

OpenStax	Learning Outcomes
2.1	Explain atomic theory and how the structure of the atom was determined.
2.1	State the law of definite proportions.
2.1	Describe the statements of Dalton's Atomic Theory.
2.1	Explain which statements of Dalton's theory are no longer accurate and why.
2.1	State the law of conservation of mass.
2.1	Perform simple problems using the law of conservation of mass.
2.2	Explain how the cathode ray tube lead to the understanding of electrons.
2.2	Describe the mass to charge ratio of the electron.
2.2	Explain the measurement of the electron's charge using the Millikan's Oil Drop Experiment.
2.3	Describe Rutherford's gold foil experiment.
2.3	Interpret the Rutherford's gold foil experiment results that lead to the conclusion that the nucleus exists as a small dense core.
2.3	Explain how the mass deficit lead to the proposal that neutrons exist.
2.3	Describe the structure of an atom and its components.
2.3	Define the atomic mass unit in terms of the mass of a carbon atom.
2.3	Compare the relative mass and charge of the subatomic particles.
2.3	Define atomic number.
2.3	Describe the relationship between the atomic number and the number of protons.
2.3	Determine the atomic number for an element using the periodic table.
2.3	Compare properties of isotopes.
2.3	Define isotope.
2.3	Define mass number.
2.3	Symbolize isotopes using chemical symbols, mass number, and atomic number.
2.3	Determine the number of protons, neutrons, and electrons in an atom given the isotopic symbol.
2.3	Construct the isotope symbol for atoms.
2.3	Use isotopic masses and natural abundance in calculations.
2.3	Define natural abundance.
2.3	Locate the average atomic mass of an element on the periodic table.
2.3	Calculate the average atomic mass of an element given abundance and isotope masses.
2.3	Calculate the relative abundance of isotopes of an element.
2.3	Recognize the difference among the terms "atomic number", "mass number", and "atomic mass".
21.3	Describe types of radioactive decay.
21.3	Identify alpha, beta, and gamma particles.
2.3	Describe characteristics of cations and anions.
2.3	Define cation and anion.
2.3	Determine the number of protons and electrons in an ion.
2.3	Determine the charge of an ion given the number of protons and electrons.
2.3	Construct the isotope symbol for ions.
2.4	Express chemical compounds using empirical, molecular and structural formulas.
2.4	Differentiate between atomic and molecular elements.
2.5	Describe features of the periodic table based on its layout.
2.5	Memorize the names and symbols of elements indicated on "Concepts to Memorize" sheet.
2.5	Recall that periods are horizontal rows in the periodic table.
2.5	Recall that groups are vertical columns in the periodic table.
2.5	Use the periodic table to classify elements as main-group elements or transition elements.
2.5	Locate noble gases, alkali metals, alkaline earth metals and halogens on the periodic table.
2.5	Use the periodic table to classify elements as metal, nonmetal, metalloid, transition metal, lanthanide or actinide.

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2.6	Distinguish between molecular and ionic compounds.	
2.6		Recall that ionic bonds generally occur between metals and nonmetal.
2.6		Recall that covalent bonds general occur between nonmetals.
2.6	Identify characteristics of monatomic and polyatomic ions.	
2.6		Use the periodic table to predict the common charge of main group elements.
2.6		Memorize polyatomic ions and charges.
2.6		Recall the formula of the hydronium ion (H_3O^+ , also shown as H^+).
2.7	Write formulas and names for compounds.	
2.7		Construct chemical formulas for ionic compounds from the known charges of the ions.
2.7		Construct chemical formulas for ionic compounds from the name of the compound.
2.7		Name ionic compounds from the chemical formula.
2.7		Name covalent compounds from the chemical formula.
2.7		Construct a chemical formula of covalent compounds given the name.
2.7		Name binary acids and provide formula from the name.
2.7		Distinguish between binary acids and oxyacids (also called oxoacids).