Hello everyone! Good job for making it through another week!

I’ll be posting weekly resources on the topics that will be covered in class the following week. Reach out to me if you need help with anything. Also do let me know if there are any specific resources you find helpful in the discussion board. If you cannot make it to Group Tutoring, remember these resources are available to you on the tutoring center website.

Our Group Tutoring sessions will be every Monday from 5:00-6:00 PM. We will go over important topics that you will be covering in class and we will practice problems that you will need to be familiar with. You can reserve a spot at https://baylor.edu/tutoring. I hope to see you there!

**Some topics I’ll be covering:**

Electronic configuration, valence electrons, and core electrons, Periodic trends

**Keywords:** Periodicity, Aufbau Principle, Electronic configuration, valence electrons, core electrons

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**TOPIC OF THE WEEK**

**Bohr’s Model of Hydrogen Atom**

- An equation that is important to know and might show up on the test is:

$$E = -R_n \left( \frac{1}{n^2} \right)$$

Where,

- $n$: principal quantum number (1,2,3,4…..)
- $R_n$: Rydberg constant= $2.18*10^{-18}$ J

- This equation can be used to calculate the energy levels of hydrogen.
- Bohr model restricted hydrogen’s electrons to move about the nucleus only in certain (allowed) circular orbits
- Remember: Bohr Model can only be used for hydrogen
**HIGHLIGHT #1: Aufbau Principle and Periodic Table**

A way to do electronic configuration

For the diagram on the left, follow the arrow to write out the electronic configuration. For example, 1s comes first followed by 2s, 2p, 3s, 3p, 4s, 3d, so on and so forth. Remember that s holds a maximum of 2 electrons, p holds a maximum of 6 electrons, d holds a maximum of 10 electrons, and f holds a maximum of 14 electrons.

https://brainly.in/question/16095149

**Do remember the exception: Copper and Chromium**

**Exceptions**

- Chromium and copper are 2 examples of exceptions to the Aufbau Principle.
- These exceptions are due to subtle electron-electron interactions in orbitals with similar energies.

\[
\begin{align*}
\text{Cr} & \quad 1s^2 \ 2s^2 \ 2p^6 \ 3s^2 \ 3p^6 \ 4s^3 \ 3d^5 \\
\text{Cu} & \quad 1s^2 \ 2s^2 \ 2p^6 \ 3s^2 \ 3p^6 \ 4s^1 \ 3d^{10}
\end{align*}
\]

https://slideplayer.com/slide/5282261/
Another way to determine electronic configuration:

For the diagram on the left, this is an easier way to identify which element is going to have that specific orbital. You just divide the periodic table into various sections as observed in the diagram, and you will be easily able to write out the electronic configuration.

HIGHLIGHT #2: Pauli Exclusion Principle

- s sublevel has 1 orbital, thus, can hold 2 electrons
- p sublevel has 3 orbitals, thus, can hold 6 electrons
- d sublevel has 5 orbitals, thus, can hold 10 electrons
- f sublevel has 7 orbitals, thus, can hold 14 electrons

Valence electrons:
Electrons in all sublevels with the highest principle energy shell are called valence electrons

Core electrons:
Electrons in lower energy shells

For example:
HIGHLIGHT #3: Commonly observed Periodic Trends

1. **Atomic radius**: Decreases from left to right across a periodic table, increases from top to bottom

2. **Ionization energy**: First, ionization energy generally increases from left to right
   
   **EXCEPTIONS**: Moving from group 2A to 3A 1st is lower; Same for moving from group 5A to 6A

3. **Electron affinity**: Electron affinities become more negative from left to right on the Periodic chart; moving down a group, EA is more positive

CHECK YOUR LEARNING

1. **Write the electronic configuration of the following**:
   
   a. Al$^{3+}$
   
   b. O$^{2-}$
   
   c. Cu

2. **What is the frequency of the radiation with a wavelength of 440nm?**

3. **Place the following in order of increasing atomic radius**: As, O, Br

4. **Which of the following quantum numbers describes the orientation of an orbital?**
   
   a. Magnetic quantum number
   
   b. Principal quantum number
   
   c. Angular momentum quantum number
   
   d. Spin quantum number

5. An element with the electronic configuration [noble gas] ns$^2$ (n-1)d$^{10}$ np$^3$ has how many valence electrons?

6. **Give the numbers for m_l for a d orbital?**
   
   a. 0,1,2,3,4
   
   b. 1,2,3,4
   
   c. -3, -2, -1, 0, +1, +2, +3
   
   d. -2, -1, 0, +1, +2
   
   e. -1, 0, +1
7. Place the following types of electromagnetic radiation in order of increasing wavelength
Visible light, gamma rays, microwaves

**THINGS YOU MAY STRUGGLE WITH**

- Determining the valence and core electrons: remember that sometimes, the electronic configuration might not be written in “order” where all the $n=1$ shells and $n=2$ and so on and so forth and written together. Always look at the $n$ value and the shell that has the $n$ value will hold the valence electrons (outermost electrons) and every other shell will hold the core electrons

- Not understanding why copper and chromium are exceptions to the general electronic configuration rule: this is because a completely full or half full d sub-level has more stability than a partially filled d sub-level, therefore, an electron from the 4s orbital is excited and rises to a 3d orbital

That’s it this week! Please reach out if you have any questions and don’t forget to visit the Tutoring Center website for further information at [www.baylor.edu/tutoring](http://www.baylor.edu/tutoring).

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Answer key:

1. a. 1s$^2$ 2s$^2$ 2p$^6$
   b. 1s$^2$ 2s$^2$ 2p$^6$
   c. 1s$^2$, 2s$^2$, 2p$^6$, 3s$^2$, 3p$^6$, **4s$^1$, 3d$^{10}$**

2. $6.81 \times 10^{14}$ s$^{-1}$

3. $O < Br < As$

4. Option a

5. 5

6. Option d

7. Gamma rays > visible light > microwaves