Name:_____Class: _____ Date: _____

CHAPTER 3 REVIEW

Atoms: The Building Blocks of Matter

SECTION 1

SHORT ANSWER Answer the following questions in the space provided.

1. Why is Democritus's view of matter considered only an idea, while Dalton's view is considered a theory?

_____

_____

_____

2. Give an example of a chemical or physical process that illustrates the law of conservation of mass.

_____

_____

_____

3. State two principles from Dalton's atomic theory that have been revised as new information has become available.

_____

_____

_____

4. The formation of water according to the equation

$$2H_2 + O_2 \rightarrow 2H_2O$$

shows that 2 molecules (made of 4 atoms) of hydrogen and 1 molecule (made of 2 atoms) of oxygen produce 2 molecules of water. The total mass of the product, water, is equal to the sum of the masses of each of the reactants, hydrogen and oxygen. What parts of Dalton's atomic theory are illustrated by this reaction? What law does this reaction illustrate?

_____

_____

_____

_____

_____

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SECTION 1 *continued*

PROBLEMS Write the answer on the line to the left. Show all your work in the space provided.

5. _____ If 3 g of element C combine with 8 g of element D to form compound CD, how many grams of D are needed to form compound CD_2?

6. A sample of baking soda, $NaHCO_3$, *always* contains 27.37% by mass of sodium, 1.20% of hydrogen, 14.30% of carbon, and 57.14% of oxygen.

   a. Which law do these data illustrate?

   _____

   b. State the law.

   _____

   _____

   _____

   _____

   _____

   _____

7. Nitrogen and oxygen combine to form several compounds, as shown by the following table.

Compound	Mass of nitrogen that combines with 1 g oxygen (g)
NO	1.70
NO_2	0.85
NO_4	0.44

   Calculate the ratio of the masses of nitrogen in each of the following:

   _____ a. $\frac{NO}{NO_2}$ _____ b. $\frac{NO_2}{NO_4}$ _____ c. $\frac{NO}{NO_4}$

   d. Which law do these data illustrate?

   _____

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CHAPTER 3 REVIEW

Atoms: The Building Blocks of Matter

SECTION 2

SHORT ANSWER Answer the following questions in the space provided.

1. In cathode-ray tubes, the cathode ray is emitted from the negative electrode, which is called the _____.
2. The smallest unit of an element that can exist either alone or in molecules containing the same or different elements is the _____.
3. A positively charged particle found in the nucleus is called a(n) _____.
4. A nuclear particle that has no electrical charge is called a(n) _____.
5. The subatomic particles that are least massive and most massive, respectively, are the _____ and _____.
6. A cathode ray produced in a gas-filled tube is deflected by a magnetic field. A wire carrying an electric current can be pulled by a magnetic field. A cathode ray is deflected away from a negatively charged object. What property of the cathode ray is shown by these phenomena?

   _____

7. How would the electrons produced in a cathode-ray tube filled with neon gas compare with the electrons produced in a cathode-ray tube filled with chlorine gas?

   _____

   _____

   _____

8. a. Is an atom positively charged, negatively charged, or neutral?

   _____

   b. Explain how an atom can exist in this state.

   _____

   _____

   _____

   _____

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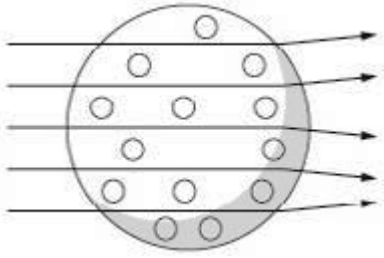
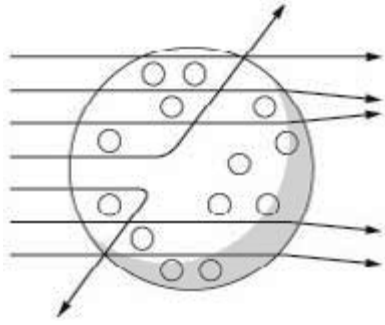
SECTION 2 *continued*

9. Below are illustrations of two scientists' conceptions of the atom. Label the electrons in both illustrations with a – sign and the nucleus in the illustration to the right with a + sign. On the lines below the figures, identify which illustration was believed to be correct before Rutherford's gold-foil experiment and which was believed to be correct after Rutherford's gold-foil experiment.



(Students should place a – sign inside all circles.)

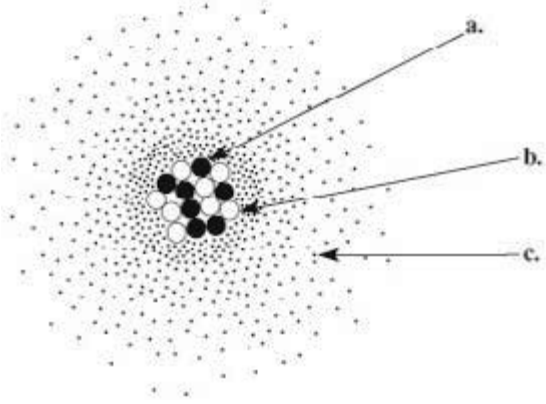
a. _____



(Students should place a + sign in the center and a – sign inside all circles.)

b. _____

10. In the space provided, describe the locations of the subatomic particles in the labeled model of an atom of nitrogen below, and give the charge and relative mass of each particle.



a. proton

_____

_____

b. neutron

_____

_____

c. electron (a possible location of this particle)

_____

_____

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CHAPTER 3 REVIEW

Atoms: The Building Blocks of Matter

SECTION 3

SHORT ANSWER Answer the following questions in the space provided.

1. Explain the difference between the *mass number* and the *atomic number* of a nuclide.

_____

_____

_____

_____

2. Why is it necessary to use the average atomic mass of all isotopes, rather than the mass of the most commonly occurring isotope, when referring to the atomic mass of an element?

_____

_____

_____

_____

_____

3. How many particles are in 1 mol of carbon? 1 mol of lithium? 1 mol of eggs? Will 1 mol of each of these substances have the same mass?

_____

_____

_____

4. Explain what happens to each of the following as the atomic masses of the elements in the periodic table increase:

   a. the number of protons

   _____

   b. the number of electrons

   _____

   c. the number of atoms in 1 mol of each element

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SECTION 3 *continued*

5. Use a periodic table to complete the following chart:

Element	Symbol	Atomic number	Mass number
Europium-151	$^{151}_{63}Eu$	**63**	**151**
Silver-109	$^{109}_{47}Ag$	**47**	**109**
Tellurium-128	$^{128}_{52}Te$	**52**	**128**

6. List the number of protons, neutrons, and electrons found in zinc-66.

_____ protons

_____ neutrons

_____ electrons

PROBLEMS Write the answer on the line to the left. Show all your work in the space provided.

7. _____ What is the mass in grams of 2.000 mol of oxygen atoms?

8. _____ How many moles of aluminum exist in 100.0 g of aluminum?

9. _____ How many atoms are in 80.45 g of magnesium?

10. _____ What is the mass in grams of 100 atoms of the carbon-12 isotope?

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