

PS-3 PERIODICITY. The periodic table presents a pattern of chemical and physical properties of the elements based on the element's location on the periodic table. These properties are based on the electronic structure of the atoms and nuclear charge.

TS-3.1 History of the periodic table- A pattern of physical and chemical properties with the elements provides the basis for the periodic table

3.1.1 Explain how the first periodic table organized elements by mass and physical/chemical properties to predict the existence of unknown elements (Mendeleev)

3.1.2 Describe how the modern periodic law was developed using atomic number (Moseley)

TS-3.2 Modern periodic table arrangement- The periodic table contains groups of elements that share common properties and electronic structures

3.2.1 Describe how elements are classified as metals, nonmetals & metalloids based on properties and their position on the periodic table.

3.2.2 Identify periods & families on the periodic table by name, common properties and electron structure

Key Ideas: Valence shell/electrons, Lewis dot structures

TS-3.3 Explain how the following periodic table trends in properties can be inferred from the electron structure, nuclear charge and the effect of shielding by core electrons.

3.3.1 Describe the trends for atomic radius

3.3.2 Describe the trends for ionization energy

Key Idea: Successive ionization energies

3.3.3 Describe the trends for electronegativity

3.3.4 Describe the trends for ion radius

3.3.5 Describe the trends for electron affinity

3.3.6 Predict reactivity based on atomic properties (such as atomic size, electronegativity, and ionization energy), electron configuration, and the placement of the elements on the periodic table

3.3.7 Use the trends in periodic properties to compare and contrast specific elements based on their locations on the periodic table

Key Ideas: Effective nuclear charge (Z_{eff}), transition metals, Noble gases, acid/base properties of oxides