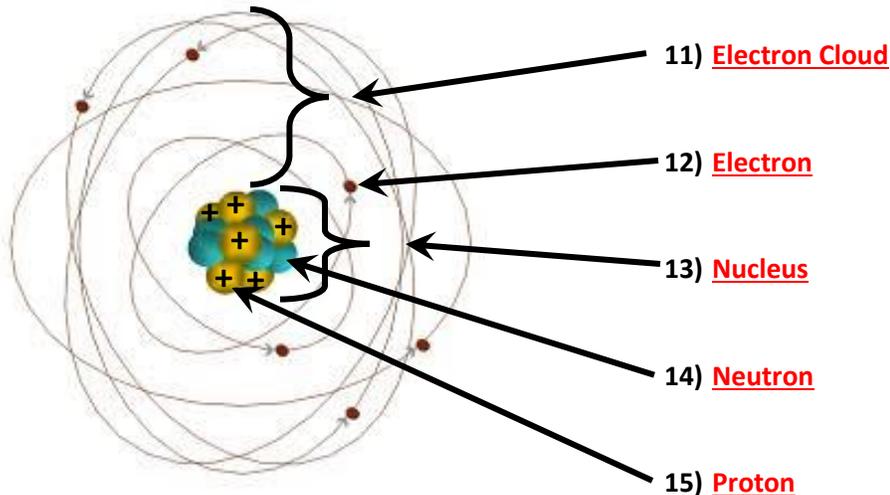


Atoms Study Guide

VOCAB – Match each term with its definition by drawing a line between them.

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|-------------------|--|
| 1) Atom | - a negatively charged (-) particle that occupies the space in an atom outside the nucleus |
| 2) Element | - a positively charged (+) particle in the nucleus of an atom |
| 3) Electron | - a substance made of only one kind of atom |
| 4) Nucleus | - the region at the center of an atom that contains most of the mass of the atom |
| 5) Proton | - a small particle that is the building block of matter |
| 6) Atomic Number | - an uncharged (\emptyset) particle in the nucleus of an atom |
| 7) Neutron | - the number of protons in the nucleus of an atom of an element |
| 8) Electron Cloud | - atoms of an element with the same number of protons but a different number of neutrons |
| 9) Isotope | - an atom that has a charge because it has gained or lost electrons |
| 10) Ion | - the region surrounding an atom's nucleus where electrons are most likely to be found |

DIAGRAM – Use the diagram to identify the parts of the atom based on the modern electron cloud model.



SUB-ATOMIC PARTICLES – Identify whether each statement refers to electrons (“e”), protons (“p”), or neutrons (“n”) by writing the corresponding letter on the line.

- 16) e the only sub-atomic particle that is NOT found in the nucleus
- 17) n the only sub-atomic particle that does NOT have a charge
- 18) n the last sub-atomic particle discovered when James Chadwick explained the “extra” mass in atoms
- 19) p has a positive charge
- 20) e first sub-atomic particle discovered when JJ Thomson bent the beam in a cathode ray tube with a magnet
- 21) p discovered by Ernest Rutherford when he realized alpha particles were hydrogen nuclei
- 22) e by far the LEAST massive of the sub-atomic particles
- 23) e has a negative charge
- 24) n has the same mass as a proton
- 25) p determines the type of atom, or the element

ELEMENTS – Use the information provided about each element to answer the questions below.

boron 5 B 10.811	carbon 6 C 12.011	nitrogen 7 N 14.007	oxygen 8 O 15.999	fluorine 9 F 18.998	neon 10 Ne 20.180
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- 26) What makes a carbon atom different from a nitrogen atom? **Carbon has 6 protons & nitrogen has 7 protons**
- 27) Which of the elements shown above has the most particles in its nucleus? **Neon has an average of 20 particles in its nucleus**
- 28) How many protons are in the nucleus of a fluorine atom? **9**
- 29) What is boron's atomic mass? **10.811**
- 30) What is the atomic number for oxygen? **8**
- 31) Carbon¹² has 6 neutrons, carbon¹³ has 7 neutrons, and carbon¹⁴ has 8 neutrons. What is the term for these atoms? **Isotopes – atoms of the same element with different numbers of neutrons**
- 32) Sometimes a fluorine atom will gain a tenth electron, causing it to have a negative charge. What is the term for this type of atom? **Ion – a charged atom (due to gaining or losing electrons)**

HISTORY – Provide a short answer for each question about the history of atomic theory.

- 33) The modern word, "atom", comes from the latin word, "atomos", used by Democritus to describe the smallest individual particle of matter. What does "atomos" mean?
"atomos" means "UNCUTTABLE"
- 34) What sub-atomic particle did JJ Thomson discover when he placed the negative end of a magnet next to a cathode ray tube and observed the beam repel away from the magnet?
electron
- 35) Inspired by the Sun at the center of the solar system, what feature of an atom was first proposed by Hantaro Nagaoka and later confirmed by Ernest Rutherford's alpha-particle cannon & gold foil experiment (when some of the alpha particles bounced back)?
nucleus
- 36) Which sub-atomic particle was discovered by Ernest Rutherford when he realized that alpha particles are the nuclei of hydrogen atoms?
proton
- 37) Which sub-atomic particle was discovered by James Chadwick when he explained the existence of a third sub-atomic particle in the nucleus with the same mass as a proton?
neutron