

Electron Configuration Practice Worksheet

In the space below, write the unabbreviated electron configurations of the following elements:

- 1) sodium $1s^2 2s^2 2p^6 3s^1$
- 2) iron $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$
- 3) bromine $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5$
- 4) barium $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2$
- 5) ⁹³neptunium $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^6 7s^2 5f^5$

In the space below, write the abbreviated electron configurations of the following elements:

- 6) cobalt $[Ar] 4s^2 3d^7$
- 7) silver $[Kr] 5s^1 4d^{10}$ * exception
- 8) tellurium $[Kr] 5s^2 4d^{10} 5p^4$
- 9) radium $[Rn] 7s^2$
- 10) ¹⁰³lawrencium $[Rn] 7s^2 4f^{14} 6d^1$

Determine what elements are denoted by the following electron configurations:

- 11) $1s^2 2s^2 2p^6 3s^2 3p^4$ sulfur
- 12) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^1$ rubidium
- 13) $[Kr] 5s^2 4d^{10} 5p^3$ antimony
- 14) $[Xe] 6s^2 4f^{14} 5d^6$ osmium
- 15) $[Rn] 7s^2 5f^{11}$ einsteinium

Determine which of the following electron configurations are not valid:

- 16) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 4d^{10} 4p^5$ ok
- 17) $1s^2 2s^2 2p^6 3s^3 3d^5$ No! ($3s^2$)
- 18) $[Ra] 7s^2 5f^8$ No! ($[Rn]$)
- 19) $[Kr] 5s^2 4d^{10} 5p^5$ ok
- 20) $[Xe]$ ok?

1. Fill in the electron configurations for the elements given in the table. Use the orbital filling diagrams to complete the table.

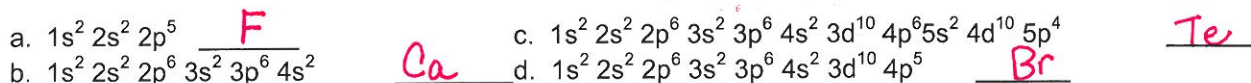
Electron Configurations for Some Selected Elements							
Element	Orbital filling					Electron configuration	
	1s	2s	2p _x	2p _y	2p _z		3s
H	↑	□	□	□	□	□	1s ¹
He	↑↓	□	□	□	□	□	1s ²
Li	↑↓	↑	□	□	□	□	1s ² 2s ¹
C	↑↓	↑↓	↑	↑	□	□	1s ² 2s ² 2p ²
N	↑↓	↑↓	↑	↑	↑	□	1s ² 2s ² 2p ³
O	↑↓	↑↓	↑↓	↑	↑	□	1s ² 2s ² 2p ⁴
F	↑↓	↑↓	↑↓	↑↓	↑	□	1s ² 2s ² 2p ⁵
Ne	↑↓	↑↓	↑↓	↑↓	↑↓	□	1s ² 2s ² 2p ⁶
Na	↑↓	↑↓	↑↓	↑↓	↑↓	↑	1s ² 2s ² 2p ⁶ 3s ¹

	1s	2s	2p	3s	3p	4s	3d	element (answer)
a	↑↓	↑↓	↑↑↑	□	□	□	□	nitrogen
b	↑↓	↑↓	↑↓↑	↑↓	↑↓↑	□	□	argon
c	↑↓	↑↓	↑↓↑	↑↓	↑↓↑	↑	□	scandium

2. Which element has the following orbital diagram?
 3. Using arrows, show how the following orbitals will fill with electrons.

	Electron Configuration	1s	2s	2p	3s	3p	4s	3d
Mg	1s ² 2s ² 2p ⁶ 3s ²	↑↓	↑↓	↑↓↑↓↑	↑↓	□	□	□
Cl	1s ² 2s ² 2p ⁶ 3s ² 3p ⁵	↑↓	↑↓	↑↓↑↓↑	↑↓	↑↓↑	□	□
Si	1s ² 2s ² 2p ⁶ 3s ² 3p ²	↑↓	↑↓	↑↓↑↓	↑↓	↑↑	□	□
Ti	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 4s ² 3d ²	↑↓	↑↓	↑↓↑↓↑	↑↓	↑↓	↑↓	↑↓

4. What elements are represented by each of the following electron configurations?



5. a. What are valence electrons?

outer energy level electrons

- b. Explain how an atom's valence electron configuration determines its place on the periodic table.

It determines what family/group the element is in

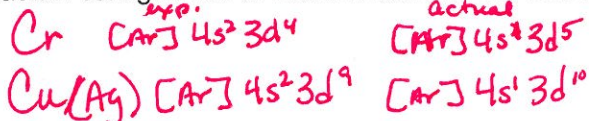
- c. List the number of valence electrons for the following atoms:

potassium = 1 magnesium = 2 carbon = 4 nitrogen = 5

6. Place the following orbitals in order of increasing energy:

1s, 3s, 4s, 6s, 3d, 4f, 3p, 7s, 5d, 5p

7. What two elements are exceptions to the way we normally write electron configurations? Write the expected and the actual configuration of each. What rules are followed? What rules are violated?



*Violated - Aufbau
 followed - Hund's + Pauli Exclusion*

and not dis class effect (we will!)