

Assessment

Arrangement of Electrons in Atoms**Section Quiz: The Development of a New Atomic Model**

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

- A 1. According to the Bohr model of the atom, which particles are allowed to exist in any one of a number of energy levels?
- a. electrons
 - b. protons
 - c. neutrons
 - d. Both (b) and (c)
- B 2. The line-emission spectrum of an atom is caused by the energies released when electrons
- a. "jump" from a lower energy level to a higher energy level.
 - b. "jump" from a higher energy level to a lower energy level.
 - c. "jump" from the ground state to an excited state.
 - d. None of the above
- C 3. Because excited hydrogen atoms always produced the same line-emission spectrum, scientists concluded that hydrogen
- a. has no electrons.
 - b. does not release energy.
 - c. releases energy of only certain values.
 - d. can exist only in the ground state.
- B 4. Which color of light in the visible spectrum has the longest wavelength?
- a. yellow
 - b. red
 - c. green
 - d. blue
- C 5. A quantum of energy is the
- a. frequency of electromagnetic energy given off by an atom.
 - b. wavelength of electromagnetic energy gained by an atom.
 - c. minimum quantity of energy that can be lost or gained by an atom.
 - d. continuous spectrum of energy given off by an atom.

CHAPTER 5 REVIEW

The Periodic Law

SECTION 2

SHORT ANSWER Use this periodic table to answer the following questions in the space provided.

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1. Identify the element and write the noble-gas notation for each of the following:

or Group 4A

a. the Group 14 element in Period 4

Ge $[Ar]4s^2 3d^{10} 4p^2$

or Group 5A

b. the only metal in Group 15

Bi $[Xe]6s^2 4f^{14} 5d^{10} 6p^3$

c. the transition metal with the smallest atomic mass

Sc $[Ar]4s^2 3d^1$

d. the alkaline-earth metal with the largest atomic number

Ra $[Rn]7s^2$

12

Chemical Periodicity

Reviewsheet

A. Completion

Use this completion exercise to check your knowledge of the terms and your understanding of the concepts introduced in this chapter. Each blank can be completed with a term, short phrase, or number.

The periodic table organizes the elements into vertical 1 and horizontal 2 in order of increasing 3. The table is constructed so that elements that have similar chemical properties are in the same 4. The elements in Groups 1A through 7A are called the 5. The 6 make up Group ^{8A}8. The elements in Groups 2A and 3A are interrupted in periods 4 and 5 by the 7 and in periods 6 and 7 by the 8.

The atoms of the noble gas elements have their outermost *s* and 9 sublevels filled. The outermost *s* and *p* sublevels of the representative elements are 10.

Atomic radii generally 11 as you move from left to right in a period. Atomic size generally 12 within a given group because there are more 13 occupied and an increased 14 effect, despite an increase in nuclear 15.

The energy required to remove an electron from an atom is known as the 16 energy. This quantity generally 17 as you move left to right across a period. The ease with which an atom gains an electron, or the 18, decreases as you move 19. The ability of a bonded atom to attract electrons to itself is known as 20, and this quantity 21 as we move from left to right across a period.

1. groups 12-2
2. periods 12-2
3. atomic number 12-2
4. group 12-2
5. representative or main group 12-3
6. noble gases 12-3
7. transition metals 12-3
8. the earth or inner transition 12-3
9. p 12-3
10. not filled 12-3
11. decrease 12-4
12. increase 12-4
13. energy levels 12-4
14. shielding 12-4
15. charge 12-4
16. ionization 12-5
17. increases 12-5
18. electronegativity 12-6
19. down a group 12-6
20. electronegativity 12-8
21. increases 12-8

B. True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

- NT 22. In his periodic table, Mendeleev arranged the elements in ascending order of atomic number. 12-1
- AT 23. The representative elements are the Group A elements. 12-3
- ST 24. The outermost s or p sublevels are only partially filled for the representative elements. 12-3
- AT 25. The transition metals are the Group B elements. 12-3
- NT 26. Chlorine has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^7$. 12-3
- NT 27. The element in Group 4A, period 3, is gallium. 12-3
- AT 28. The radius of an atom cannot be measured directly. 12-4
- AT 29. Removing one electron from an atom results in the formation of a positive ion with a $1+$ charge. 12-5
- NT ~~AT~~ 30. Diamond, a form of carbon, is a good conductor of electricity. 12-12
- AT 31. Alkali metals are stored under water to protect them from the oxygen in the air. 12-10

C. Questions and Problems

Answer the following questions or solve the following problems in the space provided. Show your work.

32. Construct a graph showing the ionization energies plotted against atomic number for the elements in period 3. Use information from Table 12.1 in your text. Use the horizontal axis for atomic number and the vertical axis for ionization energy. 12-5

