

Chemistry

WS on Atomic Theory Reading

<u>Name</u>	
<u>Period</u>	<u>Date</u>

In the space provided, write short answers to the questions below using the text you've read.

- 1) What is the atomic theory?

The atomic theory is a scientific theory of the nature of matter, which states that matter is composed of discrete units called atoms.

- 2) The word atom comes from an Ancient Greek word meaning "uncuttable". Why was this word used to describe atoms?

Democritus realized that chemical elements could not be reduced into simpler matter.

- 3) Inside a neutron stars, elementary particles cannot join together to form atoms, and instead exist as individual particles. Why does this happen in neutron stars?

Neutron stars have environments with extreme temperature and pressure

- 4) Describe the law of conservation of mass using an example.

If propane and oxygen react completely to produce carbon dioxide and water, the total mass of the propane and oxygen will equal the total mass of carbon dioxide and water.

- 5) Describe the law of definite proportions with an example.

A 20 gram sample of dry ice from Russia will have exactly the same mass ratios of carbon and oxygen as a 3 ton sample from Los Alamos.

- 6) Carbon and oxygen can combine to form two different gasses. One gas has a carbon to oxygen mass ratio of 1 to 1.33. The second has a carbon to oxygen mass ratio of 1 to 2.66. Explain why this demonstrates the law of multiple proportions.

If we had a sample of both gasses such that carbon's mass was 1 gram, then oxygen's mass would be 1.33 or 2.66 grams respectively for the first and second gasses. The ratio of 1.33 to 2.66 can be reduced to 1 to 2, both of which are small whole numbers, as predicted by the law of multiple proportions.

7) Dalton proposed the first truly scientific theory of the atom, but his theory had flaws. What are the two of the three causes for these flaws cited in the text?

1. Dalton failed to conceive of elements existing as diatomic molecules

2. Dalton assumed that the simplest combination of any elements was a 1:1 ratio

3. Dalton's equipment was crude and gave him inaccurate ratios of elements

8) What is Brownian motion and why is important to the atomic theory

Brownian motion is the jiggling motion of dust particles floating on water. It is caused by water particles colliding with and moving the dust particles. This finding provided additional validation for the particle theory of matter.

9) What did experiment did Thomson conduct that proved that electrons have a charge? Given this finding, how did he explain that an overall atom was neutral?

Thomson showed that electrons have a charge by deflecting them in a magnetic field. He explained the overall neutral charge of an atom by proposing electrons were imbedded in a uniform sea of positive charge (the plum pudding model).

10) To their surprise, Rutherford, Geiger and Marsden observed that atoms could deflect a small percentage of bombarding alpha particles. How did this observation discount Thomson's theory and lead to the planetary model of atoms?

Alpha particles have a large momentum, too large to be deflected by a thinly dispersed sea of positive charge. The observation of deflection thus discounted the plum pudding model. To deflect an alpha particle, the positive charge of an atom must be concentrated in a very small space which Rutherford called the nucleus. This nucleus would be the "sun" in the planetary model, sitting at the middle of the solar system with electrons rotation like planets.

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