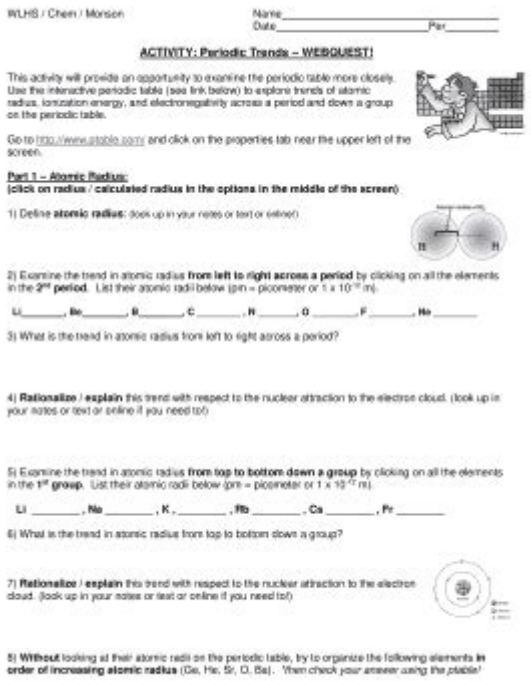
Activity Periodic Trends Webquest Answer Key



WLHS / Chem / Monson

Name:_____
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ACTIVITY: Periodic Trends – WEBQUEST!

This activity will provide an opportunity to examine the periodic table more closely. Use the interactive periodic table (see link below) to explore trends of atomic radius, ionization energy, and electronegativity across a period and down a group on the periodic table.

Go to http://www.ptable.com/ and click on the properties tab near the upper left of the screen.

Part 1 – Atomic Radius:
(click on radius / calculated radius in the options in the middle of the screen)

1) Define **atomic radius**: (look up in your notes or text or online!)

2) Examine the trend in atomic radius **from left to right across a period** by clicking on all the elements in the **2nd period**. List their atomic radii below (pm = picometer or 1 x 10^{-12} m).

Li_____, Be_____, B_____, C_____, N_____, O_____, F_____, Ne_____

3) What is the trend in atomic radius from left to right across a period?

4) **Rationalize / explain** this trend with respect to the nuclear attraction to the electron cloud. (look up in your notes or text or online if you need to!)

5) Examine the trend in atomic radius **from top to bottom down a group** by clicking on all the elements in the **1st group**. List their atomic radii below (pm = picometer or 1 x 10^{-12} m).

Li _____, Na _____, K _____, Rb _____, Cs _____, Fr _____

6) What is the trend in atomic radius from top to bottom down a group?

7) **Rationalize / explain** this trend with respect to the nuclear attraction to the electron cloud. (look up in your notes or text or online if you need to!)

8) **Without** looking at their atomic radii on the periodic table, try to organize the following elements **in order of increasing atomic radius** (Ge, He, Sr, O, Ba). *Then check your answer using the ptable!*

Activity Periodic Trends Webquest Answer Key is an essential tool for educators and students exploring the intricacies of the periodic table and the trends that govern the behavior of elements. In today's science classes, understanding periodic trends such as atomic radius, electronegativity, ionization energy, and others is crucial for grasping how elements interact in chemical reactions. This article provides a comprehensive overview of periodic trends, detailing what they are, how they are assessed in a webquest format, and the answer key that can guide learners through this educational journey.

Understanding Periodic Trends

Periodic trends refer to the predictable patterns observed in the properties of elements as one moves across a period (row) or down a group (column) in the periodic table. These trends arise from the underlying atomic structure and the arrangement of electrons within atoms. Here are the primary periodic trends:

1. Atomic Radius

The atomic radius is a measure of the size of an atom. It is typically defined as the distance from the nucleus to the outermost electron shell.

- Trend Across a Period: As you move from left to right across a period, the atomic radius decreases. This is due to the increasing positive charge in the nucleus, which pulls electrons closer.
- Trend Down a Group: As you move down a group, the atomic radius increases. This is because additional electron shells are added, making the atom larger.

2. Ionization Energy

Ionization energy is the energy required to remove an electron from an atom in its gaseous state.

- Trend Across a Period: Ionization energy generally increases from left to right across a period due to increased nuclear charge, making it harder to remove electrons.
- Trend Down a Group: Ionization energy decreases down a group because the outer electrons are farther from the nucleus and are shielded by inner electrons.

3. Electronegativity

Electronegativity is a measure of an atom's ability to attract and hold onto electrons when bonded to another atom.

- Trend Across a Period: Electronegativity increases from left to right across a period as atoms become more effective at attracting electrons due to higher nuclear charges.
- Trend Down a Group: Electronegativity decreases down a group due to increased distance from the nucleus and shielding.

4. Electron Affinity

Electron affinity is the energy change that occurs when an electron is added to a neutral atom.

- Trend Across a Period: Generally, electron affinity becomes more negative (indicating a greater tendency to gain electrons) from left to right across a period.
- Trend Down a Group: Electron affinity tends to become less negative as you move down a group due to increased atomic size.

Webquest Format for Learning Periodic Trends

A webquest is an inquiry-oriented lesson format in which most or all of the information that learners work with comes from the web. In the context of periodic trends, a webquest can effectively engage students in exploring these concepts through interactive online resources.

Components of a Periodic Trends Webquest

1. Introduction: Provide students with background information on periodic trends.
2. Task: Clearly outline what students are expected to accomplish, such as creating a presentation or report on periodic trends.
3. Process: Detail the steps students should follow to complete the task, including specific websites and resources to explore.
4. Resources: List reliable online resources, including educational websites, videos, and articles that provide information on periodic trends.
5. Evaluation: Include a rubric to assess student understanding and presentation of periodic trends.
6. Conclusion: Summarize what students should have learned about periodic trends and their importance in chemistry.

Sample Questions for the Webquest

1. What is the trend in atomic radius as you move from left to right across a period? Explain why this trend occurs.
2. How does ionization energy change as you go down a group in the periodic table? Provide reasoning for this trend.
3. Compare the electronegativity of elements in Group 1 and Group 17. What implications does this have for chemical bonding?
4. Describe the trend in electron affinity across Period 2 and provide examples of elements demonstrating this trend.

Answer Key for Webquest Questions

Providing an answer key is crucial for educators to assess student understanding and to guide discussions. Here are the answers to the sample questions proposed above:

1. Trend in Atomic Radius

- As you move from left to right across a period, the atomic radius decreases. This occurs because the increasing nuclear charge pulls the electrons closer to the nucleus, reducing the size of the atom.

2. Change in Ionization Energy

- Ionization energy increases as you go down a group. This is due to the increased distance of the outermost electrons from the nucleus, which decreases the effective nuclear charge felt by these electrons, making them easier to remove.

3. Comparison of Electronegativity

- Elements in Group 1 (alkali metals) have low electronegativity, while

elements in Group 17 (halogens) have high electronegativity. This difference leads to strong bonding characteristics in halogens, making them highly reactive with elements that have low electronegativity.

4. Trend in Electron Affinity Across Period 2

- Across Period 2, electron affinity generally becomes more negative. For example, fluorine has a higher (more negative) electron affinity compared to lithium, indicating a stronger tendency to gain an electron.

Conclusion

The Activity Periodic Trends Webquest Answer Key not only facilitates the learning process for students but also serves as a vital resource for teachers to assess understanding. Through the exploration of periodic trends, students gain insights into the behavior of elements, which is foundational for further studies in chemistry and related fields. Engaging with these concepts through a webquest format enhances critical thinking and research skills, preparing students for future scientific endeavors. By mastering these trends, learners can appreciate the interconnectedness of chemical properties and the periodic table's role in organizing elements based on their behaviors and characteristics.

Frequently Asked Questions

What are periodic trends in chemistry?

Periodic trends are predictable patterns in the properties of elements that are observed across different periods and groups in the periodic table, including atomic radius, ionization energy, electronegativity, and electron affinity.

How does atomic radius change across a period and down a group?

Atomic radius decreases across a period from left to right due to increasing nuclear charge, which pulls electrons closer to the nucleus. Conversely, atomic radius increases down a group as additional electron shells are added.

What is ionization energy and how does it vary in the periodic table?

Ionization energy is the amount of energy required to remove an electron from an atom. It generally increases across a period due to increased nuclear charge and decreases down a group as electrons are removed from higher energy levels.

What is electronegativity and why is it important?

Electronegativity is the tendency of an atom to attract electrons in a chemical bond. It is important because it helps predict how atoms will

interact in chemical reactions and the type of bonds they will form.

What are the exceptions to periodic trends?

Exceptions to periodic trends can occur due to electron configurations, such as in the case of transition metals where electron-electron repulsions and subshell filling can lead to unexpected ionization energies and atomic radii.

How can a webquest be used to teach periodic trends?

A webquest for teaching periodic trends can guide students through online resources to research specific trends, complete interactive activities, and apply their knowledge through assessments, promoting engagement and active learning.

What are some common activities included in a periodic trends webquest?

Common activities in a periodic trends webquest may include data analysis of element properties, interactive periodic table explorations, quizzes on trend predictions, and group discussions on the implications of these trends in real-world applications.

Activity Periodic Trends Webquest Answer Key

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