

Problem Set #15 – Electron Configuration

1. When the following orbitals are full, how many electrons are in each?

- a. 2s 2
b. 3p 6
c. 6f 14
d. 3d 10
e. 5p 6

2. Given only the last orbital in the ground-state electron configuration, identify which element(s) each could be.

- a. 3p³ P
b. 5s¹ Rb
c. 3d¹⁰ Cu or Zn
d. 2p⁶ Ne

3. Write the electron configuration, orbital notation and Lewis electron dot notation for the following elements (do not use short-hand):

	Electron Configuration	Orbital Diagram
Si	$1s^2 2s^2 2p^6 3s^2 3p^2$	$ \begin{array}{l} 3s \uparrow\downarrow \quad 3p \uparrow \uparrow _ \\ 2s \uparrow\downarrow \quad 2p \uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \\ 1s \uparrow\downarrow \end{array} $
K	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$	$ \begin{array}{l} 4s \uparrow \\ 3s \uparrow\downarrow \quad 3p \uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \\ 2s \uparrow\downarrow \quad 2p \uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \\ 1s \uparrow\downarrow \end{array} $
Co	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^7$	$ \begin{array}{l} 4s \uparrow\downarrow \quad 3d \uparrow\downarrow \uparrow\downarrow \uparrow \uparrow \uparrow \\ 3s \uparrow\downarrow \quad 3p \uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \\ 1 \text{ \& } 2 \text{ are full} \end{array} $

4. Give the *short-hand* electron configuration and orbital diagram and Lewis dot notation for the following:

	Electron Configuration	Orbital Diagram
Rb	$[\text{Kr}] 5s^1$	$5s \uparrow$ $[\text{Kr}]$
At	$[\text{Xe}] 6s^2 4f^{14} 5d^{10} 6p^5$	$6p \uparrow\downarrow \uparrow\downarrow \uparrow$ $5d \uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \uparrow\downarrow$ $4f \uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \uparrow\downarrow \uparrow\downarrow$ $[\text{Xe}] 6s \uparrow\downarrow$
Ru	$[\text{Kr}] 5s^2 4d^6$	$4d \uparrow\downarrow \uparrow \uparrow \uparrow \uparrow$ $[\text{Kr}] 5s \uparrow\downarrow$
Po	$[\text{Xe}] 6s^2 4f^{14} 5d^{10} 6p^4$	$6p \uparrow\downarrow \uparrow \uparrow$ Same as At w/ 1 less in 6p

4. Which element is represented by the configurations below?

- | | |
|---|-----------|
| a. $[\text{Ar}] 4s^2 3d^5$ | <u>Mn</u> |
| b. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^4$ | <u>Cr</u> |
| c. $[\text{Rn}] 7s^2 5f^{14} 6d^5$ | <u>Bh</u> |
| d. $[\text{Xe}] 6s^2$ | <u>Ba</u> |
| e. $[\text{Xe}] 6s^2 4f^{14} 5d^9$ | <u>Au</u> |

5. Are all of the configurations in question 4 correct? If not, which one(s) are not and what should it/they be?

No - gold should be
 $[\text{Xe}] 6s^1 4f^{14} 5d^{10}$