

# Electron Arrangements



Answer all the questions below

1 Complete the table below. It gives the electron arrangements for the first 20 elements.

| Element   | Chemical symbol | Atomic number | Mass number | No of protons | No of neutrons | No of electrons | Electronic configuration |
|-----------|-----------------|---------------|-------------|---------------|----------------|-----------------|--------------------------|
| hydrogen  | H               | 1             | 1           | 1             | 0              | 1               | 1                        |
| helium    |                 |               |             |               |                |                 |                          |
| lithium   | Li              |               |             |               |                |                 | 2,1                      |
| beryllium |                 |               |             |               |                |                 |                          |
| boron     |                 |               |             |               |                |                 |                          |
|           | C               |               |             |               |                |                 |                          |
| nitrogen  |                 |               |             |               |                |                 |                          |
|           |                 |               |             |               |                |                 | 2,6                      |
|           | F               |               |             |               |                |                 |                          |
|           | Ne              |               |             |               |                |                 |                          |
| sodium    |                 |               |             |               |                |                 |                          |
|           |                 | 12            |             |               |                |                 |                          |
|           |                 | 13            |             |               |                |                 |                          |
| Silicon   |                 |               |             |               |                |                 |                          |
|           | P               |               |             |               |                |                 |                          |
| sulphur   |                 |               |             |               |                |                 |                          |
|           |                 |               |             |               |                |                 | 2,8,7                    |
|           |                 |               |             |               |                |                 | 2,8,8                    |
|           | K               |               |             |               |                |                 |                          |
| Calcium   |                 |               |             |               |                |                 |                          |

2. The symbol for a helium atom is often written as  ${}^4\text{He}$

2.

Write the symbols for the following atoms in a similar way to that for the helium atom.

a. sodium   b. oxygen   c. neon   d. potassium

3. Lithium and sodium have very similar chemical properties. Using the table above suggest a reason for this.

4. Which of the following electron arrangements is correct for an oxygen atom?

a. 2, 6                      b. 2, 8, 8                      c. 2, 8, 6                      d. 1, 7

5. Which group in the periodic table contains elements with a full outer shell of electrons?

a. Group 1                      b. Group 2                      c. Group 7                      d. Group 8

6. Which element has the electron arrangement 2, 8, 1?

a. Sodium (Na)                      b. Potassium (K)                      c. Magnesium (Mg)

d. Aluminium (Al)

7. Fill in the gaps to complete the sentences below:

An element in Group 1 of the periodic table will typically have \_\_\_\_\_ electron(s) in its outer shell.

Answer: 1

b. The electron arrangement of chlorine is 2, \_\_, 7.

c. Elements in the same group have similar chemical properties because they have the same number of \_\_\_\_\_ in their outer shell.

8. Match the element with its correct electron arrangement.

| <u>Element</u> | <u>Electron Arrangement</u> |
|----------------|-----------------------------|
| A. Neon        | 1. 2, 8, 7                  |
| B. Lithium     | 2. 2, 8, 8                  |
| C. Chlorine    | 3. 2, 1                     |
| D. Sodium      | 4. 2, 8, 1                  |
| E. Calcium     | 5. 2, 8, 8, 2               |

## Answers

| Element    | Chemical symbol | Atomic number | Mass number | No of protons | No of neutrons | No of electrons | Electronic configuration |
|------------|-----------------|---------------|-------------|---------------|----------------|-----------------|--------------------------|
| hydrogen   | H               | 1             | 1           | 1             | 0              | 1               | 1                        |
| helium     | He              | 2             | 4           | 2             | 2              | 2               | 2                        |
| lithium    | Li              | 3             | 7           | 3             | 4              | 3               | 2,1                      |
| beryllium  | Be              | 4             | 9           | 4             | 5              | 4               | 2,2                      |
| boron      | B               | 4             | 11          | 5             | 6              | 5               | 2,3                      |
| carbon     | C               | 6             | 12          | 6             | 6              | 6               | 2,4                      |
| nitrogen   | N               | 7             | 14          | 7             | 7              | 7               | 2,5                      |
| oxygen     | O               | 8             | 16          | 8             | 8              | 8               | 2,6                      |
| fluorine   | F               | 9             | 19          | 9             | 10             | 9               | 2,7                      |
| neon       | Ne              | 10            | 20          | 10            | 10             | 10              | 2,8                      |
| sodium     | Na              | 11            | 23          | 11            | 12             | 11              | 2,8,1                    |
| magnesium  | Mg              | 12            | 24          | 12            | 12             | 12              | 2,8,2                    |
| aluminium  | Al              | 13            | 27          | 13            | 14             | 13              | 2,8,3                    |
| Silicon    | Si              | 14            | 28          | 14            | 14             | 14              | 2,8,4                    |
| phosphorus | P               | 15            | 31          | 15            | 16             | 15              | 2,8,5                    |
| sulphur    | S               | 16            | 32          | 16            | 16             | 16              | 2,8,6                    |
| chlorine   | Cl              | 17            | 35          | 17            | 18             | 17              | 2,8,7                    |
| argon      | Ar              | 18            | 40          | 18            | 22             | 18              | 2,8,8                    |
| potassium  | K               | 19            | 39          | 19            | 20             | 19              | 2,8,8,1                  |
| Calcium    | Ca              | 20            | 40          | 20            | 20             | 20              | 2,8,8,2                  |

2. The symbol for a helium atom is often written as  ${}^4\text{He}$

2.

Write the symbols for the following atoms in a similar way to that for the helium atom.

a. sodium      b. oxygen      c. neon      d. potassium

23

11 Na

16

8 O

20

10 Ne

39

19 K

3. Lithium and sodium have very similar chemical properties. Using the table above suggest a reason for this.

Chemical properties depend on the number of electrons in the last shells.

Lithium and sodium both have 1 electron in their last electron shell so will have similar chemical properties.

4. Which of the following electron arrangements is correct for an oxygen atom?
- a. 2, 6            b. 2, 8, 8            c. 2, 8, 6            d. 1, 7

Answer: a. 2, 6

5. Which group in the periodic table contains elements with a full outer shell of electrons?
- a. Group 1            b. Group 2            c. Group 7            d. Group 8

Answer: d. Group 8

6. Which element has the electron arrangement 2, 8, 1?
- a. Sodium (Na)            b. Potassium (K)            c. Magnesium (Mg)
- d. Aluminium (Al)

Answer: a. Sodium (Na)

7. Fill in the gaps to complete the sentences below:

An element in Group 1 of the periodic table will typically have \_\_\_\_\_ electron(s) in its outer shell.

Answer: 1

- b. The electron arrangement of chlorine is 2, \_\_, 7.

Answer: 8

- c. Elements in the same group have similar chemical properties because they have the same number of \_\_\_\_\_ in their outer shell.

Answer: electrons

8. Match the element with its correct electron arrangement.

| <u>Element</u> | <u>Electron Arrangement</u> |
|----------------|-----------------------------|
| Neon           | 2, 8, 7                     |
| Lithium        | 2, 8, 8                     |
| Chlorine       | 2, 1                        |
| Sodium         | 2, 8, 1                     |
| Calcium        | 2, 8, 8, 2                  |

