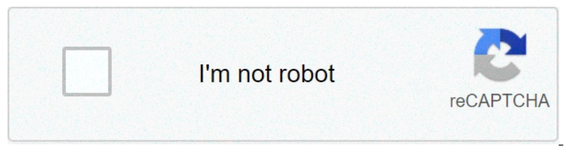

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Periodic table valence electrons chart

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Elements are grouped according to similar electronic structure, which makes these recurring element properties readily apparent in the periodic table. Electronegativity reflects how easily an atom can form a chemical bond. Generally, electronegativity increases from left to right and decreases as you move down a group. Keep in mind, the noble gasses (column at the right-hand side of the periodic table) are relatively inert, so their electronegativity approaches zero (exception to the overall trend). The larger the difference between electronegativity values, the more likely two atoms are to form a chemical bond. Ionization energy is the smallest amount of energy needed to pull an electron away from an atom in the gas state. Ionization energy increases as you move across a period (left to right) because the increasing number of protons attracts the electrons more strongly, making it harder to remove one. As you go down a group (top to bottom), ionization energy decreases because an electron shell is added, moving the outermost electron further away from the atomic nucleus. Atomic radius is the distance from the nucleus to the outermost stable electron while ionic radius is half the distance between two atomic nuclei that are just touching each other. These related values display the same trend in the periodic table. As you move down the periodic table, elements have more protons and gain an electron energy shell, so atoms become larger. As you move across a row of the periodic table, there are more protons and electrons, but the electrons are held more closely to the nucleus, so the overall size of the atom decreases. Most of the elements in the periodic table are metals, which means they display metallic character. Properties of metals include metallic luster, high electrical and thermal conductivity, ductility, malleability, and several other traits. The right-hand side of the periodic table contains the nonmetals, which do not display these properties. As with the other properties, metallic character relates to the configuration of valence electrons. Electron affinity is how easily an atom accepts an electron. Electron affinity decreases moving down a column and increases moving left to right across a row of the periodic table. The value cited for an atom's electron affinity is the energy gained when an electron is added or the energy lost when an electron is removed from a single-charged anion. This depends on the configuration of the outer electron shell, so elements within a group have a similar affinity (positive or negative). As you might expect, elements that form anions are less likely to attract electrons than those that form cations. Noble gas elements have an electron affinity near zero. A valence electron is an electron that is the most likely to be involved in a chemical reaction. They are typically the electrons with the highest value of the principal quantum number, n. Another way to think of valence electrons is that they are the outermost electrons in an atom, so they are the most susceptible to participation in chemical bond formation or ionization. The simplest way to identify the valence electrons is to look for the highest number in the electron configuration of an atom (the principal quantum number). It's worth noting the IUPAC definition of valence is for the single highest valence value that is displayed by an atom of an element. However, in practical use, main group elements of the periodic table may display any valence from 1 to 7 (since 8 is a complete octet). Most elements have preferred values of valence electrons. The alkali metals, for example, almost always display a valence of 1. The alkaline earths tend to display a valence of 2. The halogens usually have a valence of 1, yet may sometimes display a valence of 7. The transition metals may display a range of valence values because the highest energy electron subshell is only partially filled. Those atoms become more stable by emptying the shell, half-filling it, or completely filling it. Magnesium's ground state electron configuration is 1s22s2p63s2, the valence electrons would be the 3s electrons because 3 is the highest principal quantum number. Bromine's ground state electron configuration is 1s22s2p63s2p6d104s2p5, the valence electrons would be the 4s and 4p electrons. Get essential facts about the first 20 elements, all in one convenient place, including the name, atomic number, atomic mass, element symbol, group, and electron configuration. If you need detailed facts about these elements or any of the higher numbered ones, start with the clickable periodic table. Hydrogen is a nonmetallic, colorless gas under ordinary conditions. It becomes an alkali metal under extreme pressure. Atomic Number: 1 Symbol: H Atomic Mass: 1.008 Electron Configuration: 1s1 Group: group 1, s-block, nonmetal Julius Adamek / EyeEm / Getty Images Helium is a light, colorless gas that forms a colorless liquid. Atomic Number: 2 Symbol: He Atomic Mass: 4.002602(2) Electron Configuration: 1s2 Group: group 18, s-block, noble gas Bloomberg Creative Photos / Getty Images Lithium is a reactive silver metal. Atomic Number: 3 Symbol: Li Atomic Mass: 6.94 (6.938–6.997) Electron Configuration: [He] 2s1 Group: group 1, s-block, alkali metal Myriam Borzee / Getty Images Beryllium is a shiny gray-white metal. Atomic Number: 4 Symbol: Be Atomic Mass: 9.0121831(5) Electron Configuration: [He] 2s2 Group: group 2, s-block, alkaline earth metal Bloomberg Creative Photos / Getty Images Boron is a gray solid with a metallic luster. Atomic Number: 5 Symbol: B Atomic Mass: 10.81 (10.806–10.821) Electron Configuration: [He] 2s2 2p1 Group: group 13, p-block, metalloid Natalya Danko / EyeEm / Getty Images Carbon takes several forms. It's usually a gray or black solid, although diamonds may be colorless. Atomic Number: 6 Symbol: C Atomic Mass: 12.011 (12.0096–12.0116) Electron Configuration: [He] 2s2 2p2 Group: group 14, p-block, usually a nonmetal although sometimes considered a metalloid Science Photo Library / Getty Images Nitrogen is a colorless gas under ordinary conditions. It cools to form colorless liquid and solid forms. Atomic Number: 7 Symbol: N Atomic Mass: 14.007 Electron Configuration: [He] 2s2 2p3 Group: group 15 (pnictogens), p-block, nonmetal Oxygen is a colorless gas. Its liquid is blue. Solid oxygen may be any of several colors, including red, black, and metallic. Atomic Number: 8 Symbol: O Atomic Mass: 15.999 or 16.00 Electron Configuration: [He] 2s2 2p4 Group: group 16 (chalcogens), p-block, nonmetal John Cancalosi / Getty Images Fluorine is a pale yellow gas and liquid and bright yellow solid. The solid may be either opaque or translucent. Atomic Number: 9 Symbol: F Atomic Mass: 18.998403163(6) Electron Configuration: [He] 2s2 2p5 Group: group 17, p-block, halogen Neon is a colorless gas that emits a characteristic orange-red glow when excited in an electric field. Atomic Number: 10 Symbol: Ne Atomic Mass: 20.1797(6) Electron Configuration: [He] 2s2 2p6 Group: group 18, p-block, noble gas Sodium is a soft, silvery-white metal. Atomic Number: 11 Symbol: Na Atomic Mass: 22.98976928(2) Electron Configuration: [Ne] 3s1 Group: group 1, s-block, alkali metal Helmut Feil / Getty Images Magnesium is a shiny gray metal. Atomic Number: 12 Symbol: Mg Atomic Mass: 24.305 Electron Configuration: [Ne] 3s2 Group: group 2, s-block, alkaline earth metal Bloomberg Creative Photos / Getty Images Aluminum is a soft, silver-colored, nonmagnetic metal. Atomic Number: 13 Symbol: Al Atomic Mass: 26.9815385(7) Electron Configuration: [Ne] 3s2 3p1 Group: group 13, p-block, considered a post-transition metal or sometimes a metalloid ALFRED PASIEKA / SCIENCE PHOTO LIBRARY / Getty Images Silicon is a hard, blue-gray crystalline solid that has a metallic luster. Atomic Number: 14 Symbol: Si Atomic Mass: 28.085 Electron Configuration: [Ne] 3s2 3p2 Group: group 14 (carbon group), p-block, metalloid Phosphorus is a solid under ordinary conditions, but it takes several forms. The most common are white phosphorus and red phosphorus. Atomic Number: 15 Symbol: P Atomic Mass: 30.973761998(5) Electron Configuration: [Ne] 3s2 3p3 Group: group 15 (pnictogens), p-block, usually considered a nonmetal, but sometimes a metalloid Edwin Remsberg / Getty Images Sulfur is a yellow solid. Atomic Number: 16 Symbol: S Atomic Mass: 32.06 Electron Configuration: [Ne] 3s2 3p4 Group: group 16 (chalcogens), p-block, nonmetal galitskaya / Getty Images Chlorine is a pale yellow-green gas under ordinary conditions. Its liquid form is bright yellow. Atomic Number: 17 Symbol: Cl Atomic Mass: 35.45 Electron Configuration: [Ne] 3s2 3p5 Group: group 17, p-block, halogen Pramote Polyamate / Getty Images Argon is a colorless gas, liquid, and solid. It emits a bright lilac-purple glow when excited in an electric field. Atomic Number: 18 Symbol: Ar Atomic Mass: 39.948(1) Electron Configuration: [Ne] 3s2 3p6 Group: group 18, p-block, noble gas Aleksei Vel. / Getty Images Potassium is a reactive, silvery metal. Atomic Number: 19 Symbol: K Atomic Mass: 39.0983(1) Electron Configuration: [Ar] 4s1 Group: group 1, s-block, alkali metal seksan Mongkhonkhamsao / Getty Images Calcium is a dull silver metal with a faint yellowish cast. Atomic Number: 20 Symbol: Ca Atomic Mass: 40.078(4) Electron Configuration: [Ar] 4s2 Group: group 2, s-block, alkaline earth metal Todd Helmenstine This downloadable color periodic table contains each element's atomic number, atomic mass, symbol, name, and electron configuration. The electron configurations are written in the noble gas notation. This notation uses the symbol of the previous row’s noble gas in brackets to represent the part of the electron configuration that is identical to that noble gas’s electron configuration. This table is available for download and printing in PDF format here. For the best printing options, choose "Landscape" and "Fit" as the size option. You can use the image as a 1920x1080 HD wallpaper for your computer desktop. Click the image for full size and save to your computer. Todd Helmenstine This color periodic table wallpaper contains each element's atomic number, atomic mass, symbol, name, and electron configuration. The electron configurations are written in the noble gas notation. This notation uses the symbol of the previous row’s noble gas in brackets to represent the part of the electron configuration that is identical to that noble gas’s electron configuration. The above image can be used as an HD wallpaper for your computer desktop. Click the image for full size and save it to your computer. Todd Helmenstine This periodic table contains each element's atomic number, atomic mass, symbol, name, and electron configuration. The electron configurations are written in the noble gas notation. This notation uses the symbol of the previous row’s noble gas in brackets to represent the part of the electron configuration that is identical to that noble gas’s electron configuration. You can download this table for easy printing in PDF format here. For the best printing options, choose Landscape and "Fit" as the size option. Each of the chemical elements has its own distinctive set of properties, making it cool in its own way. If you had to choose the coolest element, which would it be? Here are some top contenders for the title and reasons why they are awesome. amandine45 / Getty Images Pretty much all of the radioactive elements are cool. Plutonium is particularly awesome because it truly does glow in the dark. Plutonium's glow isn't due to its radioactivity, though. The element oxidizes in air, emitting red light like a burning ember. If you were to hold a chunk of plutonium in your hand (not recommended), it would feel warm thanks to the huge number of radioactive decays and the oxidation. Too much plutonium in one place leads to a runaway chain reaction, also known as a nuclear explosion. One interesting fact is that plutonium is more likely to go critical in a solution than as a solid. The element symbol for plutonium is Pu. Pee-Uuu. Get it? Plutonium rocks. Natalie Fobes / Getty Images Carbon is cool for several reasons. First, all life as we know it is based on carbon. Every cell in your body contains carbon. It's in the air you breathe and the food you eat. You couldn't live without it. It's also cool because of the interesting forms assumed by the pure element. You encounter pure carbon as diamonds, graphite in a pencil, soot from combustion, and as those wild cage-shaped molecules known as fullerenes. Jrgen Wambach / EyeEm / Getty Images You usually think of sulfur as a yellow rock or powder, but one of the cool things about this element is that it changes color under different conditions. Solid sulfur is yellow, but it melts into a blood-red liquid. If you burn sulfur, the flame is blue. Another neat thing about sulfur is that its compounds have a distinctive smell. Some might even call it a stench. Sulfur is responsible for the odor of rotten eggs, onions, garlic, and skunk spray. If it's stinky, there's probably sulfur in there somewhere. Bloomberg Creative Photos / Getty Images All of the alkali metals react spectacularly in water, so why did lithium make the list while cesium did not? Well, for one, you can get lithium from batteries, while cesium requires a special permit to obtain. For another, lithium burns with a hot pink flame. What's not to love? Lithium is also the lightest solid element. Before bursting into flame, this metal floats on water. Its high reactivity means it would also corrode your skin, so this is a no-touchy element. Lester V. Bergman / Getty Images Gallium is a silvery metal that you can use to perform the bending spoon magic trick. You make a spoon of the metal, hold it between your fingers, and use the power of your mind to bend the spoon. Really, you're using the heat of your hand and not a superpower, but we'll keep that our little secret. Gallium transitions from a solid to a liquid slightly above room temperature. The low melting point and resemblance to stainless steel makes gallium perfect for the disappearing spoon trick. Gallium is also used for the gallium beating heart demonstration, which is a much safer version of the classic chem demo that uses mercury.