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I spend countless hours writing, researching, editing and generating graphics/charts for each question. I want to continue creating useful content for you to use - however, I also want to ensure my work is fairly compensated.

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Thank you for supporting us. And, we look forward to helping you with your teaching practice. Please feel free to reach out to us if you have any questions or suggestions.

Sincerely,

Kent
REAL Science Challenge Founder
Science Department Head (Burnaby South Secondary)

1st Attempt



You

Write three multiple choice questions about atomic structure and subatomic particles: one question for the beginner learner, one question for the proficient learner, and one question for the advanced student. Include the answer key and reasons as to why each distractor is incorrect.



ChatGPT

Beginner Learner:

Question:

Which subatomic particle carries a negative charge?

- A) Proton
- B) Electron
- C) Neutron
- D) Photon

Answer:

B) Electron

Explanation:

Electrons carry a negative charge. Protons carry a positive charge, neutrons carry no charge, and photons are particles of light and do not have a charge.

Proficient Learner:

Question:

What is the total number of protons and neutrons in the nucleus of an atom with atomic number 20 and mass number 40?

- A) 20
- B) 40
- C) 60
- D) 80

Answer:

C) 60

Explanation:

The atomic number (Z) is the number of protons, which is 20 in this case. The mass number (A) is the sum of protons and neutrons, so neutrons = $A - Z = 40$. Therefore, protons + neutrons = $20 + 40 = 60$.

Advanced Student:**Question:**

If an atom is in an excited state, which electron transition is most likely to result in the emission of a photon?

- A) $n = 1$ to $n = 2$
- B) $n = 2$ to $n = 3$
- C) $n = 3$ to $n = 4$
- D) $n = 4$ to $n = 5$

Answer:

- C) $n = 3$ to $n = 4$

Explanation:

The emission of a photon occurs when an electron transitions from a higher energy level to a lower energy level. The energy levels are represented by quantum numbers (n). As the electron transitions from a higher (initial) level ($n = 3$) to a lower (final) level ($n = 4$), energy is released in the form of a photon. The other options involve transitions to higher energy levels, which would require energy input rather than release.

2nd Attempt



You

Write three multiple choice questions about atomic structure and subatomic particles: one question for the beginner learner, one question for the proficient learner, and one question for the advanced student. The questions should be based on the next generation science standards in middle school chemistry. Include the answer key and reasons as to why each distractor is incorrect.



ChatGPT

Beginner Learner (NGSS MS-PS1-1):

Question:

What is the charge of an electron?

- A) Positive
- B) Negative
- C) Neutral
- D) Variable

Answer:

- B) Negative

Explanation:

Electrons carry a negative charge. Protons carry a positive charge, and neutrons are neutral, having no charge. The term "variable" does not accurately describe the charge of an electron.

Advanced Student (NGSS MS-PS1-5):

Question:

In the context of atomic structure, what is meant by the term "quantum leap"?

- A) Rapid movement of electrons within an energy level
- B) Transition of electrons between energy levels
- C) Change in the number of protons in the nucleus
- D) Transformation of a neutron into a proton

Answer:

- B) Transition of electrons between energy levels

Explanation:

A "quantum leap" refers to the abrupt movement of an electron between energy levels, typically accompanied by the absorption or emission of energy. Rapid movement within an energy level (option A) does not involve a change in energy state. Changes in the number of protons (option C) or the transformation of neutrons into protons (option D) are unrelated to the concept of a quantum leap in the context of electrons and energy levels.

Proficient Learner (NGSS MS-PS1-4):

Question:

How do isotopes of an element differ from each other?

- A) Number of electrons
- B) Number of protons
- C) Number of neutrons
- D) Atomic mass

Answer:

- C) Number of neutrons

Explanation:

Isotopes of an element have the same number of protons (which defines the element) but differ in the number of neutrons. The number of electrons is the same for isotopes of an element. Atomic mass is influenced by the combined mass of protons and neutrons, but it is not what makes isotopes different from each other.

3rd Attempt



You

Write three multiple choice questions about atomic structure and subatomic particles: one question for the beginner learner, one question for the proficient learner, and one question for the advanced student. The questions should be based on the next generation science standards in high school chemistry. Include the answer key and reasons as to why each distractor is incorrect.



ChatGPT

Beginner Learner (NGSS HS-PS1-1):

Question:

Which subatomic particle is responsible for determining the chemical properties of an element?

- A) Proton
- B) Electron
- C) Neutron
- D) Photon

Answer:

B) Electron

Explanation:

Electrons are involved in chemical reactions and determine an element's chemical properties. Protons and neutrons are located in the nucleus and do not directly participate in chemical reactions. Photons are particles of light and are not subatomic particles.

Proficient Learner (NGSS HS-PS1-2):

Question:

How does the number of electrons in a neutral atom relate to its atomic number?

- A) It is always greater than the atomic number.
- B) It is always equal to the atomic number.
- C) It is always less than the atomic number.
- D) It is unrelated to the atomic number.

Answer:

B) It is always equal to the atomic number.

Explanation:

The atomic number represents the number of protons in an atom, and in a neutral atom, the number of electrons is equal to the number of protons. Options A and C are incorrect because the number of electrons and protons in a neutral atom is the same. Option D is incorrect because the number of electrons is related to the atomic number.

Advanced Student (NGSS HS-PS1-8):

Question:

When an electron absorbs energy and moves to a higher energy level, what happens when it returns to its original energy level?

- A) It emits a photon of lower energy.
- B) It emits a photon of higher energy.
- C) It releases a neutron.
- D) It undergoes nuclear fission.

Answer:

A) It emits a photon of lower energy.

Explanation:

When an electron moves to a higher energy level, it absorbs energy. Upon returning to its original energy level, it releases this absorbed energy in the form of a photon.

Options B, C, and D are incorrect because they do not accurately describe the process of electron transitions between energy levels.

To see complete ChatGPT query, please go to:

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