



# Electron Configurations

## Student Activity



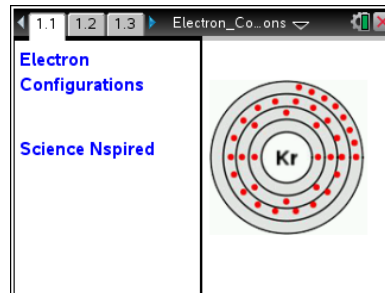
Name \_\_\_\_\_

Class \_\_\_\_\_

Open the TI-Nspire document *Electron\_Configurations.tns*.

Atoms are composed of protons, neutrons, and electrons.

However, the chemical properties of an atom depend almost entirely on the arrangement of the electrons, specifically the electrons in the outer shell. In this activity you will be able to observe the electron configurations of atoms and discover the relationship between the electron configuration and the position of an element in the Periodic Table.

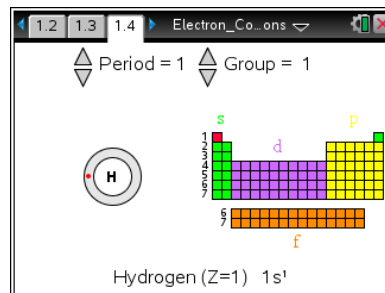


Move to pages 1.2 and 1.3.

Read the introduction on page 1.2 and page 1.3.

Move to page 1.4.

1. Adjust the two sliders or the arrow keys to move through the periods and groups in the Periodic Table. Observe the electron configurations. Watch for patterns between the electron configurations at the bottom and the location and number of electrons in the atom. Also try and find patterns between the electron locations in the atom and the location of that element on the periodic table.



**Tech Tip:** Region *f* on the Periodic Table can be accessed by setting the period to 6 or 7 and then setting the group number to 3.

Move to pages 1.5–1.22. Answer the following questions here or in the .tns file.

- Q1. The 5th element (atomic number 5) in the Periodic Table is in period 2 and group 3. What is this element?
 

|           |           |
|-----------|-----------|
| A. Sodium | C. Carbon |
| B. Boron  | D. Oxygen |
- Q2. Carbon has atomic number 6.  
 Carbon (C)  $6 \rightarrow [\text{He}] 2s^2 2p^2$   
 How many electrons does a neutral carbon atom have?
 

|      |      |      |      |
|------|------|------|------|
| A. 2 | B. 4 | C. 6 | D. 8 |
|------|------|------|------|
- Q3. The total number of electrons in any neutral atom of any element is the same as the atomic number for that element.
 

|         |          |
|---------|----------|
| A. True | B. False |
|---------|----------|



# Electron Configurations

## Student Activity



Name \_\_\_\_\_

Class \_\_\_\_\_

- Q4. The number of electron shells is equal to \_\_\_\_\_.  
A. the period number                      C. the atomic number  
B. the group number                      D. none of the above
- Q5. What is the maximum number of electrons in the first shell?  
A. 2                      B. 4                      C. 8                      D. 18
- Q6. What is the maximum number of electrons in the second shell?  
A. 2                      B. 4                      C. 8                      D. 18
- Q7. What is the maximum number of electrons in the third shell?  
A. 2                      B. 4                      C. 8                      D. 18
- Q8. The number of electrons in each shell follows a pattern: 2, 8, 18... . What is the mathematical rule for this pattern, in terms of the shell number  $n$ ? (HINT: Try first dividing the numbers above by 2.)  
A.  $2n$                       C.  $n^2$   
B.  $2n + 1$                       D.  $2n^2$
- Q9. Sodium (Na, 11) has electron configuration 2, 8, 1. This indicates that the number of electrons in its outer shell is \_\_\_\_\_.  
A. 1                      C. 8  
B. 2                      D. 11
- Q10. Two elements with one electron in their outer shells are \_\_\_\_\_.  
A. Hydrogen and Helium                      C. Lithium and Potassium  
B. Lithium and Beryllium                      D. Potassium and Chlorine
- Q11. Elements in the same column have the same number of \_\_\_\_\_.  
A. protons                      C. neutrons  
B. electrons                      D. outer electrons

### Move to page 1.17.

Elements with 8 electrons ( $ns^2 np^6$ ) in the outer shell (**an octet**), or 2 electrons ( $1s^2$ ) in the case of helium, are generally stable and unreactive. These elements are known as **noble gases**.

- Q12. Which of the following are noble gases? (List all that apply.)  
A. Hydrogen                      C. Neon  
B. Helium                      D. Argon



## Student Activity



## Class

Chlorine (2, 8, 7) and Oxygen (2, 6), which have close to an octet of electrons in the outer shell, are classified as **non-metals**.

A. True

B. False

A. Magnesium gains 1; Oxygen loses 2

C. Magnesium gains 2; Oxygen loses 2

B. Magnesium loses 1; Oxygen gains 2

D. Magnesium loses 2; Oxygen gains 2

### A. Fluorine

### C. Sodium

### B. Arsenic

#### D. Neon