

Electron Affinity Quiz Questions and Answers PDF

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Provide an example of an anomaly in electron affinity trends and explain the reason behind it.

The anomaly occurs between nitrogen and oxygen; nitrogen has a higher electron affinity than oxygen.

Explain why electron affinity generally increases across a period in the periodic table.

Electron affinity generally increases across a period in the periodic table because as you move from left to right, the effective nuclear charge increases, leading to a stronger attraction between the nucleus and the incoming electron.

Discuss why elements with nearly full outer shells have high electron affinities.

Elements with nearly full outer shells, such as halogens, have high electron affinities because they are one electron short of a full valence shell, making the addition of an electron highly favorable and energetically advantageous.

How does atomic size affect electron affinity, and why?

As atomic size increases, the distance between the nucleus and the outermost electrons increases, resulting in a weaker attraction for additional electrons and thus lower electron affinity.

Describe the role of electron affinity in determining an element's chemical reactivity.

Electron affinity plays a crucial role in determining an element's chemical reactivity by indicating how readily an atom can accept an electron, with higher electron affinity correlating to greater reactivity, especially in nonmetals.

Which of the following statements about electron affinity trends is true? (Select all that apply)

- Electron affinity increases across a period ✓

- Electron affinity decreases down a group ✓**
- Electron affinity is higher for larger atoms
- Electron affinity is unaffected by electron configuration

Electron affinity generally increases across a period from left to right and decreases down a group. This trend is due to the increasing nuclear charge and decreasing atomic radius, which enhance the attraction of added electrons.

Which unit is commonly used to measure electron affinity?

- Joules
- Newtons
- Electronvolts (eV) ✓**
- Amperes

Electron affinity is commonly measured in electron volts (eV) or kilojoules per mole (kJ/mol). These units reflect the energy change associated with the addition of an electron to a neutral atom.

Which factor does NOT influence electron affinity?

- Atomic size
- Nuclear charge
- Electron configuration
- Number of neutrons ✓**

Electron affinity is primarily influenced by atomic size, nuclear charge, and electron shielding. However, factors such as the presence of isotopes do not affect electron affinity.

Which of the following factors influence electron affinity? (Select all that apply)

- Atomic size ✓**
- Nuclear charge ✓**
- Number of isotopes
- Electron configuration ✓**

Electron affinity is influenced by several factors including atomic size, nuclear charge, and electron shielding. These factors determine how easily an atom can gain an electron and the energy change associated with that process.

What is electron affinity?

- The energy change when an electron is added to a neutral atom ✓
- The energy required to remove an electron from an atom
- The tendency of an atom to lose electrons
- The energy required to add a proton to an atom

Electron affinity is the amount of energy released when an electron is added to a neutral atom in the gas phase, resulting in the formation of a negative ion. It reflects the tendency of an atom to attract and hold onto an additional electron.

Why might an element have a lower than expected electron affinity? (Select all that apply)

- It has a half-filled orbital ✓
- It is a noble gas ✓
- It has a high atomic number
- It has a small atomic radius

An element may have a lower than expected electron affinity due to its electron configuration, particularly if it is already stable or has a filled subshell, or if the addition of an electron leads to increased electron-electron repulsion.

How can electron affinity be measured experimentally, and what challenges might arise in its measurement?

Electron affinity can be measured using photoelectron spectroscopy, where the energy of electrons emitted from atoms or molecules is analyzed, or by examining the energy changes in gas-phase reactions when an electron is added to an atom or ion. Challenges include the need for high precision in measurements and the potential influence of surrounding molecular interactions.

Which element is likely to have the highest electron affinity?

- Fluorine ✓
- Neon
- Sodium

Lithium

Chlorine is likely to have the highest electron affinity among the elements, as it readily accepts an electron to achieve a stable noble gas configuration. This property is due to its high electronegativity and position in the periodic table.

What are some applications of electron affinity? (Select all that apply)

- Designin semiconductors ✓
- Predictin weather patterns
- Understanding chemical reactivity ✓
- Biological electron transfer processes ✓

Electron affinity is crucial in understanding chemical bonding and reactivity, particularly in predicting the formation of anions and the stability of ionic compounds. It also plays a significant role in various applications such as semiconductor technology, electrochemistry, and materials science.

Which elements typically have low or positive electron affinities? (Select all that apply)

- Noble gases ✓
- Alkali metals ✓
- Halogens
- Transition metals

Elements with low or positive electron affinities are typically found among the noble gases and some alkaline earth metals, as they do not readily gain electrons due to their stable electron configurations.

Which of the following elements has an electron affinity anomaly due to a half-filled p orbital?

- Oxygen
- Nitrogen ✓
- Carbon
- Borom

The element that exhibits an electron affinity anomaly due to a half-filled p orbital is nitrogen. This is because nitrogen has a half-filled p subshell configuration, which makes it less favorable to gain an additional electron compared to other elements in its group.

In which direction does electron affinity generally increase across the periodic table?

- From right to left

- From top to bottom
- From left to right ✓
- It remains constant

Electron affinity generally increases from left to right across a period in the periodic table. This trend is due to the increasing nuclear charge, which attracts electrons more strongly as you move towards the right.

Why do noble gases have low electron affinities?

- They have high atomic masses
- They have complete valence shells ✓
- They are highly reactive
- They have low atomic numbers

Noble gases have low electron affinities because they possess a complete valence shell, making them stable and less likely to gain additional electrons. This stability results in minimal energy change when an electron is added, leading to low electron affinity values.

Which elements are likely to have high electron affinities? (Select all that apply)

- Chlorine ✓
- Argon
- Oxygen ✓
- Potassium

Elements with high electron affinities are typically found in the halogen group (Group 17) of the periodic table, such as fluorine and chlorine, as they readily gain electrons to achieve a stable electron configuration.

What happens to electron affinity as you move down a group in the periodic table?

- It increases
- It decreases ✓
- It remains the same
- It fluctuates randomly

As you move down a group in the periodic table, electron affinity generally decreases due to increased atomic size and shielding effects, which make it less favorable for an atom to attract additional electrons.