

Use with textbook pages 64–67.

## The number game with atoms and ions

- Complete the following sentences using the terms in parentheses.
  - The atomic \_\_\_\_\_ (number/mass) of an element is the same as the number of protons in the nucleus of an atom.
  - An \_\_\_\_\_ (atom/ion) of an element has the same number of protons as electrons.
  - A positively charged ion has \_\_\_\_\_ (lost/gained) electrons.
  - A negatively charged ion has \_\_\_\_\_ (lost/gained) electrons.
- 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                   |
|              | 11            | 0          | atom         |                   |                     |
|              |               | 0          |              | 18                | 18                  |
| chlorine     |               | 0          |              |                   |                     |
|              | 7             | 3–         |              |                   | 10                  |
| calcium      |               | 0          |              |                   |                     |
|              |               | 2–         |              | 16                |                     |
|              | 3             | +          |              |                   |                     |
|              |               | 3+         |              | 13                |                     |

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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             |                   |                     |                           |
| fluorine ion   | 9             | 9                 | 10                  | 2                         |
| sodium atom    |               |                   |                     |                           |
| sodium ion     |               |                   | 10                  |                           |
| argon atom     |               |                   |                     |                           |
| chlorine atom  |               |                   |                     |                           |
| chlorine ion   |               |                   | 18                  |                           |
| potassium atom |               |                   |                     |                           |
| potassium ion  |               |                   | 18                  |                           |

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 |
|------------|---------------|--------------|----------------|---------------|
|            |               |              |                |               |

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