stable. Lack of Iodine in your daily diet results in goiter, thyroid- and development-related diseases. So keep your Iodine-127 balanced!

54 PROTONS
Xenon
Element 54, Xenon, is a noble gas. It is used in high-powered lamps and as a propellant in ion drives for spacecraft. Xe has 40 isotopes, one of which (Xe-136) is used in searching for new physics in extremely rare double-beta decay processes.

55 PROTONS
CESIUM
Cesium, element 55, has 39 known isotopes, only one of which is stable. This soft metal is used in atomic clocks and as a propellent for early ion engines designed for spacecraft.

56 PROTONS
Barium
Barium, atomic number 56, has 39 known isotopes, 7 of which are stable. It is a metallic element that is soft and silvery-white when pure. Barium sulfate is commonly used as a radio-contrast agent in x-ray imaging of the digestive system.

72 PROTONS
Hafnium
Hafnium, Hf, is a metal with 34 known isotopes (5 stable). Hf is the last stable element to be discovered in human history, back in 1923. Hf can be used in control rods found in US naval nuclear reactors to absorb neutrons during fission.

73 PROTONS
TANTALUM
Tantalum, element 73, is a corrosion-resistant metal. It is used in capacitors and ubiquitous in modern electronics. Ta has 36 isotopes (1 stable). Ta-180 has an observationally stable excited state with a half-life longer than 10^15 years.

74 protons
TUNGSTEN
Tungsten, element 74 with 35 isotopes, has the highest melting point of all the metals, making it ideal for light bulb filaments. It is often used to produce electrons for applications like Cathode Ray Tube TVs! (Kids ask your parents)

75 PROTONS
RHENIUM
Rhenium, Re, is one of the rarest elements in the Earth's crust. Only one of its known 35 isotopes is stable. Re-186 and Re-188 are radioactive and used for liver cancer treament. Most Rhenium metal, however, is used for making jet engine parts.

76 PROTONS
OSMIUM
With 76 protons and 42 known (six stable) isotopes, osmium is the densest naturally occuring element as well as one of the rarest. It is a shiny yet brittle metal, useful for applications that require extreme durability and hardness.

77 PROTONS
IRIDIUM
Iridium, encompassing 41 isotopes, is among the least abudant elements in earth's crust, but is more common in meteorites. This helped to solve the mysterious sudden extinction of the dinosaurs by supporting the theory of meteorite impact.

78 PROTONS
platinum
Element number 78 is platinum. It has 43 known isotopes, 5 of which are stable. Platinum is a precious metal, and its value comes from its low reactivity. The name "platinum" comes from the Spanish term "platina," which means "little silver."

79 PROTONS
GOLD
Gold, atomic number 79 with 38 isotopes, has always been valued for its beauty. It has many fantastic properties such as the ability to reflect infrared radiation, making it useful for astronauts who need extra protection from the sun in space.

80 PROTONS
mercury
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Named after a Roman god, mercury is the only metal that is liquid at room temperature. It has 80 protons and 45 known isotopes (seven stable). Although toxic, the silvery metal is used in thermometers, flourescent lighting, and even dentistry.

81 PROTONS
THALLIUM
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There are 41 isotopes of thallium, element 81. Rarely found freely in nature, it must be extracted from other heavy-metal ores for electronics manufacturing. Tl-208 emits a characteristic gamma-ray, useful for calibrating radiation detectors.

82 PROTONS
LEAD
A common metal known thoughout history, Lead (Pb), has been an integral part of our society. There are 41 isotopes known, with 4 stable isotopes found in nature. Due to its high density, Pb blocks are used to absorb radiation in laboratories.

83 PROTONS
BISMUTH
Recognized for its use in medicines such as Pepto-Bismol, bismuth is element number 83. Out of its 41 known isotopes, only one is stable. Bismuth can be used as a low-toxicity replacement for lead in certain applications.

84 PROTONS
polonium
Polonium has 42 isotopes, which are all radioactive. It was discovered by Marie Curie, who named it after her homeland, Poland. The isotope Po-210 can be found in nature and was also used as a power source for satellites and other spacecraft.

85 PROTONS
ASTATINE
Astatine (At), with 39 known isotopes, is a radioactive chemical element. It is the rarest element found in the Earth's crust, produced as a decay product. At-211 is used to make bismuth targets for fundamental nuclear studies.

86 PROTONS
RADON
Radon (Rn) is a colorless, odorless, tasteless noble gas with 37 known isotopes that are all radioactive. Scientists have been investigating using Rn concentrations to predict the occurence of earthquakes through cracks forming in the ground.

87 protons
FRANCIUM
Francium (Fr) is the most unstable naturally occurring element (as a trace from uranium decay), with 34 radioactive isotopes. A solid sample of Francium can't exist because the heat produced during its rapid decays would actually vaporize it!

88 protons
RADIUM
Radium was discovered by Marie Curie, so-named with a French word signifying radium's power to emit energy in the form of rays. It has 88 protons and a total of 33 isotopes (114-146 neutrons). The most stable one is 226Ra with a pear-like shape.

104 PROTONS
Rutherfordium
The synthetic element Rutherfordium is named for physicist Ernest Rutherford, whose experiments proved the existence of the nucleus. Sixteen isotopes have been reported so far, produced by direct fusion or as decays from heavier elements.

105 PROTONS
Dubnium
Dubnium (Db) was first created at the Joint Institute for Nuclear Research in Dubna, Russia. Bombarding americium with neon led to element 105. It took three experiments to make 23 atoms of Db-268, with a measured half-life of over 24 hours.

106 PROTONS
Seaborgium
Nobel Laureate Glenn Seaborg was part of the team that produced some of the earliest atoms of seaborgium (element 106). Twelve radioactive isotopes have been synthesized, which decay through alpha emission or spontaneous fission.

107 PROTONS
BOHRIUM
Element 107 is named for Niels Bohr, a physicist known for his early model of the atom. The 12 known isotopes undergo alpha decay. Unconfirmed Bh-278, however, may undergo spontaneous fission with a half-life ten times longer than the others

108 PROTONS
HASSIUM
Only three isotopes of element 108, named for the German state of Hesse, are known. All three have half-lifes of just seconds, which makes it difficult to study! If a solid form could be produced, hassium is predicted to be the densest element.

109 PROTONS
MEITNERIUM
Meitnerium is a synthetic element named for the Austrian physicist Lise Meitner, one of the discoverers of nuclear fission. Only ten atoms have ever been produced. The longest-lived of its 7 isotopes has a half-life of only 8 seconds!

110 PROTONS
DARMSTADTIUM
Named after the German city where it was first produced in 1994, darmstadtium is predicted to be the heaviest element of the nickel group. Its short half-life of less than 10s makes chemical studies difficult. Ds has 9 known isotopes.

111 protons
ROENTGENIUM
Roentegenium is a synthetic element with 111 protons and 7 known isotopes. Its position in the periodic table suggests it may have similar properties to gold and silver, but due to its high radioactivity we discourage its usage in jewelry.

112 protons
Copernicium
Named in honor of the astronomer Nicolaus Copernicus on his 537th birthday, Cn has seven known radioactive isotopes. The longest half-life among them is only 28 seconds! Models predict it to be the most noble metal (resistent to oxidation).

113 protons
Nihonium
Nihonium is a synthetic chemical element. "Nihon" is the Japanese word for Japan, and this element was named in recognition of its discovery by Japanese researchers. The most stable isotope is 286Nh with a half-life of about 10 seconds.

114 PROTONS
Flerovium
With a half-life of 1-2s - long enough for an electron cloud to form - flerovium is the heaviest element to have been studied chemically, using just one atom at a time. Seven isotopes of Fl are known.

115 PROTONS
Moscovium
Moscovium is a synthetic element with 115 protons. It has 4 known isotopes with mass numbers between 287 and 290, the longest half-life being only 0.8 seconds (290Mc). It was first created in 2003 in Dubna (Russia) using americium and calcium.

116 PROTONS
Livermorium
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Livermorium is an artificial element with 116 protons which was first created in 2000 in Dubna (Russia) by fusing calcium and curium. Nowadays there are four known radioisotopes and 293Lv is the longest-lived one, with a half-life of only 53 ms.

117 PROTONS
Tennessine
Tennessine (Ts) is located in the hypothesized "Island of Stability", reversing the trend of decreasing stability for superheavy elements. Only two isotopes of Ts have been synthesized, but experiments are being planned to discover more.

118 PROTONS
OGANESSON
Oganesson is the only element currently named after someone who is still alive. Only 1 isotope of Og has ever been produced by humans, but there may be as many as 100 different isotopes of oganesson (from N=170 to N=270)!

57 PROTONS
LANTHANUM
Lanthanum, atomic number 57, is a rare earth element that is used in the motion picture industry in carbon arc lights for studio lighting and projectors. It has 2 stable isotopes and 32 radioactive isotopes.

58 PROTONS
CERIUM
Cerium was the first lanthanide discovered, identified in 1803. This rare-earth metal is actually the 25th most abundant element in the Earth's crust. Of 37 known isotopes, one stable and three long-lived radioactive isotopes occur in nature.

59 PROTONS
PRASEODYMIUM
Element number 59, Praseodymium, is the third member of the lanthanide series. It has one stable isotope and 38 known radioactive isotopes. Its name comes from the Greek word for green because when oxidized it forms a green coating.

60 PROTONS
neodymium
Neodymium, atomic number 60, has 5 stable and 2 radioactive naturally occuring isotopes. Its compounds are used in glass dyes and its alloys can make high-strength magnets. The Nd:YAG is one of the most commonly used solid-state lasers.

61 PROTONS
PROMETHIUM
Named after the Greek Titan who stole the fire from the gods, Promethium is the element with 61 protons. None of the 38 known isotopes is stable, and the longest-lived one has a half-life of only 17.7 years.

62 PROTONS
SAMARIUM
Samarium, atomic #61, was first discovered in 1879. Samarium has 7 naturally-occuring isotopes and 37 known isotopes. Its applications range from the production of strong permanent magnets to cancer treatment and nuclear power.

63 PROTONS
EUROPIUM
The most reactive and softest lanthanide, Europium, exists with 63 protons and 37 different combinations of neutrons. Europium oxide is widely used in color TVs and computer screens, quantum memory chips and fluorescent materials.

64 PROTONS
GADOLINIUM
Gadolinium (35 known isotopes, 6 stable) is a silvery-white, melleable metal. The isotope Gd-157 has the largest probability to capture neutrons out of all the stable nuclei. This makes Gadolinium useful in neutron therapy for tumors.

65 PROTONS
TERBIUM
Terbium is a silver-white rare Earth metal, with 36 radioisotopes and only one stable isotope. It can be found in naval sonar systems and cathode ray tubes in the tv monitors of the past. It was named after the town of Ytterby, Sweden.

66 PROTONS
Dysprosium
Dysprosium, element 66, is a rare-earth metal. In nature, it is only found in minerals, never in its elemental form. Dysprosium is used to make permanent magnets for wind turbine generators and electric cars. Dy has 29 isotopes (7 stable).

67 PROTONS
HOLMIUM
Element no. 67, Holmium, is named after the city of Stockholm. It has the highest naturally-occurring magnetic moment of any element and is used for creating the strongest magnetic fields. Only one of its 36 isotopes is stable.

68 PROTONS
erbium
Erbium, atomic number 68, has a total of 36 isotopes. The stable Er-168 is used to produce the radioactive Er-169 for treatment of rheumatoid arthritis. Erbium is also used to produce the pink color in cubic zirconium which is used in jewelry.

69 PROTONS
Thulium
Thulium is a silver-gray metal, usually found as an impurity in natural oxides. It is sourced primarily from clay in southern China. Lasers made with Thulium are very useful for surgery. Of 35 known isotopes, only Th-169 is thought to be stable.

70 PROTONS
YTTERBIUM
Ytterbium, Yb, is naturally found as a mixture of its seven stable isotopes. 27 radioisotopes have been discovered. Yb can be used as a radiation source in portable X-ray machines. Atomic clocks based on Yb hold the record for stability.

71 PROTONS
LUTETIUM
Lutetium is the last element in the Lanthanide series, with only 1 stable isotope out of 35 known. The beta decay of Lu-176 allows scientists to determine how old meteorites are. Lutetium can also be used in therapy for neuroendocrine tumors.

89 PROTONS
Actinium
Actinium (Ac) is a radioactive element with 32 known isotopes. It is the first of the actinide series. 227AcBe has been used as a neutron probe for measuring the moisture during quality control tests in highway construction.

90 PROTONS
THORIUM
Thorium, named after the Norse god of thunder Thor, has 90 protons and 31 observed isotopes. The isotope 232Th, which has been observed in old stars, is used as a tool to determine when the heaviest elements have been produced in the universe.

91 protons
Protactinium
Protactinium has 91 protons and 29 observed isotopes, but none of them is stable. Its isotope 231Pa has been used in oceanography to determine the movement of North Atlantic water bodies during the last melting of Ice Age glaciers.

92 PROTONS
URANIUM
Uranium has more protons (92) than any other element naturally found on earth. Natural uranium is composed of three isotopes: 234U, 235U and 238U, with the latter being the most abundant and having a half-life close to the age of the earth.

93 PROTONS
NEPTUNIUM
Neptunium was firstly synthesized in 1940 but small amounts can be found naturally in uranium ores. This element has 93 protons and 23 known isotopes, and the 237Np is used as a precursor of the 238Pu to provide electricity inside spacecrafts.

94 PROTONS
PLUTONIUM
All 20 isotopes of plutonium are unstable and somewhat short-lived, so it's not found in nature. Instead, it is artificially produced using nuclear reactors. Pu can be used as fuel for reactors or radioisotope thermoelectric generators (RTGs).

95 PROTONS
Americium
Americium has 20 known isotopes, all of which are radioactive. Many smoke detectors use alpha radiation from very small amounts of its isotope 241Am to detect the presence of smoke in the air. Check the batteries on your smoke detectors!

96 PROTONS
CURIUM
With 19 known isotopes, curium is normally made by bombarding uranium or plutonium in reactors. Cm is the first element named after scientists Pierre and Marie Curie. Curium-244 is used in alpha particle X-ray spectrometers in space missions.

97 protons
Berkelium
Berkelium, with 18 known radioactive isotopes, is a transuranic element that is produced in minute amounts at high-flux nuclear reactors. The element is named after the city of Berkeley, California, where the element was discovered in 1949

98 PROTONS
Californium
Californium, element 98, is the 2nd heaviest element produced in quantities visible to the eye. The most stable of its 20 isotopes has a half life of 898 years. Cf is used to start nuclear reactors, in portable neutron sources & cancer therapy.

99 protons
EINSTEINIUM
Optical lines of einsteinium have been identified in Przybylski's star, leading some scientists to speculate that the spectra of superheavy elements may someday be observed in neutron star mergers or supernovae. 4 isotopes of Es are known.

100 PROTONS
FERMIUM
Fermium was discovered in 1952 in the debris from the Ivy Mike hydrogen bomb test in the Pacific Ocean. A total of 19 isotopes of Fm are known today, all of them unstable.

101 PROTONS
MENDELEVIUM
Mendelevium is named after the father of the periodic table, Dmitri Mendeleev. This element has 101 protons and 15 known isotopes, which half-lives vary from 90 ms to 51 days. The isotope 256Md was the first atom ever produced one at time.

102 PROTONS
NOBELIUM
Nobelium is an element with 102 protons and 12 known isotopes, which was named in honor of the Swedish chemist Alfred Nobel. The official discovery was made at the Joint Institute of Nuclear Research at Dubna (USSR) in 1966.

103 protons
LAWRENCIUM
Famed cyclotron inventor Ernest Lawrence is honored with this artificially-produced element. Lawrencium has 12 known isotopes, including one of the longest-lived superheavy isotopes: Lr-266, with a half-life of ten hours!