

Name \_\_\_\_\_

Date \_\_\_\_\_

Use with textbook pages 64–67.

## The number game with atoms and ions

1. Complete the following sentences using the terms in parentheses.

- (a) The atomic number (number/mass) of an element is the same as the number of protons in the nucleus of an atom.
- (b) An atom (atom/ion) of an element has the same number of protons as electrons.
- (c) A positively charged ion has lost (lost/gained) electrons.
- (d) A negatively charged ion has gained (lost/gained) electrons.

2. Complete the following table. Some answers are provided to help guide you. You can refer to the Bohr model chart on page 32 and the periodic table on page 202.

Element name	Atomic number	Ion charge	Atom or ion?	Number of protons	Number of electrons
beryllium	4	2+	ion	4	2
sodium	11	0	atom	11	11
argon	18	0	atom	18	18
chlorine	17	0	atom	17	17
nitrogen ion	7	3-	ion	7	10
calcium	20	0	atom	20	20
sulfur ion	16	2-	ion	16	18
lithium ion	3	+	ion	3	2
aluminum ion	13	3+	ion	13	10

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## Drawing Bohr model diagrams

1. Refer to the Bohr model chart on page 32 to help you complete the following table. Some answers are provided for you. (Hint: Remember that the maximum number of electrons in the first three shells is 2, 8, and 8.)

Atom/ion	Atomic number	Number of protons	Number of electrons	Number of electron shells
neon atom	10	10	10	2
fluorine atom	9	9	9	2
fluorine ion	9	9	10	2
sodium atom	11	11	11	3
sodium ion	11	11	10	3
argon atom	18	18	18	3
chlorine atom	17	17	17	3
chlorine ion	17	17	18	3
potassium atom	19	19	19	4
potassium ion	19	19	18	4

2. Use the table above to draw the Bohr model diagram for the following atoms and ions.

Argon atom	Chlorine atom	Chlorine ion	Potassium atom	Potassium ion
$18p \left. \begin{array}{l} \left. \left. \right) \right) \right) \\ \left. \left. \left. \right) \right) \right) \end{array} \right\} 8e$	$17p \left. \begin{array}{l} \left. \left. \right) \right) \right) \\ \left. \left. \left. \right) \right) \right) \end{array} \right\} 7e$	$17p \left. \begin{array}{l} \left. \left. \right) \right) \right) \\ \left. \left. \left. \right) \right) \right) \end{array} \right\} 8e$	$19p \left. \begin{array}{l} \left. \left. \left. \right) \right) \right) \right) \\ \left. \left. \left. \left. \right) \right) \right) \right) \end{array} \right\} 1e$	$19p \left. \begin{array}{l} \left. \left. \right) \right) \right) \\ \left. \left. \left. \right) \right) \right) \end{array} \right\} 8e$

3. What do you notice about the arrangement of electrons in the Bohr model of a neon atom, fluorine ion, and a magnesium ion?

they are the same

4. What would you expect to see with the arrangement of electrons in the Bohr model of an argon atom, chlorine ion, and a potassium ion?

be the same