# Atomic Trends Worksheet

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## Part 1: Foundational Knowledge

**What is the atomic number of an element?**

*Hint: Think about what defines the identity of an element.*

- ◯ The number of neutrons in an atom
- ◯ The number of protons in an atom
- ◯ The total number of protons and neutrons
- ◯ The number of electrons in an atom

**Which of the following statements about isotopes are true?**

*Hint: Consider the definitions of isotopes and their properties.*

- ☐ Isotopes have the same number of protons.
- ☐ Isotopes have different numbers of neutrons.
- ☐ Isotopes have different atomic numbers.
- ☐ Isotopes have the same chemical properties.

**Describe the relationship between atomic number and the identity of an element.**

*Hint: Consider how the atomic number determines the element's properties.*

**List two characteristics that differentiate metals from nonmetals.**

*Hint: Think about physical and chemical properties.*

1. Characteristic 1

2. Characteristic 2

**Which trend is observed in atomic radius as you move across a period from left to right?**

*Hint: Consider how the number of protons affects the size of the atom.*

- ◯ It increases.
- ◯ It decreases.
- ◯ It remains constant.
- ◯ It varies unpredictably.

## Part 2: Understanding Periodic Trends

**Which factors contribute to the increase in ionization energy across a period?**

*Hint: Think about the effects of nuclear charge and electron configuration.*

- ☐ Increased nuclear charge
- ☐ Decreased atomic radius
- ☐ Increased electron shielding
- ☐ Decreased electron affinity

**Explain why electronegativity generally increases across a period.**

*Hint: Consider the role of nuclear charge and electron attraction.*

**Identify two elements that are exceptions to the general trend of electron affinity and explain why.**

*Hint: Think about the electron configurations of these elements.*

1. Element 1

2. Element 2

## Part 3: Applying Knowledge and Analyzing Relationships

**If an element has a high electronegativity, what type of bond is it likely to form with a metal?**

*Hint: Consider the nature of the bond formed between different types of elements.*

- ◯ Ionic bond
- ◯ Covalent bond
- ◯ Metallic bond
- ◯ Hydrogen bond

**Which of the following scenarios would result in a decrease in atomic radius?**

*Hint: Think about the effects of electron loss or gain on atomic size.*

- ☐ An atom loses an electron.
- ☐ An atom gains an electron.
- ☐ An atom forms a cation.
- ☐ An atom forms an an ion.

**Predict how the reactivity of alkali metals changes as you move down the group and explain why.**

*Hint: Consider the trends in atomic size and electron shielding.*

**Which of the following best explains the decrease in atomic radius across a period?**

*Hint: Think about the relationship between nuclear charge and electron shielding.*

- ◯ Increased electron shielding
- ◯ Increased nuclear charge
- ◯ Decreased nuclear charge
- ◯ Decreased electron shielding

**Analyze the following elements: Na, Mg, and Al. Which statements are true regarding their ionization energies?**

*Hint: Consider the trends in ionization energy across periods.*

- ☐ Na has the lowest ionization energy.
- ☐ Al has the highest ionization energy.
- ☐ Mg has a higher ionization energy than Na.
- ☐ Al has a lower ionization energy than Mg.

## Part 4: Synthesis and Reflection

**Which element would you predict to have the highest electron affinity based on its position in the periodic table?**

*Hint: Consider the trends in electron affinity across periods and groups.*

- ◯ Fluorine
- ◯ Oxygen
- ◯ Chlorine
- ◯ Nitrogen

**Evaluate the following statements and select those that correctly describe the reactivity of halogens.**

*Hint: Think about the trends in reactivity among halogens.*

- [ ] Reactivity decreases down the group.
- [ ] Reactivity increases down the group.
- [ ] Halogens form ionic bonds with metals.
- [ ] Halogens form covalent bonds with nonmetals.

**Propose a real-world application that utilizes the high reactivity of alkali metals and explain the underlying atomic trend that makes this application possible.**

*Hint: Consider how alkali metals react with water or halogens.*

**Create a hypothetical element with unique properties based on known periodic trends. Describe its atomic number, likely chemical properties, and potential uses.**

*Hint: Think about how the position in the periodic table influences properties.*

1. Atomic Number

2. Chemical Properties

3. Potential Uses