Chemistry Worksheet Electron Configuration

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Part 1: Foundational Knowledge

Which of the following is the correct electron configuration for a carbon atom?

Hint: Consider the number of electrons in a carbon atom.

- ◯ $1s^2\ 2s^2\ 2\ p^2$
- ◯ $1s^2\ 2s^2\ 2\ p^4$
- ◯ $1s^2\ 2s^1\ 2\ p^3$
- ◯ $1s^2\ 2s^2\ 3s^2$

Which of the following principles are used to determine electron configuration? (Select all that apply)

Hint: Think about the rules that govern how electrons are arranged in atoms.

- ☐ Aufbau Principle
- ☐ Pauli Exclusion Principle
- ☐ Hund's Rule
- ☐ Dalton's Law

Explain the significance of the Pauli Exclusion Principle in electron configuration.

Hint: Consider how this principle affects the arrangement of electrons in orbitals.

List the four types of atomic orbitals and their maximum electron capacities.

Hint: Think about the shapes and types of orbitals.

1. What are the four types of atomic orbitals?

2. What is the maximum electron capacity of s orbitals?

3. What is the maximum electron capacity of p orbitals?

4. What is the maximum electron capacity of d orbitals?

5. What is the maximum electron capacity of f orbitals?

Part 2: Understanding Electron Configuration

What is the principal quantum number for the outermost electrons in an oxygen atom?

Hint: Consider the electron configuration of oxygen.

- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4

Which elements are likely to have electron configurations that deviate from the expected order? (Select all that apply)

Hint: Think about the transition metals and their unique configurations.

- ☐ Chromium
- ☐ Copper
- ☐ Neon
- ☐ Argon

Describe how the periodic table is organized based on electron configurations.

Hint: Consider the arrangement of elements in rows and columns.

Part 3: Applying and Analyzing Concepts

If an element has the electron configuration [Ne] $3s^2$ 3 p^4, which element is it?

Hint: Identify the element based on its position in the periodic table.

- ◯ Sulfur
- ◯ Chlorine
- ◯ Phosphorus
- ◯ Argon

Which of the following electron configurations represent transition metals? (Select all that apply)

Hint: Consider the d-block elements in the periodic table.

- ☐ [Ar] $4s^2$ 3 d^{10}
- ☐ [Kr] $5s^2$ 4 d^{10} 5 p^6
- ☐ [Xe] $6s^2$ 4 f^{14} 5 d^{10}
- ☐ [Ne] $3s^2$ 3 p^6

Predict the electron configuration of an ion with a +2 charge that originally has the configuration [Ar] $4s^2$ 3 d^6.

Hint: Consider how the charge affects the electron count.

Which of the following statements best describes Hund's Rule?

Hint: Think about how electrons fill orbitals.

- ◯ Electrons fill the lowest energy orbitals first.
- ◯ No two electrons can have the same set of quantum numbers.
- ◯ Electrons will fill an unoccupied orbital before pairing up.
- ◯ Electrons in the same orbital must have opposite spins.

Part 4: Synthesis and Reflection

Which of the following elements would most likely form a +3 ion based on its electron configuration?

Hint: Consider the position of the element in the periodic table.

- ◯ Aluminum
- ◯ Silicon
- ◯ Phosphorus
- ◯ Sulfur

Evaluate the following statements and select those that correctly describe the relationship between electron configuration and chemical reactivity. (Select all that apply)

Hint: Think about how electron configurations influence reactivity.

- ☐ Elements with a full outer shell are generally unreactiv.
- ☐ Elements with one electron in their outer shell are highly reactive.
- ☐ Elements with half-filled d orbitals are more stable.
- ☐ Elements with similar electron configurations exhibit similar chemical properties.

Create a hypothetical element with an electron configuration that ends in $4f^{14}$ 5 d^{10} $6s^2$. Describe its potential properties and place in the periodic table.

Hint: Consider the characteristics of elements in the f-block.