

Seventh Grade “Atomic Structure” Assessment

1a. Protons, neutrons and _____ are the three parts of an atom.

1b. Which particles are in the nucleus of an atom?

- a. protons and electrons
- b. electrons and neutrons
- c. protons and neutrons
- d. protons and magnets

1c. List each of the three main subatomic particles, tell where each is located and the charge of each.

Particle	location	charge
_____	_____	_____
_____	_____	_____
_____	_____	_____

2a. A combination of two or more atoms held together by a force is:

- a. an element
- b. a molecule

2b. A combination of two or more atoms is a _____ or _____.

2c. Discuss the similarities and differences between compounds and molecules.

3a. The early Greeks believed everything was made out of earth, air, _____ and water.

3b. List the four early Greek elements:

3c. List the four early Greek elements and tell a possible example of something that might be made of each.

- 1. _____
- 2. _____
- 3. _____
- 4. _____

4a. Democritus said everything is made of _____.

- a. dirt
- b. atoms

4b. Democritus decided that everything is actually made of _____.

4c. Analyze Democritus' revolutionary theory of atoms and what this theory meant to the society of his day.

5a. If you have several atoms of the same type you can call them:

- a. an element
- b. a compound

5b. If you have a group of atoms all of the same kind, they are called:

- a. a compound
- b. a family
- c. an element
- d. a class

5c. What forms a pure element?

6a. Alchemy was the search for a process that would change ordinary things like lead into _____.

6b. What did Alchemists want to do? _____

6c. Why do we call Alchemy the ancestor of modern chemistry?

7a. Lavoisier discovered the role of _____ in chemical reactions.

- a. heat
- b. oxygen

7b. The scientist that discovered oxygen's role in chemical reactions was _____.

7c. Explain Lavoisier's role in the beginnings of modern chemistry:

- 8a. During a chemical reaction, matter is not lost or _____.
- 8b. During a chemical reaction, matter is not _____ or _____.
- 8c. How do chemical reactions demonstrate the Law of Conservation of Matter?

- 9a. Dalton said that every atom of a particular element is _____.
- a. alike
 - b. different
- 9b. Dalton determined that every atom of a particular element had the same _____.
- a. atomic weight
 - b. amount of electrons
 - c. charge
 - d. phase of matter
- 9c. Dalton determined several different groundbreaking theories about atoms. Give details of at least two.

- 10a. Mendeleev came up with the first version of the _____ Table.
- a. Tide
 - b. Periodic
- 10b. Who invented the first Periodic Table? _____
- 10c. Discuss the properties of atoms Mendeleev used to construct his first version of the Periodic Table and the changes that have been made to his version since.

- 11a. Mendeleev said that atoms have properties that repeat in patterns. This helped him put the atoms into _____.
- a. molecules
 - b. groups

11b. Mendeleev detailed the Periodic Law, which states that atoms have properties that _____ in Groups and Periods.

11c. Give examples of the Periodic properties of Mendeleev's Periodic Table.

12a. Niels Bohr said that electrons exist in different energy levels called _____.

12b. Niels Bohr realized that electrons exist in different _____ levels called _____.

12c. How many electrons in each of the first three electron shells of an atom? Which shell has the most and least amount of energy?

13a. The atomic number of an atom tells how many _____ it has.

- a. isotopes
- b. protons

13b. The atomic number of an atom also tells the number of _____ and/or _____.

13c. In an uncharged atom, what information can we gain just by knowing its atomic number?

14a. The atomic mass of an atom is the mass of the protons and the _____ combined.

- a. electrons
- b. neutrons

14b. The atomic mass of an atom is found by adding together the _____.

- a. protons and electrons
- b. protons and neutrons
- c. neutrons and electrons
- d. protons and nougat

14c. Explain how to find the atomic mass of an atom.

15a. An isotope is an atom with more or less _____ than normal.

15b. Give the definition of an isotope:

15c. Explain how isotopes are formed and the difference between stable and unstable isotopes.

The following Colorado Model Content Standards are addressed in this assessment by the questions indicated:

Questions 7c, 8b, 8c: Standard 1. Students understand the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations.

Questions 1a, 1b, 1c, 2a, 2b, 2c, 3a, 3b, 3c, 4a, 4b, 4c, 5a, 5b, 5c, 6a, 6b, 6c, 7a, 7b, 7c, 8a, 8b, 8c, 9a, 9b, 9c, 10a, 10b, 10c, 11a, 11b, 11c, 12a, 12b, 12c, 13a, 13b, 13c, 14a, 14b, 14c, 15a, 15b, 15c: Standard 2. Physical Science: Students know and understand common properties, forms, and changes in matter and energy.

Questions 2c, 3c, 4a, 4b, 4c: Standard 3. Life Science: Students know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment.

Questions 1a, 1b, 1c, 4a, 4b, 4c, 15a, 15b, 15c: Standard 4. Earth and Space Science: Students know and understand the processes and interactions of Earth's systems and the structure and dynamics of Earth and other objects in space.

Questions 3a, 3b, 3c, 4a, 4b, 4c, 6a, 6b, 6c, 7a, 7b, 7c, 8a, 8b, 8c, 9a, 9b, 9c, 10a, 10b, 10c: Standard 5. Students know and understand interrelationships among science, technology, and human activity and how they can affect the world.

Questions 2a, 2b, 2c, 3a, 3b, 3c, 6a, 6b, 6c, 8a, 8b, 8c: Standard 6. Students understand that science involves a particular way of knowing and understand common connections among scientific disciplines.

Answer Key

- 1a. electrons
1b. c. protons and neutrons
1c.

<u>proton</u>	<u>nucleus</u>	<u>+</u>
<u>neutron</u>	<u>nucleus</u>	<u>none</u>
<u>electron</u>	<u>orbiting nucleus</u>	<u>-</u>
- 2a. b. a molecule
2b. Molecules or compounds
2c. Acceptable answers could include:
Both: two or more atoms held together by bonds
Molecules - often formed from only one element, with covalent or metallic bonds
Compound - form from more than one element, usually with ionic bonds.
- 3a. Fire
3b. Earth, air, fire, water
3c. Acceptable answers could include:
-earth, air fire and water with a plausible example of each
- 4a. b. atoms
4b. atoms
4c. Acceptable answers could include:
-should involve the problems with people accepting that everything was made of tiny things no one could see
- 5a. a. an element
5b. c. an element
5c. Acceptable answers could include:
-A sample of atoms all of the same kind
- 6a. Gold
6b. Change common elements into gold.
6c. Acceptable answers could include:
-Alchemists were the first to experiment with different compounds to try to end up with different substances.
- 7a. b. oxygen
7b. Lavoisier
7c. Acceptable answers could include:
-Lavoisier discovered that oxygen in water always stayed there no matter the form of the water or what chemical reactions it had gone through.
- 8a. gained
8b. lost or gained

- 8c. Acceptable answers could include:
-The same numbers and masses of atoms that go into a chemical reaction come out the other side. Nothing is lost or gained.
- 9a. a. alike
9b. a. atomic weight
9c. Acceptable answers could include:
-details about atomic mass/weight, different elements containing different atoms, every atom of a certain element has the same mass, etc.
- 10a. b. Periodic
10b. Mendeleev
10c. Acceptable answers could include:
-Mendeleev organized his table by ascending atomic mass. Modern tables are organized by ascending atomic number.
- 11a. b. groups
11b. repeat
11c. Acceptable answers could include:
-Chemical reactivity, phase, Mass, and element type all happen in patterns.
- 12a. Shells
12b. Energy, electron shells
12c. Acceptable answers could include:
-1st shell- two electrons
-2nd shell- 8 electrons
-3rd shell- 18
-The closer to the nucleus a shell is, the less energy it has.
- 13a. b. protons
13b. Protons, electrons
13c. Acceptable answers could include:
-The atomic number tells the number of protons the atom has. If the atom has no net charge, the number of electrons must be equal to the number of protons to balance charges.
- 14a. b. neutrons
14b. b. protons and neutrons
14c. Acceptable answers could include:
-Add together the number of protons and neutrons of the atom. (The periodic table has atomic masses as fractions because they use the average mass of a sample of several different isotopes.)
- 15a. neutrons
15b. Acceptable answers could include:
-an atom containing more or less neutrons than the “normal” atom

- 15c. Acceptable answers could include:
- an atom containing more or less neutrons than the “normal” atom
 - Stable isotopes are still nearly normal and are still balanced enough to stay together.
 - Unstable isotopes have a large number of extra neutrons, which will decay and come off of the nucleus because it is unbalanced.