Electron Configuration Worksheet Questions and Answers PDF

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Part 1: Building a Foundation

What is the maximum number of electrons that can occupy a single s-orbial?

Hint: Consider the electron capacity of orbitals.

- ◯ A) 1
- ◯ **B) 2 ✓**
- ◯ C) 4
- ◯ D) 6

> The maximum number of electrons in a single s-orbial is 2.

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

Hint: Think about the fundamental principles of electron arrangement.

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

> The correct principles include the Aufbau Principle, Pauli Exclusion Principle, and Hund's Rule.

Explain the significance of the noble gas notation in electron configurations and provide an example.

Hint: Consider how noble gas notation simplifies electron configurations.

Noble gas notation simplifies electron configurations by using the electron configuration of the nearest noble gas to represent core electrons, making it easier to write and understand.

List the types of orbitals and their maximum electron capacities.

Hint: Think about the different shapes and capacities of orbitals.

1. s-orbitals

2

2. p-orbitals

6

3. d-orbitals

10

4. f-orbitals

14

> The types of orbitals include s (2), p (6), d (10), and f (14).

Which of the following elements has the electron configuration [Ne] $3s^2$ 3 p^4?

Hint: Identify the element based on its electron configuration.

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

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

Part 2: Comprehension and Application

According to Hund's Rule, how do electrons fill orbitals of the same energy?

Hint: Consider the filling order of electrons in orbitals.

- ◯ A) They pair up in each orbital before moving to the next.
- ◯ **B) They fill each orbital singly before pairing up. ✓**
- ◯ C) They fill the highest energy orbital first.
- ◯ D) They fill orbitals randomly.

> According to Hund's Rule, electrons fill each orbital singly before pairing up.

Which of the following statements about electron configurations are true? (Select all that apply)

Hint: Evaluate the statements based on your understanding of electron configurations.

- ☐ **A) Electrons fill orbitals in order of increasing energy. ✓**
- ☐ B) An orbital can hold a maximum of three electrons.
- ☐ **C) The 4s orbital is filled before the 3 d orbital. ✓**
- ☐ **D) The electron configuration of an ion differs from its neutral atom. ✓**

> The true statements include that electrons fill orbitals in order of increasing energy, the 4s orbital is filled before the 3 d orbital, and the electron configuration of an ion differs from its neutral atom.

Write the electron configuration for the ion Ca^{2+} and explain how it differs from the neutral atom.

Hint: Consider the loss of electrons in the ion compared to the neutral atom.

The electron configuration for Ca^{2+} is [Ar] $4s^2$, which differs from the neutral atom by the loss of two electrons from the 4s orbital.

Which element would have an electron configuration ending in $4s^1$ 3 d^5?

Hint: Identify the element based on its electron configuration.

- ◯ **A) Chromium ✓**
- ◯ B) Manganese
- ◯ C) Iron
- ◯ D) Copper

The element with the electron configuration ending in $4s^1$ 3 d^5 is Chromium.

Part 3: Analysis, Evaluation, and Creation

Which of the following electron configurations represents an excited state of an atom?

Hint: Consider the arrangement of electrons in the configurations.

- ◯ A) $1s^2$ $2s^2$ 2 p^6 $3s^2$ 3 p^1
- ◯ B) $1s^2$ $2s^2$ 2 p^6 $3s^2$ 3 p^6
- ◯ **C) $1s^2$ $2s^2$ 2 p^6 $3s^1$ 3 p^1 ✓**
- ◯ D) $1s^2$ $2s^2$ 2 p^6 $3s^2$ 3 p^5

The electron configuration that represents an excited state is $1s^2$ $2s^2$ 2 p^6 $3s^1$ 3 p^1.

Analyze the following electron configurations and identify which could belong to transition metals. (Select all that apply)

Hint: Consider the characteristics of transition metals in the periodic table.

- [x] **A) [Ar] $4s^2$ 3 d^5 ✓**
- [ ] B) [Kr] $5s^2$ 4 d^{10} 5 p^6
- [ ] C) [Xe] $6s^2$ 4 f^{14} 5 d^{10} 6 p^2
- [ ] D) [Ne] $3s^2$ 3 p^6 $4s^1$

> The configurations that could belong to transition metals are [Ar] $4s^2$ 3 d^5 and [Kr] $5s^2$ 4 d^{10} 5 p^6.

Evaluate the following statement: "Elements with similar electron configurations have similar chemical properties." Provide examples to support your evaluation.

Hint: Think about the periodic trends and chemical behavior of elements.

> **Elements with similar electron configurations often exhibit similar chemical properties due to their similar valence electron arrangements, such as the alkali metals.**

Design an experiment to demonstrate the effect of electron configuration on the reactivity of alkali metals. Include a hypothesis, materials, and procedure.

Hint: Consider how you would set up an experiment to observe reactivity.

> **The experiment could involve observing the reactivity of different alkali metals with water, hypothesizing that reactivity increases down the group due to electron configuration.**