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## Trents in the Perriodic Table

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- describe the trends in the Periodic Table within a group or period


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## Going across the table from left to right within a row or period

* the number of protons increases
* the pull on the electrons increases
$\star$ the covalent atomic radius decreases
* metallic properties decrease (except in the transition elements)
is Ionization energy increases
* Ionization energy - energy needed to remove the most loosely held electron from an element in the gaseous phase
* found in Table S
* second ionization energy - it requires more energy to remove each successive electron
is Electronegativity increases (also Table S)
is There is a gradual change from positive oxidation states to negative oxidation states
* the number of valence electrons increases
* the number of shells remains the same

Going down the table within a group or family
$\star$ the number of protons increases
$\star$ the number of shells increases

* the atomic radius increases
* the pull on the electrons decreases
* metallic properties increase
* the number of valence electrons remains the same


## Resulting organization of the Periodic Table



## Answer the questions below by circling the number of the correct response

1. Which element has the smallest atomic radius? (1) $\mathrm{Mg}(2) \mathrm{Ca}$ (3) Sr (4) Ba
2. As one proceeds from lithium to fluorine in the Periodic Table, the tendency for the elements to be oxidized (1) decreases,
(2) increases, (3) remains the same
3. Which ion has the smallest radius? (1) $\mathrm{K}^{+}$
(2) $\mathrm{Na}^{+}$
(4) $\mathrm{Al}^{+3}$ $\mathrm{Mg}^{+2}$
4. As the elements in Period 3 are considered from left to right, the ability of each successive element to act as a reducing agent (1) decreases, (2) increases, (3) remains the same
5. The element with the most metallic character in Group 16 (VIA) is (1) O , (2) S , (3) Se , (4) Te
6. As the elements in Group 14 (IVA) are considered in order of increasing atomic number, the metallic properties of successive elements (1) decreases, (2) increases, (3) remains the same
7. In Period 3 of the Periodic Table, the element with the smallest atomic radius is in Group (1) 1 (2) 2 (3) 15 (4) 17
8. Which Group 2 (IIA) element has the greatest tendency to form ions? (1) calcium (2) barium (3) strontium (4) magnesium
9. Which Group in the Periodic Table contains atoms that form -2 ions? (1) 1 (IA) (2) 2 (IIA) (3) 16 (VIA) (4) 17 (VIIA)
10. The elements in Group 2 (IIA) have similar chemical properties primarily because they have the same (1) ionization energies, (2) oxidation potentials, (3) number of principal energy levels, (4) number of electrons in the outermost shell
11. As one proceeds from left to right across Period 2 of the Periodic Table, the decrease in atomic radius is primarily due to an increase in the number of (1) orbitals, (2) protons, (3) neutrons, (4) principal energy levels
12. The most active metal in Period 4 of the Periodic Table is (1) Fe , (2) Sc , (3) K , (4) Ca .
13. In Period 3, as the atomic numbers increase, the pattern according to which the properties of the elements change is
(1) metal $\rightarrow$ metalloid $\rightarrow$ nonmetal $\rightarrow$ noble gas
(3) metal $\rightarrow$ nonmetal $\rightarrow$ noble gas $\rightarrow$ metalloid
(2) nonmetal $\rightarrow$ metalloid $\rightarrow$ metal $\rightarrow$ noble gas
(4) nonmetal $\rightarrow$ metal $\rightarrow$ noble gas $\rightarrow$ metalloid
14. In going down the Group 15 (VA) elements on the Periodic Table, the metallic properties of the elements (1) decrease, (2) increase, (3) remain the same
15. As one proceeds from left to right across Period 3 of the Periodic Table, there is a decrease in
(1) ionization energy
(3) metallic characteristics
(2) electronegativity
(4) valence electrons
16. As one proceeds from fluorine to astatine in Group 17, the electronegativity (1) decreases and the atomic radius increases,
(2) decreases and the atomic radius decreases, (3) increases and the atomic radius decreases, (4) increases and the atomic radius increases.
17. As the elements in Period 3 are considered in order of increasing atomic number, the number of principal energy levels in each successive element (1) decreases, (2) increases, (3) remains the same
18. If the elements are considered from top to bottom in Group 17 (VIIA), the number of electrons in the outermost shell will (1) decrease, (2) increase, (3) remain the same
19. Which represents the correct order of activity for the Group 17 (VIIA) elements [> means greater than]
(1) bromine $>$ iodine $>$ fluorine $>$ chlorine
(2) fluorine $>$ chlorine $>$ bromine $>$ iodine
(3) iodine $>$ bromine $>$ chlorine $>$ fluorine
(4) fluorine $>$ bromine $>$ chlorine $>$ iodine
20. Which is most characteristic of metals with very low ionization energies? (1) they are very reactive (2) they have a small atomic radius (3) they form covalent bonds (4) they have a high electronegativity
21. Metallic elements usually possess
(1) low electronegativities and high ionization energies
(2) high electronegativities and low ionization energies
(3) high electronegativities and high ionization energies
(4) low electronegativities and low ionization energies
22. If the members of the halogen family are arranged in order of increasing electronegativity, they are also arranged in order of increasing (1) ionization energy, (2) atomic radius, (3) atomic mass, (4) nuclear charge
23. As the elements are considered from top to bottom in Group15 (VA) of the Periodic Table, the ionization energy (1) decreases, (2) increases, (3) remains the same
24. An element that has both a high ionization energy and a high electronegativity is most likely a (1) metal (2) metalloid
(3) nonmetal
(4) noble gas
25. The element with the lowest first ionization energy in any given Period will always belong to Group (1) 1 (IA) (2) 2 (IIA)
(3) 17 (VIIA)
(4) 18 (0)
