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7.1 IONS

Section Review

Objectives

- Determine the number of valence electrons in an atom of a representative element
- Explain the octet rule
- Describe how cations form
- Explain how anions form

Vocabulary

- valence electrons
- electron dot structures
- octet rule
- halide ions

Part A Completion

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

Elements within the same group of the periodic table behave similarly because they have the same number of ___1___. The ___2___ number of a representative element indicates how many valence electrons that element has. Diagrams that show valence electrons as dots are called ___3___. Gilbert Lewis's ___4___ states that in forming compounds, atoms tend to achieve the electron configuration of a noble gas.

The transfer of valence electrons produces positively charged ions, or ___5___, and negatively charged ions called ___6___. The cations of Group 1A elements always have a charge of ___7___. ___8___ are produced when atoms of the elements in Group 7A ___9___ an electron. For transition metals, the ___10___ of cations may vary.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

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Part B True-False

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

_____ **11.** The chlorine atom gains seven electrons when it becomes an ion.

_____ **12.** The chemical properties of an element are largely determined by the number of valence electrons the element has.

_____ **13.** Atoms acquire the stable electron structure of a noble gas by losing electrons.

_____ **14.** An atom of an element in Group 1A has seven valence electrons.

_____ **15.** Among the Group 1A and 2A elements, the group number of each element is equal to the number of valence electrons in an atom of that element.

_____ **16.** Sulfur and magnesium both have two valence electrons.

Part C Matching

Match each description in Column B to the correct term in Column A.

Column A	Column B
_____ **17.** electron dot structure	**a.** ions that are produced when halogens gain electrons
_____ **18.** valence electron	**b.** a depiction of valence electrons around the symbol of an element
_____ **19.** octet rule	**c.** has the electron configuration of argon
_____ **20.** cations	**d.** an electron in the highest occupied energy level of an element's atom
_____ **21.** anions	**e.** Atoms in compounds tend to have the electron configuration of a noble gas.
_____ **22.** halide ions	**f.** atoms or groups of atoms with a negative charge
_____ **23.** chloride ion	**g.** atoms or groups of atoms with a positive charge

Part D Questions and Problems

Answer the following in the space provided.

24. Write the electron dot structures for the following atoms.

a. silicon _____

b. rubidium _____

c. barium _____

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25. State the number of electrons lost or gained in forming each of these ions. Name the ions and tell whether it is an anion or a cation.

a. Mg^{2+} _____ **c.** Br^{-} _____

b. Ca^{2+} _____ **d.** Ag^{+} _____

26. Describe the formation of an ion from a metal and a nonmetal in terms of the octet rule.

_____

_____

_____