# Answers to Questions of lesson 3: U2Ch4L2

## Essential Question

1. How does the Bohr model explain the emission of light from excited atoms?  
 - The Bohr model shows that electrons move in fixed energy levels. When an electron absorbs energy, it jumps to a higher level. When it falls back, it releases energy as light. The color of the light depends on the energy difference between the levels.

## Lesson Phenomenon

2. Why do you think different elements emit different colors? How might this relate to the movement of electrons?  
 - Each element has a unique setup of energy levels. When electrons jump between these levels, they release light with different energies. These differences create unique colors for each element.

## Progress Check 1

3. Explain how the concept of energy levels helps to describe the arrangement of electrons in an atom and why electrons in higher energy levels are farther from the nucleus.  
 - Energy levels show where electrons are likely to be found. Higher energy levels are farther from the nucleus because the electrons have more energy to resist the pull of the nucleus.

## Progress Check 2

4. Compare how the Bohr model and the quantum mechanical model explain the behavior of electrons in an atom. What are the key differences, and how do these differences affect our understanding of atomic structure?  
 - The Bohr model shows electrons in fixed orbits, while the quantum model shows them in cloud-like areas. The quantum model is more accurate because it explains electron behavior in terms of probability, not fixed paths.

## Progress Check 3

5. Why do different elements emit different colors of light?  
 - Each element has unique energy levels. Electrons moving between these levels release light with different energies, creating different colors.

6. What is a photon, and how is it different from protons?  
 - A photon is a particle of light, carrying energy but no mass. A proton is a particle in the nucleus, with a positive charge and mass.

7. Describe what happens when an electron in an atom absorbs a photon.  
 - The electron gains energy and moves to a higher energy level. This process is called excitation.

8. Distinguish between absorption and emission spectra.  
 - **Absorption spectra** show dark lines where light is absorbed by electrons moving to higher levels. Emission spectra show bright lines where electrons release energy as light when falling to lower levels.

## Lesson Check

9. How does the Bohr model explain the emission of light from excited atoms, and why are these emissions seen as specific colors?  
 - The Bohr model shows electrons jumping between fixed energy levels. The specific colors come from the energy released when electrons fall to lower levels, with each jump creating light of a certain wavelength.

10. Explain why the sodium streetlights give off a yellow glow when energized.  
 - Sodium atoms have energy levels that release light in the yellow range when electrons drop from higher levels. This creates the yellow glow of sodium lights.

11. Describe what happens when an electron absorbs a photon. What changes occur within the atom?  
 - The electron moves to a higher energy level, gaining energy. The atom becomes excited but unstable, so the electron eventually falls back, releasing energy.

12. How can the unique arrangement of energy levels in each element help scientists identify unknown elements through their emission spectra? Provide an example.  
 - Each element has unique energy levels that create a unique spectrum. For example, hydrogen’s emission spectrum shows distinct red, blue, and violet lines, helping scientists identify it.

## Beyond the Lesson

13. How are the concepts of energy levels, electron transitions, and atomic spectra applied in real-world technologies such as neon signs, lasers, streetlights, and fireworks?  
 - These concepts explain how electrons release energy as light. In neon signs, electricity excites electrons, creating bright colors. Lasers focus light from transitions. Fireworks use specific elements to produce different colors.