

Atomic Theory and Structure Review

1. Because any metal cathode used in a cathode-ray tube produces the same charged particles, it was concluded that all atoms contain _____.
 - a. positive particles (protons).
 - b. negative particles (electrons).
 - c. neutral particles (neutrons).
2. Dalton's atomic theory helped to explain the law of conservation of mass because it stated that atoms
 - a. are indivisible.
 - b. all have the same mass.
 - c. cannot be created or destroyed.
3. The basic principles of atomic theory were first conceived by
 - a. Avogadro.
 - b. Bohr.
 - c. Dalton.
4. The law of multiple proportions is demonstrated by the compounds
 - a. FeCl_3 and $\text{Fe}(\text{SO}_4)_3$.
 - b. O_2 and O_3 .
 - c. CO and CO_2 .
5. Neutral atoms of the same element can differ in
 - a. mass number.
 - b. atomic number.
 - c. number of protons and electrons.
6. The discovery of the nucleus was a result of Rutherford's observation that a small percentage of the positively charged particles bombarding the metal's surface
 - a. were deflected back toward the source.
 - b. passed straight through the metal.
 - c. combined with the metal.
7. Calcium is located in period number _____ and group number _____

8. The relative masses of a _____ and _____ are both 1 amu.
9. Group number _____ is known as the Alkaline Earth metals.
10. Calculate the average atomic mass of lithium, which occurs as two isotopes that have the following atomic masses and abundances in nature: Li-6, 7.30% and Li-7, 92.70%. Don't forget the units (amu)
11. Draw the Bohr model for Magnesium on a scrap piece of paper. Tell if it is stable or unstable. Reactive or non-reactive.
12. Epsoms salt has a chemical formula of MgSO_4 . It is a white, crystalline solid that melts at $1,124^\circ\text{C}$ and conducts electricity in the dissolved state. Based on these characteristics this compound would be classified as a _____ solid.
13. Uranium-235 (U-235) is used as fuel for nuclear power plants and reactors. What are the number of protons and neutrons found in the nucleus of these atoms.
14. If a particular compound is composed of elements A and B, the ratio of the mass of B to the mass of A will always be the same. This is a statement of the law of _____.
15. The smallest particle of an element that retains the chemical properties of that element is a(n) _____.

16. Atoms of one element that have different masses are called _____.

17. Identify each of the following as Aufbau, Pauli Exclusion or Hund's Rule:

a. No two electrons can have the exact same set of four quantum numbers.

b. Electrons at equal energy sublevels must first fill those levels separately before doubling up.

c. Electrons must first fill the lowest energy states possible.

18. The total number of protons and neutrons in the nucleus of an isotope is called its _____ number.

19. The number of protons in the nucleus of an element is called its _____ number.

20. Give the most common ionic symbol and name for Chlorine.
_____.

PART III Complete the following table to compare the types of subatomic particles.

Particle	Mass number/unit	Relative charge	Location
21. Proton			
22. Electron			
23. Neutron			

24. The atomic number of Cobalt-60 is 27. How many neutrons does this isotope

have?

25. Nitrogen-15 has 7 neutrons. What is the atomic number of Nitrogen-15?
26. A neutral atom of sulfur-32 contains 16 protons. How many electrons does it have?
27. Write the Noble gas configuration for Phosphorus.
28. Explain why the atomic mass of a particular isotope of an element differs from the average atomic mass of that element.
29. Oxygen has three naturally occurring isotopes in the following proportions: oxygen-16, 99.762%; oxygen-17, 0.038000%; oxygen-18, 0.20000%. What is the average atomic mass of oxygen? Don't forget the units (amu)