

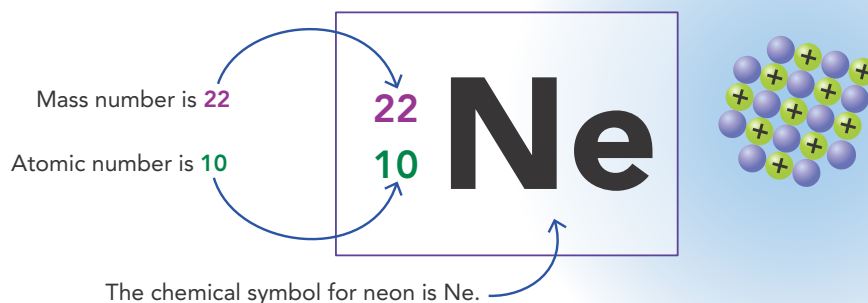
Grade 11 NTI Day #4 Chemistry

Assignment: Please read the excerpt as an independent reading assignment. Then read and answer the questions below the excerpt.

Mass Number

Most of the mass of an atom comes from protons and neutrons. The total number of protons plus neutrons in an atom is called the **mass number**. If you know the atomic number and mass number of an atom, then you can determine the number of neutrons in the atom.

Representing Atoms The composition of any atom can be represented in shorthand notation using the element's chemical symbol, **atomic number**, and **mass number**.

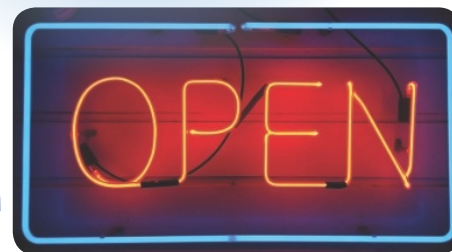


Neon-22 You can also represent atoms by using the name of the element and the mass number.

Mass Number and Neutrons You can calculate the number of neutrons from the atomic number and the mass number of an atom. For example, let's calculate the number of neutrons in neon.

$$\text{Number of neutrons} = \text{mass number} - \text{atomic number}$$

$$\text{Number of neutrons} = 22 - 10 = 12$$



Neon is one element in this sign. Such signs are often called neon signs, even if they contain other elements.

- 12 SEP Use Mathematics** Complete the table by identifying the atomic number and mass number for each atom and then using those data to determine the numbers of protons, neutrons, and electrons.

Composition of Atoms					
Atom	Atomic number	Mass number	Protons	Electrons	Neutrons
${}_{11}^{23}\text{Na}$					
${}_{16}^{32}\text{S}$					
silver-108	47				
gold-197	79				

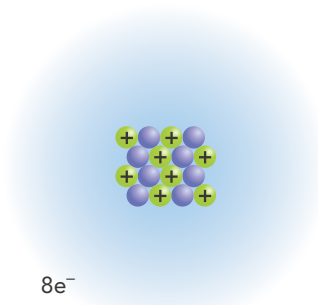
Isotopes

All atoms of an element have the same number of protons. However, atoms of the same element may have different numbers of neutrons. **Isotopes** are atoms that have the same number of protons but different numbers of neutrons. Since isotopes of an element have different numbers of neutrons, they also have different mass numbers.

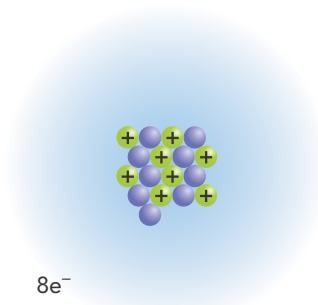


Sizes of Dogs Dogs come in a variety of sizes. The mass of each can be large or small, but they are all still dogs. Their DNA determines they are dogs.

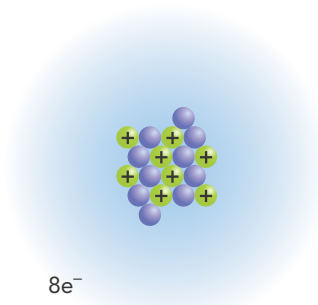
Isotopes of Oxygen Similarly, atoms may have different numbers of neutrons and different masses but still be the same type of atom. All three of these atoms are isotopes of oxygen. They have 8 protons, but different numbers of neutrons.



$^{16}_8\text{O}$
oxygen-16
+ 8 protons
● 8 neutrons
● 8 electrons



$^{17}_8\text{O}$
oxygen-17
+ 8 protons
● 9 neutrons
● 8 electrons



$^{18}_8\text{O}$
oxygen-18
+ 8 protons
● 10 neutrons
● 8 electrons

13 SEP Communicate Information How does the overall charge of oxygen-16 compare to the overall charge of oxygen-17 and oxygen-18? Use the models of isotopes to help explain your answer.

.....

.....

.....

Chemistry Assignment: Atomic Numbers, Mass Numbers, and Isotopes

1. What is the atomic number of an element?

- A) The number of neutrons in the atom
- B) The number of protons in the atom
- C) The total number of protons and neutrons
- D) The number of electrons in the atom

2. How can you calculate the number of neutrons in an atom?

- A) Subtract the number of electrons from the atomic number
- B) Add the number of protons and electrons
- C) Subtract the atomic number from the mass number
- D) Add the number of protons and neutrons

3. What does the mass number of an atom represent?

- A) The total number of protons and neutrons
- B) The total number of electrons and neutrons
- C) The total number of protons and electrons
- D) The number of neutrons in the nucleus

4. Which of the following statements about isotopes is true?

- A) Isotopes of an element have the same number of protons but different numbers of neutrons
- B) Isotopes of an element have the same mass number but different atomic numbers
- C) Isotopes of an element have different numbers of protons and neutrons
- D) Isotopes of an element have the same number of neutrons but different numbers of protons

5. How are oxygen-16, oxygen-17, and oxygen-18 different from one another?

- A) They have different numbers of protons
- B) They have different numbers of neutrons
- C) They have different atomic numbers
- D) They have different numbers of electrons