Electron Configurations

Student Activity

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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 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.

 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.

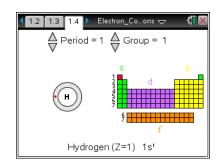
EXAMPLE 7 Tech Tip: Region *f* on the Periodic Table can be accessed by

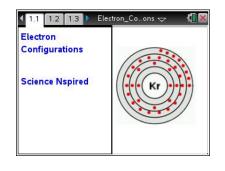
setting the period to 6 or 7 and then setting the group number to 3.

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) $6 \blacktriangleright [He] 2s^2 2p^2$
How many electrons does a neutral carbon atom have?A. 2B. 4C. 6D. 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





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Q4.		n shells is equal to				
	A. the period number			the atomic numb		
Q5.	B. the group number D. none of the above What is the maximum number of electrons in the first shell?					
					P	40
	A. 2 B.	4	C.	δ	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 th	e tł	nird shell?		
	A. 2 B.	4	C.	8	D.	18
0.0	the numbers above by A. 2 <i>n</i> B. 2 <i>n</i> + 1		C. D.	n ² 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.	Q		
	B. 2		С. D.	o 11		
	D. 2		υ.			
Q10.	Two elements with one electron in their outer shells are					
	A. Hydrogen and Hel	ium	C.	Lithium and Pot	assium	
	B. Lithium and Berylli	um	D.	Potassium and	Chlorine	
Q11.	Elements in the same	column have the same n	um	ber of		
	A. protons			neutrons		
	B. electrons		D.	outer electrons		
Eleme		s ² np ⁶) in the outer shell (and unreactive. These ele				
	• •	are noble gases? (List al			-	

- A. Hydrogen C. Neon
 - B. Helium D. Argon

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Move to page 1.19.

Elements such as Sodium, Potassium and Zinc, which have a small number of electrons in their outer shell, are classified as metals. Metals generally have 4 or less electrons in the outer shell. 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.

Q13. Non-metals are generally found on the left side of the Periodic Table.

A. True B. False

- Q14. To satisfy the "octet rule", a non-metal such as Oxygen (2, 6) needs to gain electrons. A metal such as Magnesium (2, 8, 2) needs to lose electrons. When magnesium burns in air, the two elements exchange electrons to form a stable compound. How many electrons does each need to gain or lose?
 - A. Magnesium gains 1; Oxygen loses 2
 - B. Magnesium loses 1; Oxygen gains 2
- C. Magnesium gains 2; Oxygen loses 2
- D. Magnesium loses 2; Oxygen gains 2
- Q15. Silicon (2, 8, 4) has some properties of metals and some of non-metals. This is because it has about half the number of electrons required for an octet and so may gain or lose electrons. Another such element is _____

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- A. Fluorine C. Sodium
- B. Arsenic D. Neon



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