Practice Electron Configuration Worksheet Questions and Answers PDF

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Part 1: Building a Foundation

Which principle states that electrons fill the lowest energy orbitals first?

Hint: Think about the order in which electrons occupy orbitals.

- ◯ A) Hund's Rule
- ◯ B) Pauli Exclusion Principle
- ◯ **C) Aufbau Principle ✓**
- ◯ D) Heisenberg Uncertainty Principle

> The Aufbau Principle states that electrons fill the lowest energy orbitals first.

Which of the following are types of atomic orbitals? (Select all that apply)

Hint: Consider the different shapes and types of orbitals.

- ☐ **A) s ✓**
- ☐ **B) p ✓**
- ☐ **C) d ✓**
- ☐ **D) g ✓**

> The types of atomic orbitals include s, p, d, and g.

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

Hint: Consider how this principle affects electron pairing in orbitals.

The Pauli Exclusion Principle states that no two electrons can have the same set of quantum numbers, which means that each orbital can hold a maximum of two electrons with opposite spins.

List the order of filling for the first four types of orbitals in an atom.

Hint: Think about the sequence in which orbitals are filled according to energy levels.

1. 1s

1s

2. 2s

2s

3. 2 p

2 p

4. 3s

3s

> The order of filling for the first four types of orbitals is: 1s, 2s, 2 p, 3s.

Which element has the electron configuration $1s^2$ $2s^2$ 2 p^6 $3s^2$ 3 p^6 $4s^1$?

Hint: Identify the element based on its electron configuration.

- ◯ **A) Potassium ✓**
- ◯ B) Calcium
- ◯ C) Argon
- ◯ D) Sodium

> The element with the electron configuration $1s^2$ $2s^2$ 2 p^6 $3s^2$ 3 p^6 $4s^1$ is Potassium.

Part 2: Comprehension and Application

Which of the following statements about Hund's Rule are true? (Select all that apply)

Hint: Consider how electrons occupy orbitals of the same energy.

- ☐ **A) Electrons fill degenerate orbitals singly before pairing. ✓**
- ☐ B) It applies only to s orbitals.
- ☐ **C) It minimizes electron repulsion. ✓**
- ☐ D) It is irrelevant for noble gases.

> Hund's Rule states that electrons fill degenerate orbitals singly before pairing, which minimizes electron repulsion.

Describe how the periodic table is organized in terms of electron configurations and blocks.

Hint: Think about the arrangement of elements and their electron configurations.

The periodic table is organized into blocks (s, p, d, f) based on the electron configurations of the elements, reflecting their valence electrons and chemical properties.

What is the electron configuration for an element in the d-block of the periodic table?

Hint: Consider the ending of the electron configuration for d-block elements.

- ◯ A) Ends in p
- ◯ **B) Ends in d ✓**
- ◯ C) Ends in s
- ◯ D) Ends in f

An element in the d-block of the periodic table has an electron configuration that ends in d.

Given the electron configuration [Ne] $3s^2$ 3 p^4, which element is this?

Hint: Identify the element based on its electron configuration.

- ☐ **A) Sulfur ✓**
- ☐ B) Chlorine
- ☐ C) Phosphorus
- ☐ D) Argon

The element with the electron configuration [Ne] $3s^2$ 3 p^4 is Sulfur.

Predict the chemical properties of an element with the electron configuration [Ar] $4s^2$ 3 d^{10} 4 p^5.

Hint: Consider the position of the element in the periodic table and its valence electrons.

An element with the electron configuration [Ar] $4s^2$ 3 d^{10} 4 p^5 is likely to exhibit properties similar to halogens, being highly reactive and capable of forming bonds with alkali metals.

Part 3: Analysis, Evaluation, and Creation

Analyze the following electron configurations and identify which are exceptions to the expected order. (Select all that apply)

Hint: Consider the typical order of filling and identify any deviations.

- [x] **A) [Ar] $4s^1$ 3 d^5 ✓**
- [ ] B) [Kr] $5s^2$ 4 d^{10} 5 p^6
- [ ] C) [Ar] $4s^2$ 3 d^{10} 4 p^6
- [x] **D) [Ar] $4s^1$ 3 d^{10} ✓**

> The exceptions to the expected order of electron configurations include [Ar] $4s^1$ 3 d^5 and [Ar] $4s^1$ 3 d^{10}.

Explain why chromium and copper have electron configurations that are exceptions to the Aufbau Principle.

Hint: Consider the stability of half-filled and fully filled subshells.

> **Chromium and copper have electron configurations that are exceptions to the Aufbau Principle because they achieve greater stability with half-filled (chromium) and fully filled (copper) d subshells.**

Which principle can be used to explain the electron configuration of transition metals?

Hint: Consider the principles that govern electron arrangement.

- ○ A) Hund's Rule
- ○ B) Pauli Exclusion Principle
- ○ C) Aufbau Principle
- ○ **D) All of the above ✓**

> The principles that can be used to explain the electron configuration of transition metals include Hund's Rule, Pauli Exclusion Principle, and the Aufbau Principle.

Evaluate the impact of electron configuration on the reactivity of alkali metals.

Hint: Consider how the electron configuration influences the behavior of alkali metals.

The electron configuration of alkali metals, which ends in s^1, makes them highly reactive as they readily lose their single valence electron to achieve a stable noble gas configuration.

Propose an electron configuration for a hypothetical element with an atomic number of 120, and justify your reasoning.

Hint: Consider the expected order of filling and the principles governing electron configurations.

1. [Rn] $5f^{14}$ $6s^2$ 6 p^6

[Rn] $5f^{14}$ $6s^2$ 6 p^6

A proposed electron configuration for an element with atomic number 120 could be [Rn] $5f^{14}$ $6s^2$ 6 p^6, following the expected order of filling and the principles of electron configuration.

Which of the following elements would likely form a +2 ion based on its electron configuration?

Hint: Consider the electron configurations of the elements listed.

- ◯ **A) Magnesium ✓**
- ◯ B) Sodium
- ◯ C) Aluminum
- ◯ D) Potassium

Magnesium would likely form a +2 ion based on its electron configuration, as it has two valence electrons that it can easily lose.