Grade 11 NTI Day #3 Chemistry

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

EXPERIENCE 2

Modeling Atoms

GO ONLINE to Explore and Explain the makeup and properties of atoms and isotopes.

Visualizing the Atom

Matter is made of particles, called atoms, that are too tiny to see without powerful microscopes. An atom is the smallest particle of an element that retains its identity in a chemical reaction. Atoms are extremely small. A single row of 100,000,000 copper atoms would produce a line only 1 cm long. Because of the creative experiments of many scientists, we know that atoms are made of even smaller particles called subatomic particles. **Protons** are positively charged subatomic particles. **Neutrons** are subatomic particles with no charge. **Electrons** are negatively charged subatomic particles. An electron cloud surrounds the **nucleus,** which is the dense central core made of protons and neutrons.

Diamond and Carbon Atoms
Diamonds are made of carbon atoms.

Nucleus
The nucleus is made of protons and neutrons. It accounts for most of an atom's mass. An atomic mass unit (amu) is the unit used to measure the mass of subatomic particles.

Electron Cloud
The electron cloud, where the electrons are found, takes up most of an atom's volume. It is mostly empty space.

Electron
Symbol: e^-
Charge: 1–
Mass: about 0.0005 amu

Proton
Symbol: p^+
Charge: 1+
Mass: about 1 amu

Neutron
Symbol: n^0
Charge: 0
Mass: about 1 amu

9 **CCC Scale, Proportion, and Quantity** Which subatomic particles account for most of an atom's mass and volume?

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Types of Atoms

Atomic Number An element is the simplest form of matter that has a unique set of properties. The number of pr)otons in an atom is what makes one element different from another. The number of protons in the nucleus of an atom is called an element's **atomic number.** For example, carbon has 6 protons and has an atomic number of 6.

Atoms are electrically neutral particles because they have no net charge.

Therefore, for an atom to be neutral, the number of protons (positively charged particles) must equal the number of electrons (negatively charged particles).

Helium The element helium is less dense than air, so it is used in balloons.
Atomic number: 2
Number of protons: 2
Number of electrons: 2

Silver The element silver is reflective and resists corrosion, so it is often used in jewelry.
Atomic number: 47
Number of protons: 47
Number of electrons: 47

10 **CCC Scale, Proportion, and Quantity** Identify the numbers of protons and electrons in fluorine and iodine.

The element **fluorine** helps prevent tooth decay and is found in many toothpastes.

Atomic number: 9

Number of protons: .....

Number of electrons: .....

The element **iodine** is often used to clean skin before surgery.

Atomic number: 53

Number of protons: .....

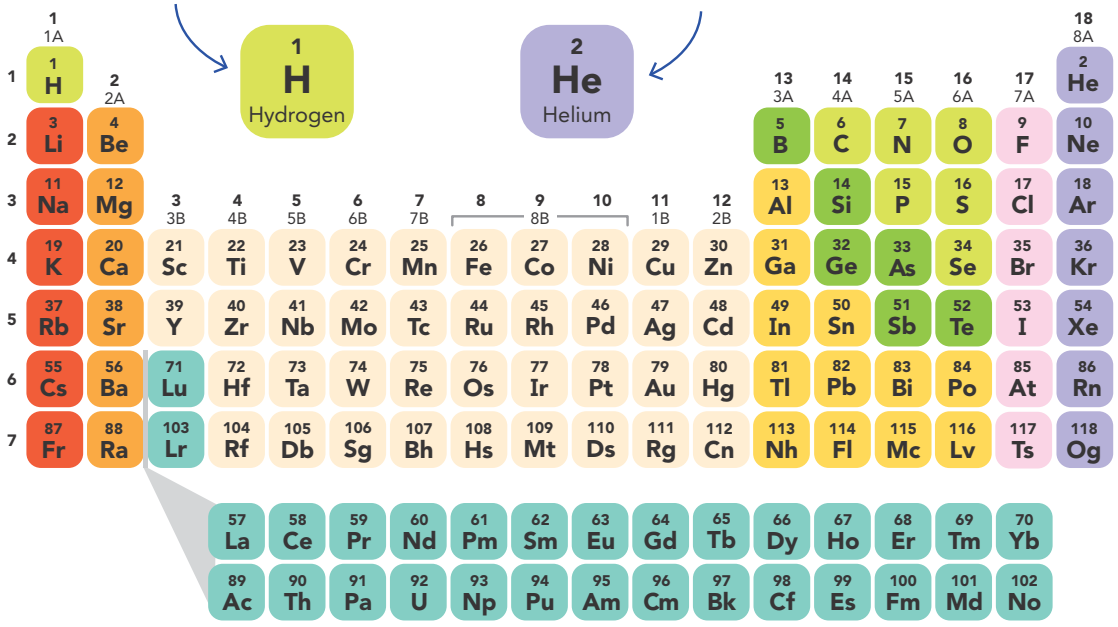
Number of electrons: .....

The Periodic Table There are 118 elements, all with different atomic numbers. They are organized into a table called a periodic table. A **periodic table** is an arrangement of elements in which the elements are separated into groups based on a set of repeating properties. The elements are listed in order from left to right and top to bottom by atomic number. The organization of the periodic table allows you to easily compare the properties of one element (or a group of elements) to another element (or group of elements). Elements above and below each other tend to have similar properties.

Chemical Symbols All elements have a name, but an element's name is often not convenient to use. Each element can be represented by a one- or two-letter chemical symbol. It is these chemical symbols that are used to represent the elements in the periodic table, as well as in chemical formulas for compounds. When writing the formula for a compound, you combine the symbols of the elements that make up the compound. For example, the chemical formula for water is H_2O.

Symbols With One Letter The symbol for hydrogen is H. Its atomic number is 1, so it is the first element in the periodic table.

Symbols With Two Letters The symbol for helium is He. The second letter in a symbol is always lowercase. Helium's atomic number is 2, so it is the second element in the periodic table.



11 **Infer** Based on the organization and colors in the periodic table, which two elements do you think are most similar in terms of their properties: magnesium (Mg), barium (Ba), and gold (Au)? Explain.

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Chemistry Assignment: Atomic Structure and the Periodic Table

1. What subatomic particle has a positive charge?

- A) Proton
- B) Neutron
- C) Electron
- D) Atom

2. Which of the following best describes an atomic nucleus?

- A) It contains only electrons
- B) It contains protons and neutrons and accounts for most of the atom's mass
- C) It is mostly empty space
- D) It is made of only neutrons

3. What is the charge of an electron?

- A) Positive
- B) Neutral
- C) Negative
- D) It has no charge

4. The atomic number of an element is determined by the number of:

- A) Neutrons in the nucleus
- B) Electrons in the electron cloud
- C) Protons in the nucleus
- D) Protons and neutrons combined

5. In the periodic table, what does each element's chemical symbol represent?

- A) The atomic mass of the element
- B) The atomic number of the element
- C) The name of the element in one or two letters
- D) The total number of protons and neutrons

6. Which of the following elements would have properties most similar to barium (Ba)?

- A) Magnesium (Mg)
- B) Gold (Au)
- C) Oxygen (O)
- D) Carbon (C)