

Atomic structure and periodic relationships

study guide

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What is the relationship between the atomic structure and the periodic table? It is related as follows: The number of outer shell electrons determines the group number of the element. The number of occupied principle quantum shells (energy levels) determines the period of the element. The proton number determines the element itself and its position.

Which of the following describes what takes place when iron Fe is oxidized to Fe²⁺ ions? Oxidation is a loss of electrons. The loss of negative charge causes an increase in oxidation state of the substance. Fe atoms lose two electrons, so they are oxidized to Fe²⁺ ions. Note that the two-electron oxidation raises the oxidation state of iron from 0 in the atom to +2 in the ion.

Which of these elements is found in a family with the following electron configuration: ns², np³? The nitrogen family includes the following compounds: nitrogen (N), phosphorus (P), arsenic (As), antimony (Sb), and bismuth (Bi). All Group 15 elements have the electron configuration ns²np³ in their outer shell, where n is the principal quantum number.

What additional knowledge about electrons did Millikan's experiment provide? Millikan discovered that there is a fundamental electric charge—the charge of an electron. Rutherford's gold foil experiment showed that atoms have a small, dense, positively charged nucleus; the positively charged particles within the nucleus are called protons.

Can I study the periodic table before atomic structure? You can definitely study classification of elements and periodicity chapter without studying the atomic

structure but you would have to study some more topics from the previous chapters as it would be handy in this case.

How does atomic structure relate to periodic trends? As you move across a period from left to right, the atomic number increases, leading to an increase in the positive charge of the nucleus. This increased nuclear charge attracts the electrons more strongly, reducing the atomic radius (atomic size) and increasing ionisation energy and electronegativity.

Why Fe^{2+} is easily oxidized to Fe^{3+} ? The electronic configuration of Fe^{3+} is more stable because its 3d orbital is a half-filled orbital. It has extra stability compared to the Fe^{2+} . Hence, Fe^{2+} will lose one electron easily to form Fe^{3+} .

Why is Fe^{2+} bigger than Fe^{3+} ? Among the Iron (II) ion (charge is 2+) and Iron (III) ion (charge is 3+), the magnitude of positive charge is higher on Iron (III) ion, and therefore, the size of Iron (III) ion will be smaller than Iron (II) ion.

What can oxidize Fe^{2+} to Fe^{3+} ? Example: Acidified manganate(VII) ions are a powerful oxidizing agent. They can oxidize Fe^{2+} ions to Fe^{3+} ions.

Which family of elements has a stable outer electron configuration? Helium (?), neon (?), and argon (?), as group 18 elements, have outer electron shells that are full or satisfy the octet rule. This makes them highly stable as single atoms.

Which family on the periodic table of elements has a full outer electron shell?
Answer and Explanation: The elements which have a full outer electron shell are named as noble gases. The noble gas with the least number of electrons is helium that is He.

How many electrons does a group 7A atom need to gain in order to achieve a stable electron configuration? Atoms in Group 7A have 7 valence electrons and gain 1 more electron to get octet.

Why is clock oil used in Millikan's experiment? The apparatus was made of two chambers. The chamber on top was fitted to an atomizer that sprayed fine clock oil. Millikan used oil instead of water because it reduced evaporation from the surface of the droplets.

How did Thomson's atomic model differ from Dalton's atomic model? Note:

The basic difference between the two models lies in the fact that Dalton proposed that an atom was indivisible and indestructible whereas Thomson worked on the existence of subatomic particles inside an atom and their arrangements i.e., he considered an atom to be a divisible quantity unlike Dalton.

How does the quantum mechanical model describe an electron? The Quantum Mechanical Model of the Atom views electrons within an atom as waves, not as particles as previously believed. Because of this, electrons can be described as having a high probability of residing in specific orbitals, or regions of space, within the atom.

What is the relationship between an atom and any element on the periodic table? An atom is the part of an element. A particular element is composed of only one type of atom. Atoms are further composed of subatomic particles called electrons, protons and neutrons. Elements can combine with each other to form molecules via chemical reaction.

What is the relationship between the periodic table and elements? The modern periodic table (PT) represents the arrangements of elements according to the building up (Aufbau principle), where each element has one electron more than the previous element.

What is the relationship between the periodic table and electronic structure? As we go across the rows of the periodic table, the overall shape of the table outlines how the electrons are occupying the shells and subshells. The first two columns on the left side of the periodic table are where the s subshells are being occupied.

What is atomic number and what relationship does it have to the periodic table? Atomic Number: the number of protons in the nucleus (which is the same as the number of electrons in the atom). Symbol: a one or two letter symbol that represents the element. These internationally-used symbols are abbreviations for the common name or the Latin name of the element. Name: the element's common name.



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