Name _____ Class _____ Date _____

Skills Worksheet

Vocabulary and Section Summary A

Development of the Atomic Theory

VOCABULARY

In your own words, write a definition of the following terms in the space provided.

1. atom

2. electron

3. nucleus

4. electron cloud

SECTION SUMMARY

Read the following section summary.

- Democritus thought that matter is composed of atoms.
- Dalton based his theory on observations of how elements combine.
- Thomson discovered electrons in atoms.
- Rutherford discovered that atoms are mostly empty space with a dense, positive nucleus.
- Bohr proposed that electrons are located in levels at certain distances from the nucleus.
- The electron-cloud model represents the current atomic theory.
- Atoms are extremely tiny, but scanning tunneling electron microscopes can be used to form direct images of them.

Name _____ Class _____ Date _____

Skills Worksheet

Vocabulary and Section Summary A

The Atom

VOCABULARY

In your own words, write a definition of the following terms in the space provided.

1. proton

2. atomic mass unit

3. neutron

4. atomic number

5. isotope

6. mass number

7. atomic mass

SECTION SUMMARY

Read the following section summary.

- Atoms consist of a nucleus, which has protons and usually neutrons, and electrons, which are located in electron clouds around the nucleus.
- The number of protons in the nucleus of an atom is that atom's atomic number. All atoms of an element have the same atomic number.
- Different isotopes of an element have different numbers of neutrons in their nuclei. Isotopes of an element share most chemical and physical properties.
- The mass number of an atom is the sum of the atom's neutrons and protons.
- Atomic mass is a weighted average of the masses of all natural isotopes of an element.
- The forces at work in an atom are gravitational force, electromagnetic force, strong force, and weak force.

Name _____ Class _____ Date _____

Skills Worksheet

Chapter Review

USING VOCABULARY

1. Academic Vocabulary In the sentence, "Each element of matter has distinct properties and a distinct atomic structure," what does the word *structure* mean?

_____

Correct each statement by replacing the underlined term.

2. Electrons have a positive charge.

_____

3. All atoms of the same element contain the same number of neutrons.

_____

4. Protons have no electric charge.

_____

5. The atomic number of an element is the number of protons and neutrons in the nucleus.

_____

6. The mass number is a weighted average of the masses of all of the naturally occurring isotopes of an element.

_____

UNDERSTANDING CONCEPTS

Multiple Choice

_____ **7.** The discovery of which particle proved that the atom is not indivisible?

a. proton
b. neutron
c. electron
d. nucleus

_____ **8.** How many protons are in the nucleus of an atom that has an atomic number of 23 and a mass number of 51?

a. 23
b. 28
c. 51
d. 74

_____ **9.** Which of the following determines the identity of an element?

a. atomic number
b. mass number
c. atomic mass
d. overall charge

_____ **10.** Isotopes exist because atoms of the same element can have different numbers of

a. protons.
b. neutrons.
c. electrons.
d. None of the above

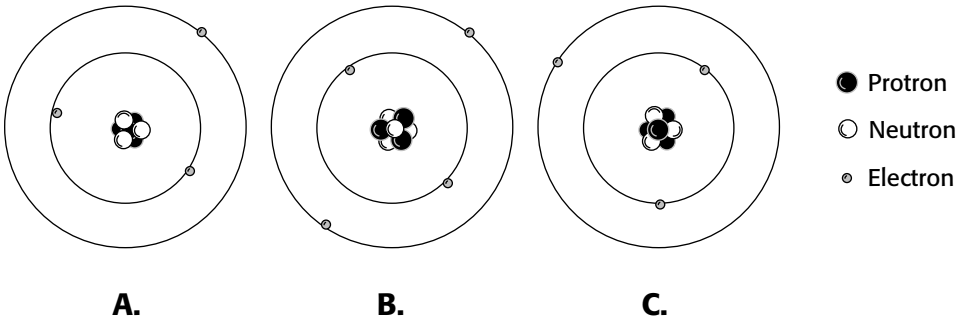
Short Answer

11. Describing In his experiment, what discovery was Rutherford trying to test and learn more about?

12. Identifying What keeps an electron in motion around the nucleus to which it is attracted?

INTERPRETING GRAPHICS

Use the diagram below to answer the next three questions.



13. Identifying What is the atomic number for the atom represented in diagram A?

14. Identifying What is the mass number for the atom represented in diagram B?

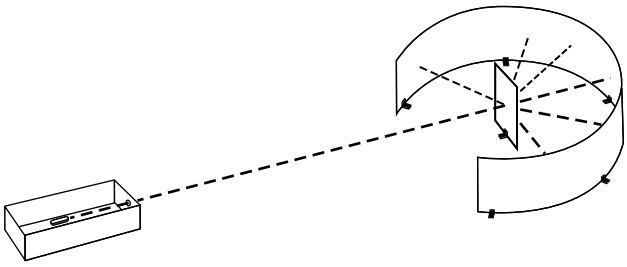
15. Classifying Which diagrams represent isotopes of the same element?

18. Analyzing Ideas John Dalton made a number of statements about atoms that are now known to be incorrect. Why do you think his atomic theory is still mentioned in science textbooks?

19. Applying Concepts If scientists had tried to repeat Thomson's experiment and found that they could not, would Thomson's conclusion have been valid? Explain your answer.

INTERPRETING GRAPHICS

Use the diagram below to answer the next two questions.



20. Analyzing Methods A diagram of an important atomic experiment is shown above. What do the dotted lines represent, and how do they relate to the conclusion of the experiment?

21. Analyzing Processes How did the experiment represented above demonstrate that atoms are mostly empty space?

22. Evaluating Assumptions What assumptions did Thomson make when, based on his experimental results, he proposed the plum-pudding model? Based on the information he had available at the time, were his assumptions valid?

23. Analyzing Processes Particle accelerators are devices that speed up charged particles to smash the particles together. Scientists use these devices to make atoms. How can scientists determine whether the atoms formed are new elements or new isotopes of known elements?

24. Predicting Consequences What would happen to a stable nucleus in which the number of neutrons suddenly decreased?

25. Applying Concepts Imagine that you have a sample of an unknown element and that you know only the element's mass number. Without directly measuring the number of protons in the nucleus of that element, what other information would you need to know to identify the element?

MATH SKILLS

26. Making Calculations Calculate the number of neutrons in an atom of an element that has a mass number of 98 and an atomic number of 42. Show your work below.

27. Making Calculations Calculate the number of protons, neutrons, and electrons in an atom of zirconium-90 that has no overall charge and an atomic number of 40. Show your work below.

CHALLENGE

28. Expressing Opinions Ernest Rutherford's experimental results greatly surprised him. What had Rutherford been expecting to find? Imagine that you lived in Rutherford's day and had the same information about the atom that he did. Do you think that you would have been surprised at his findings? Explain.