

Hydrogen Models – Pretest

Answer the following questions.

Question 1: Which of the following is closest to the speed of light in a vacuum?

- a) 3.00×10^8 m/s
- b) 1.86×10^8 m/s
- c) 1.86×10^5 m/s
- d) 186,000 m/s
- e) 3.00×10^5 m/s

Question 2: How is the energy of a photon related to the photon's wavelength?

- a) directly proportional
- b) inversely proportional
- c) none of the above

Question 3: Which wavelength of light below has the highest frequency?



Question 4: An electron has what kind of charge?

- a) positive
- b) negative
- c) neutral

Question 5: Select all the terms which apply to or are consistent with the quantum model.

- a) electrons can only have certain discrete binding energies
- b) electrons can be found anywhere inside an "electron cloud" around the atom
- c) electrons move around the nucleus in fixed distance "orbits"
- d) electrons can exist around the atom with any particular energy

Question 6: The 2nd excited state refers to which number orbital?

- a) 0th orbital
- b) 1st orbital
- c) 2nd orbital
- d) 3rd orbital
- e) 4th orbital
- f) 5th orbital

Question 7: An electron in the 1st orbital has a binding energy of -13.6 eV. The next highest orbital has a binding energy of -3.4 eV. What happens if a photon of 0.3 eV "hits" the atom?

- a) It will pass through the atom without affecting the electron.
- b) It will excite the atom to the 2nd orbital.
- c) It will ionize the atom.
- d) None of the above.

Question 8: Which type of light below is less energetic than visible light?

- a) ultraviolet light
- b) infrared light
- c) both infrared and ultraviolet are more energetic than visible light
- d) both infrared and ultraviolet are less energetic than visible light

Question 9: An electron is in the 1st orbital and has a binding energy of -13.6 eV. The binding energy of the next orbital is -3.4 eV. What range of energies will “miss” the electron?

- a) 0 eV to 13.6 eV
- b) 10.2 to 13.6 eV
- c) 0 eV to 10.2 eV
- d) >13.6 eV

Question 10: What event can be associated with the transition shown in the figure?

- a) a photon was absorbed
- b) a photon was emitted



Question 11: Given a low density cloud of Hydrogen atoms, what happens when the temperature of the cloud is increased?

- a) The number of electrons in the excited states increases.
- b) The Hydrogen atoms move faster but the number of electrons in each orbital stays basically the same.
- c) None of the above.