

Multiple Choice.

1. Tap water is best classified as a
a. heterogeneous mixture. b. homogeneous mixture. c. pure substance. d. pure compound.
2. Which of the following lists include one or more wrong evidence of a chemical change?
a. bubbles, ppt, change in temp b. new colour, new odour, light produced
c. change in state/phase, dissolving, heat produced d. heat produced, heat lost, fire produced
3. The scientist credited with determining the identity of an element by knowing the number of positive charges was:
a. Ernest Rutherford. b. Dmitri Mendeleev. c. J.J. Thomson. d. Henry Moseley.
4. Which of the following incorrectly matches the atomic model with the scientist that suggested it?
a. Dalton - billiard ball model
b. Rutherford - nuclear model
c. Bohr - Raisin Bun (or Plum Pudding) Model
d. Nakoka - Saturn model
5. According to modern atomic theory, the number of occupied energy levels in an atom of lead is
a. 2 b. 4 c. 6 d. 14
6. According to restricted Quantum Mechanics Theory (electrons exist in energy levels), an atom has an electron energy level distribution of 2e-, 8e-, 8e-, 2e-. The symbol for the particle is
a. Ca b. Ca²⁺ c. Ca²⁻ d. Ne.
7. Which of the following incorrectly matches the scientist with his contribution to the development of atomic theory?
a. Chadwick - neutrons b. Thomson - electrons c. Moseley - electron orbits d. Rutherford - nucleus.
8. Bohr was the first to suggest that elements start a new period because elements in the last column on the periodic table
a. have a full valence level. b. have an equal number of protons and electrons. c. become gases at SATP.
d. have an even number of electrons.
9. An entity with 18 e- and a net charge of 3+ is represented by
a. Sc³⁺ b. P³⁺ c. P³⁻ d. Ar³⁺
10. Which of the following correctly shows the atomic number, mass number, number of neutrons, and number of electrons (in that order) for the chlorine-37 isotope.
a. 37, 17, 37, 37 b. 17, 35.45, 20, 17 c. 17, 37, 20, 17 d. 17, 35.45, 18, 17
11. All atomic masses of the elements are measured using the unit known as the atomic mass unit (amu). An amu is based on and properly defined as
a. the mass of a carbon atom. b. 1/12 of the mass of a carbon atom. c. the mass of 12 hydrogen atoms.
d. the mass of 12 hydrogen atoms.
12. Which of the following is not a definition of an isotope?
a. atoms with the same atomic number but different mass number
b. atoms with the same number of protons but different number of neutrons
c. atoms of the same element with different atomic mass
d. atoms of the same element with radioactive properties
e. atoms of the same element with different number of neutrons
13. In any atom, there will always be the same number of which of the following subatomic particles?
a. **p, e** b. **p, n** c. p, n, e d. n, e
14. The first (principal) quantum number best describes which characteristic of the electron?
a. velocity b. spin c. orbital d. energy level
15. Which of the following is the information about the location of an electron that indicates the shape of its cloud?
a. velocity b. spin c. orbital d. energy level
16. A completely filled third energy level of an atom would contain how many electrons?
a. 8 b. 14 c. 18 d. 32
17. Which of the following is the correct electron configuration for an atom with 34 electrons?
a. 1s²2s²2p⁶3s²3p⁶3d¹⁰4s²4p⁴ b. 1s²2s²2p⁶3s²3p⁶4s²3d¹⁰4p⁶
c. 1s²2s²2p⁶3s²3p⁶4s²4p⁴3d¹⁰ d. 1s²2s²2p⁶3s²3p⁶4s²3d¹⁰4p⁴

III. Short Answer.

1. For each of the following, fill in the blanks for the atomic number (Z), mass number (A), number of neutrons, and number of electrons

a. sodium-22 atom _____ b. uranium-238 atom _____.

2. Complete the following table re name, relative mass, and relative charge of the 3 main subatomic particles.

Subatomic particle name	Mass (amu)	Charge (+, 0, or -)	Inside or Outside Nucleus

2. Complete the following chart.

Atom/Ion	p	e	n	Z	A	charge
magnesium ion		10	14	12		
phosphide					31	3-
		53	74			0
	16				32	2-
	14	10			30	

4. Write the chemical symbol (e.g. Al^{3+} ; O^{2-}) and the chemical name (e.g. aluminum ion; oxide ion) for the following:

a. a particle with 54 e⁻ and a net charge of 2+ symbol: _____ name: _____

b. a particle with 10 e⁻ and a net charge of 2- symbol: _____ name: _____

5. a. What is the ending e-configuration for any element in group 13 on the periodic table? _____

b. Any element with an ending e-configuration of d^7 will be in what group of the periodic table? _____

c. What is the symbol of the element that has an ending e-configuration of $4p^5$? _____

6. Write the electron configuration for each of the following elements:

a. N (Z = 7) _____

b. K (Z=19) _____

c. Mo (Z = 42) _____

7. In a certain atom, the first, second, and third energy levels are totally filled. In the fourth level, the s sublevel is filled, and the p sublevel has only 2 electrons. All other sublevels are empty.

a. Write the electron configuration. _____

b. Write the symbol of the element. _____

8. Show the orbital filling diagram (groups of boxes for sublevels and orbitals) for the elements:

a. Cl ($Z = 17$)

b. nickel ($Z = 28$)