Ethiopia School Private Channel
Chemistry

Structure of Atoms

Grade 9 unit 1

Old

100 multiple-choice questions

Atomic Theory and History

1. The concept of the atom as indivisible particles was first proposed by: a) John Dalton b) Aristotle c) Democritus d) J.J. Thomson
2. The word "atom" comes from the Greek word "atomos," which means: a) Small particle b) Continuous c) Uncuttable or indivisible d) Solid sphere
3. Which Greek philosopher believed that matter was continuous and infinitely divisible? a) Democritus b) John Dalton c) Aristotle d) J.J. Thomson
4. Who is often referred to as the father of modern atomic theory? a) Democritus b) Aristotle c) J.J. Thomson d) John Dalton
5. Dalton's atomic theory was based on: a) Philosophical reasoning b) Scientific experimental observations and logical laws c) Ancient Greek beliefs d) The discovery of subatomic particles
6. Dalton's atomic theory was developed in: a) 1700s b) early 1800s c) late 1800s d) 1900s
7. One of the postulates of Dalton's atomic theory states that: a) Atoms are divisible b) Atoms of the same element may have different masses c) All atoms of a given element are identical in mass and properties d) Atoms are created and destroyed in chemical reactions
8. Which of the following is NOT a law of chemical combination that Dalton's theory is based on? a) The law of conservation of mass b) The law of definite proportions c) The law of multiple proportions d) The law of thermodynamics
9. According to the law of conservation of mass: a) Matter is created in a chemical reaction. b) Matter is destroyed in a chemical reaction. c) Matter is neither created nor destroyed. d) Reactants have less mass than the products.
10. The law of definite proportions states that: a) The mass of reactants equals the mass of products. b) Two different compounds can be formed from the same elements. c) A pure compound always contains the same elements combined in a definite ratio by mass. d) The masses of one element in different compounds are in whole number ratios.
11. According to the law of multiple proportions: a) The mass of reactants equals the mass of products. b) A pure compound always contains the same elements combined in a definite ratio by mass. c) When two different compounds are formed from the same elements, the masses of one element in

the two compounds, compared to a given mass of the other element, is in a small whole-number ratio. d) Atoms of the same element are identical.

12. Which of Dalton's postulates has been proven incorrect by later work? a) All elements are made of atoms. b) Atoms are neither created nor destroyed. c) Compounds are formed when atoms combine. d) Atoms are indivisible and indestructible.
13. What was discovered towards the end of the 19th century that led to modifications of Dalton's Atomic Theory? a) The existence of atoms b) The law of conservation of mass c) Subatomic particles and isotopes d) The nucleus
14. Which of the following is a part of the modern atomic theory but NOT of Dalton's atomic theory? a) Atoms are the smallest particles of an element b) Atoms of the same element have identical chemical properties c) Atoms of the same element may have different masses d) Atoms of different elements have different chemical properties

Subatomic Particles and Nucleus

15. The three fundamental subatomic particles are: a) Alpha, beta, and gamma particles b) Ions, molecules, and compounds c) Electrons, protons, and neutrons d) Nucleus, shell, and orbital
16. Who discovered the electron? a) Rutherford b) Dalton c) J.J. Thomson d) Millikan
17. Cathode rays are: a) Positively charged b) Negatively charged c) Neutral d) A type of radiation
18. Cathode rays are deflected towards the _____ plate in an electric field. a) Negative b) Positive c) Neutral d) No deflection
19. What did J.J. Thomson determine about the charge-to-mass ratio of an electron? a) It depends on the gas in the discharge tube b) It depends on the cathode material c) It's a constant value of 1.76 x 10^8 coulomb/g d) It is a different value for each element
20. Which experiment was used to determine the charge of an electron? a) Cathode ray tube experiment b) Millikan’s oil drop experiment c) Rutherford's gold foil experiment d) Thomson's plum pudding model
21. The charge of an electron is approximately: a) 1.76 × 10^8 coulombs b) 9.11 × 10^-31 kg c) 1.60 × 10^-19 coulombs d) 1.673 × 10^-27 kg

22. The mass of an electron is approximately: a) 1.60 × 10^-19 coulombs b) 9.11 × 10^-31 kg c) 1.673 × 10^-27 kg d) 1.675 × 10^-24 g
23. Who discovered X-rays? a) Antoine Becquerel b) Wilhelm Röntgen c) Marie Curie d) James Chadwick
24. What is radioactivity? a) The emission of X-rays b) The study of fluorescent substances c) The spontaneous emission of particles and/or radiation by certain elements d) The process of nuclear fusion
25. Which of the following is not a type of radioactive emission? a) Alpha rays b) Beta rays c) X-rays d) Gamma rays
26. Which type of radioactive emission consists of positively charged particles? a) Beta rays b) Alpha rays c) Gamma rays d) X-rays
27. Which type of radioactive emission is composed of electrons of nuclear origin? a) Alpha rays b) Beta rays c) Gamma rays d) X-rays
28. Gamma rays are similar to which other type of ray? a) Alpha rays b) Beta rays c) X-rays d) Cathode rays
29. Who conducted the gold foil experiment? a) J.J. Thomson b) Niels Bohr c) Ernest Rutherford d) James Chadwick
30. What did Rutherford expect to observe in the gold foil experiment? a) Alpha particles deflected at wide angles. b) Alpha particles passing straight through with slight deflection c) Alpha particles not passing through the gold foil d) No deflection at all
31. What was the unexpected result of the gold foil experiment? a) All alpha particles passed through undeflected. b) Some alpha particles were deflected at large angles. c) No alpha particles passed through the gold foil. d) No deflection at all
32. The gold foil experiment led to the discovery of the: a) Electron b) Neutron c) Nucleus d) Proton
33. According to Rutherford, most of the space in an atom is: a) Occupied by electrons b) Occupied by protons c) Empty d) Occupied by neutrons
34. According to Rutherford, the nucleus is: a) Negatively charged b) Positively charged c) Neutral d) Very large
35. Rutherford's model compared the atom to: a) A plum pudding b) The solar system c) A billiard ball d) A chocolate chip ice cream
36. Which subatomic particle was discovered by James Chadwick? a) Electron b) Proton c) Neutron d) Alpha particle
37. Neutrons have a mass approximately equal to that of: a) An electron b) A proton c) An alpha particle d) A beta particle

Atomic Structure and Isotopes

38. The charge of a proton is: a) Negative b) Positive c) Neutral d) Variable
39. Atoms are electrically neutral because they contain: a) Only neutrons b) Equal numbers of protons and electrons c) Only protons d) More electrons than protons
40. Most of the mass of an atom is concentrated in the: a) Electrons b) Nucleus c) Orbitals d) Empty space
41. The atomic number (Z) of an element is equal to the number of: a) Neutrons in the nucleus b) Electrons in a neutral atom c) Protons in the nucleus d) Protons plus neutrons in the nucleus
42. The mass number (A) of an atom is equal to: a) The number of protons b) The number of neutrons c) The sum of protons and neutrons d) The number of electrons
43. The number of neutrons in an atom is calculated by: a) Adding the atomic number and mass number b) Multiplying the atomic number and mass number c) Subtracting the atomic number from the mass number d) Dividing the mass number by the atomic number
44. Which of the following represents the correct notation for mass number (A) and atomic number (Z)? a) A to the right of Z b) Z as a superscript, A as a subscript c) A as a superscript, Z as a subscript d) Z to the right of A
45. What does the symbol 24/12 Mg represent? a) Magnesium with 24 protons and 12 neutrons b) Magnesium with 12 protons and 24 neutrons c) Magnesium with 12 protons and a mass number of 24 d) Magnesium with 12 electrons and a mass number of 24
46. Atoms of the same element with different numbers of neutrons are called: a) Ions b) Molecules c) Isotopes d) Allotropes
47. Which of these is NOT an isotope of hydrogen? a) Protium b) Deuterium c) Tritium d) Oxygen-16
48. Isotopes of an element have: a) Different atomic numbers b) Different numbers of protons c) The same number of protons and electrons but different numbers of neutrons d) Different chemical properties
49. What is the standard used to set up a relative scale of atomic mass? a) Hydrogen-1 b) Oxygen-16 c) Carbon-12 d) Magnesium-24
50. One atomic mass unit (a.m.u.) is defined as: a) The mass of a hydrogen atom b) The mass of a proton c) 1/12 the mass of a carbon-12 atom d) The mass of an electron

51. The atomic mass of an element is determined by: a) Adding up the mass of all isotopes b) Multiplying the mass of all isotopes c) Comparing it with the mass of carbon-12 d) Using the mass of the most abundant isotope
52. What is the term for the weighted average of the atomic masses of the naturally occurring isotopes of an element? a) Isotopic mass b) Average atomic mass c) Relative atomic mass d) Mass number
53. How is average atomic mass calculated? a) By adding the mass numbers of the isotopes b) By dividing the mass numbers of the isotopes c) By summing up the products of relative atomic mass and percentage abundance of each isotope and dividing by 100. d) By averaging the mass of the most abundant isotope

Atomic Models

54. Which of the following is NOT an atomic model discussed in the sources? a) Dalton’s model b) Thomson’s model c) Rutherford’s model d) Chadwick's model
55. Dalton's atomic model is also known as the: a) Plum pudding model b) Planetary model c) Billiard ball model d) Quantum mechanical model
56. In Thomson’s model, electrons are embedded in a: a) Neutral sphere b) Positively charged sphere c) Negatively charged sphere d) Empty space
57. Thomson’s atomic model is also known as the: a) Planetary model b) Billiard ball model c) Plum-pudding model d) Quantum mechanical model
58. Rutherford's model of the atom proposed that: a) Electrons are evenly spread throughout the atom b) Electrons move in fixed orbits around the nucleus. c) The atom has a small, dense, positively charged nucleus. d) Atoms are solid, indestructible spheres
59. Rutherford's model is also referred to as the: a) Plum pudding model b) Nuclear or Planetary model c) Billiard ball model d) Quantum mechanical model
60. What was the main drawback of Rutherford’s model? a) It did not explain the nature of electrons b) It did not explain the nucleus c) It did not explain how electrons were arranged outside the nucleus d) It did not explain subatomic particles
61. Which scientist proposed that electrons move around the nucleus in specific circular paths (orbits)? a) J.J. Thomson b) Niels Bohr c) Ernest Rutherford d) James Chadwick

62. Bohr’s atomic model proposed that electrons move around the nucleus in: a) Random patterns b) Elliptical paths c) Circular paths called orbits d) Irregular paths
63. In Bohr's model, electrons can exist only in restricted numbers of stable orbits called: a) Orbitals b) Energy levels or shells c) Sublevels d) Nuclei
64. What does the principal quantum number (n) represent in Bohr's model? a) The number of neutrons b) The charge of an electron c) The energy level or shell d) The shape of an orbital
65. Which letters represent the first three energy levels in Bohr's model? a) a, b, c b) s, p, d c) K, L, M d) 1, 2, 3
66. What is the maximum number of electrons that can occupy the first energy level (n=1) according to Bohr’s model? a) 4 b) 2 c) 8 d) 18
67. What is the maximum number of electrons that can occupy the second energy level (n=2) according to Bohr’s model? a) 2 b) 4 c) 8 d) 18
68. What is the maximum number of electrons that can occupy the third energy level (n=3) according to Bohr’s model? a) 2 b) 8 c) 18 d) 32
69. According to the Bohr model, the outermost shell of an atom cannot accommodate more than how many electrons? a) 2 b) 18 c) 32 d) 8
70. According to the Bohr model, electrons first occupy the: a) Shell with highest energy b) Shell with lowest energy c) Outermost shell d) Innermost shell
71. Which model describes electrons in terms of probability of being found in certain regions of space about the nucleus? a) Bohr Model b) Rutherford Model c) Quantum Mechanical Model d) Thomson Model
72. In the quantum mechanical model, regions of space where the probability of finding an electron is maximum are called: a) Shells b) Orbitals c) Energy levels d) Sublevels
73. In the quantum mechanical model, energy levels are described by the: a) Sublevel b) Principal quantum number (n) c) Orbital d) Electron configuration
74. What are the four types of sublevels in the quantum mechanical model? a) K, L, M, N b) s, p, d, f c) 1, 2, 3, 4 d) Alpha, beta, gamma, delta
75. The number of sublevels within each energy level or shell is equal to the numerical value of: a) Atomic number (Z) b) Mass number (A) c) Principal quantum number (n) d) Number of neutrons
76. How many orbitals are in an s-sublevel? a) 2 b) 3 c) 1 d) 5
77. How many orbitals are in a p-sublevel? a) 1 b) 3 c) 5 d) 7
78. How many electrons can a single orbital hold? a) 1 b) 2 c) 3 d) 4

79. How many electrons can a p-sublevel hold? a) 2 b) 3 c) 6 d) 10
80. How many electrons can a d-sublevel hold? a) 2 b) 6 c) 10 d) 14
81. How many electrons can an f-sublevel hold? a) 2 b) 6 c) 10 d) 14
82. What is the term for the arrangement of electrons in an atom? a) Orbital diagram b) Electron configuration c) Sublevel diagram d) Energy level diagram
83. What is the lowest energy arrangement of the electrons in an atom called? a) Excited state b) Ground state electron configuration c) Valence state d) Transition state
84. What does the coefficient in the quantum mechanical model's notation represent (e.g. in 1s2)? a) The number of electrons in the sublevel b) The main energy level c) The shape of the orbital d) The sublevel
85. What does the letter in the quantum mechanical model's notation represent (e.g. in 1s2)? a) The number of electrons in the sublevel b) The main energy level c) The sublevel that an electron occupies d) The number of the shell
86. What does the superscript in the quantum mechanical model's notation represent (e.g. in 1s2)? a) The main energy level b) The sublevel c) The number of electrons in that particular sublevel d) The number of protons
87. According to the Aufbau principle, electrons fill orbitals in order of: a) Decreasing energy b) Increasing energy c) Increasing atomic number d) Increasing mass number
88. Which sublevel is filled before the 3d sublevel? a) 3p b) 4s c) 5s d) 4p
89. What is the term for the outermost occupied energy level of an atom? a) Core level b) Inner shell c) Valence shell d) Ground state
90. What are the electrons in the outermost energy level called? a) Core electrons b) Valence electrons c) Inner electrons d) Transition electrons
91. How do you write the electron configuration of an atom using a noble gas core? a) By using a random element's symbol to represent filled shells b) By using the symbol of a noble gas in brackets to represent filled inner electron shells c) By ignoring all the core electrons d) By only including the valence electrons

Key Concepts

92. What is the definition of an "atom"? a) A positively charged particle b) A negatively charged particle c) The smallest fundamental particle of an element d) A neutral subatomic particle

93. Which of the following defines an isotope? a) Atoms with the same number of neutrons b) Atoms with different numbers of protons c) Atoms of the same element with the same atomic number but different mass numbers d) Atoms with different numbers of electrons
94. What is the definition of the "nucleus"? a) The region surrounding an atom b) The small, dense, positively charged center of an atom c) A negatively charged particle within the atom d) The region where electrons orbit the atom
95. What is the definition of "radioactivity"? a) The process of nuclear fusion b) The emission of X-rays c) The spontaneous emission of particles and/or radiation by certain elements d) The creation of new elements
96. What is meant by the term "atomic mass"? a) The number of protons in an atom b) The sum of protons and neutrons in an atom c) The mass of an atom relative to the mass of carbon-12 d) The mass of an atom relative to the mass of hydrogen
97. What is meant by the term "valence electrons"? a) The electrons in the nucleus b) The electrons in the outermost occupied energy level of an atom c) The electrons in the innermost shell d) The electrons in the p-sublevel
98. What does "Aufbau principle" refer to? a) The principle of how electrons are emitted from the nucleus b) The principle governing how electrons fill energy levels and sublevels c) The principle explaining electron spin d) The principle governing the stability of the nucleus
99. What does the term "atomic model" refer to? a) A real, physical representation of an atom b) A tentative mental picture of the atomic concept c) A method of creating new atoms d) The actual size of an atom
100. Which of the following is NOT a fundamental subatomic particle? a) Proton b) Alpha particle c) Neutron d) Electron