

# Electron Configurations Worksheet Answer Key

**Electron Configurations - POGIL** Name \_\_\_\_\_ Per \_\_\_\_\_ Date \_\_\_\_\_  
**Unit 3 Assignment 1**

**Learning Target** - I understand that, when an atom is in ground state, that its electrons occupy the lowest-energy levels, sublevels, and orbitals.  
**Success Criteria** - I can use the periodic table to determine the electron configuration for ground-state atoms.

**Model 1 - The Boarding House**

**Sunny Rooms** **Pink Rooms**

Time: 1:00 pm  
 Manager's Code:  $1s^1$

Time: 3:00 pm  
 Manager's Code:  $1s^2 2s^2 2p^2$

Time: 5:00 pm  
 Manager's Code:  $1s^2 2s^2 2p^4$


Time: 7:00 pm  
 Manager's Code:  $1s^2 2s^2 2p^6 3s^1$

Time: 9:00 pm  
 Manager's Code:  $1s^2 2s^2 2p^6 3s^2 3p^1$

Time: 11:00 pm  
 Manager's Code:  $1s^2 2s^2 2p^6 3s^2 3p^3$

1. Examine the boarding house diagrams in Model 1. Match each symbol below with its most likely meaning.

\_\_\_ a. ● I. Bunk bed for boarders

\_\_\_ b.  II. Manager's code for the number of boarders in the house and their room assignments.

\_\_\_ c.  $1s^2 2s^2 2p^6 3s^1$  III. Boarder

Electron configurations worksheet answer key is an essential tool for students and educators alike, particularly in the field of chemistry and physics. Understanding electron configurations is crucial for grasping how elements interact, bond, and behave in various chemical reactions. This article will delve into the importance of electron configurations, how to read them, and provide insights into creating and utilizing worksheets that can enhance the learning process.

# Understanding Electron Configurations

Electron configurations describe the distribution of electrons in an atom's orbitals. Each element has a unique electron configuration that reflects its atomic structure. Knowing how to write and interpret these configurations is fundamental for predicting chemical properties and reactivity.

## Basic Principles of Electron Configurations

1. Aufbau Principle: Electrons occupy the lowest energy orbitals first before moving to higher energy levels.
2. Pauli Exclusion Principle: No two electrons in an atom can have the same set of four quantum numbers, meaning an orbital can hold a maximum of two electrons with opposite spins.
3. Hund's Rule: Electrons will fill degenerate orbitals (orbitals of the same energy) singly before pairing up.

## Notation of Electron Configurations

An electron configuration is typically written using the following notation:

- The principal quantum number ( $n$ ) indicates the energy level.
- The letter corresponds to the type of orbital (s, p, d, f).
- A superscript indicates the number of electrons in that orbital.

For example, the electron configuration of oxygen is written as  $1s^2 2s^2 2p^4$ , which indicates that there are two electrons in the 1s orbital, two in the 2s orbital, and four in the 2p orbital.

## Creating an Electron Configurations Worksheet

An effective worksheet on electron configurations can help students practice and reinforce their understanding. Here are the key elements to include when designing a worksheet:

### Worksheet Structure

1. Introduction Section: Briefly explain what electron configurations are and their significance in chemistry.
2. Practice Problems: Include a variety of problems that require students to write electron configurations for different elements.
3. Answer Key Section: Provide a clear and detailed answer key for self-

assessment.

## Types of Problems to Include

- Simple Configurations: Ask students to write electron configurations for the first 20 elements of the periodic table.
- Noble Gas Notation: Encourage students to use noble gas shorthand for larger elements, e.g., [Ne]  $3s^2 3p^5$  for chlorine.
- Transition Metals and Rare Earth Elements: Challenge students with elements in the d and f blocks, such as iron (Fe) and uranium (U).

## Sample Problems and Solutions

Here are some sample problems that can be included in the worksheet along with their corresponding solutions:

### Sample Problem 1

Write the electron configuration for sodium (Na).

Answer: Sodium has 11 electrons, and its electron configuration is  $1s^2 2s^2 2p^6 3s^1$ .

### Sample Problem 2

Using noble gas notation, write the electron configuration for bromine (Br).

Answer: Bromine has 35 electrons. Its configuration using noble gas notation is [Ar]  $4s^2 3d^{10} 4p^5$ .

### Sample Problem 3

Determine the electron configuration for silver (Ag).

Answer: Silver has 47 electrons. Its full electron configuration is  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 4d^{10}$ .

### Sample Problem 4

Write the electron configuration for an ion of calcium ( $\text{Ca}^{2+}$ ).

Answer: Calcium has 20 electrons, but as a  $\text{Ca}^{2+}$  ion, it has lost two electrons, leading to an electron configuration of  $1s^2 2s^2 2p^6 3s^2 3p^6$ , or simply [Ar].

## Sample Problem 5

What is the electron configuration for the element with atomic number 50 (tin, Sn)?

Answer: Tin has 50 electrons, and its electron configuration is  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^2$ .

## Utilizing the Answer Key

The electron configurations worksheet answer key serves several purposes for both students and educators:

- Self-Assessment: Students can use the answer key to verify their answers and understand where they may have gone wrong.
- Study Aid: The answer key can act as a study tool for students preparing for exams, allowing them to practice writing configurations multiple times.
- Teaching Resource: Educators can use the answer key to guide discussions or clarify points of confusion during lessons.

## Common Mistakes to Watch For

When reviewing answers, both students and educators should be aware of common pitfalls:

- Incorrectly Counting Electrons: Ensure that the total number of electrons matches the atomic number of the element.
- Misapplying Hund's Rule: Students often forget to fill degenerate orbitals singly before pairing electrons.
- Forgetting to Account for Ions: When dealing with ions, remember to adjust the number of electrons accordingly.

## Conclusion

In summary, the electron configurations worksheet answer key is an invaluable resource for reinforcing the fundamental concepts of electron arrangements in atoms. By understanding how to write and interpret these configurations,

students will gain insights into the behavior of elements and the principles that govern chemical interactions.

Educators can create engaging worksheets that facilitate learning and provide students with the confidence to tackle more complex topics in chemistry. Armed with a solid grasp of electron configurations, students will be better prepared for advanced studies in science.

## **Frequently Asked Questions**

### **What is an electron configuration worksheet?**

An electron configuration worksheet is a resource used to help students practice writing the electron configurations of different elements based on their atomic numbers.

### **How do I find the electron configuration for an element?**

To find the electron configuration for an element, you can use the periodic table to determine the number of electrons and then fill the orbitals according to the Aufbau principle, Hund's rule, and the Pauli exclusion principle.

### **What is the significance of the answer key in an electron configurations worksheet?**

The answer key provides students with the correct electron configurations for the elements covered in the worksheet, allowing them to check their work and understand any mistakes.

### **Are there common mistakes to watch for when completing an electron configuration worksheet?**

Common mistakes include incorrectly filling orbitals, overlooking the noble gas shorthand notation, and forgetting to follow the order of increasing energy levels.

### **Can I use the answer key to study for chemistry exams?**

Yes, using the answer key can help you verify your understanding of electron configurations, which is a key topic in chemistry, thus aiding your exam preparation.

## What is the general format for writing electron configurations?

The general format for writing electron configurations is to list the energy levels and sublevels in order, followed by the number of electrons in each sublevel, for example,  $1s^2 2s^2 2p^6$ .

## Is there a difference between electron configurations and orbital diagrams?

Yes, electron configurations are written representations that show the distribution of electrons among orbitals, while orbital diagrams visually depict the electrons in each orbital with arrows.

## Where can I find practice electron configuration worksheets with answer keys?

You can find practice electron configuration worksheets with answer keys on educational websites, in chemistry textbooks, or through online resources dedicated to chemistry education.

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