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Question 1

2 / 2 points

Which electron energy will produce the largest cutoff wavelength for X-ray production from a nickel ($Z = 28$) surface?

- a) 40 keV
- b) 35 keV
- c) 30 keV
- d) 45 keV
- e) 25 keV

Question 2

2 / 2 points

Consider the following list of electron configurations:

- (1) $1s^2 2s^2 3s^2$
- (2) $1s^2 2s^2 2p^6$
- (3) $1s^2 2s^2 2p^6 3s^1$
- (4) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$
- (5) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$

Reference: Ref 30-3

Which one of the above configurations represents a transition element?

- a) 5
- b) 3
- c) 4
- d) 2
- e) 1

Question 3

2 / 2 points

Complete the following statement: An individual copper atom emits electromagnetic radiation with wavelengths that are

- a) the same as other elements in the same column of the periodic table.
- b) unique to that particular copper atom.
- c) evenly spaced across the spectrum.
- d) the same as those of all elements.
- e) unique to all copper atoms.

Question 4

2 / 2 points

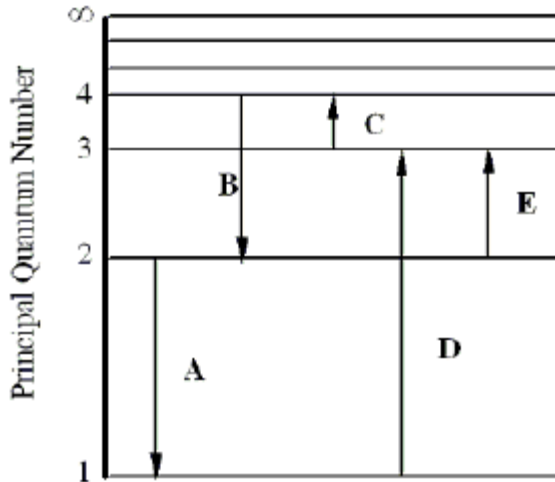
Why was it necessary for Bohr to require that electrons remain in *stationary orbits*?

- a) No two electrons can be in the same region in the atom.
- b) An electron must travel in a circular path.
- c) It was required by the Heisenberg uncertainty principle.
- d) Classical physics predicts that the electron should spiral into the nucleus.
- e) It was required by the Pauli exclusion principle.

Question 5

2 / 2 points

The figure shows an energy level diagram for the hydrogen atom. Several transitions are shown and are labeled by letters.



Note: The diagram is not drawn to scale.

Reference: Ref 30-4

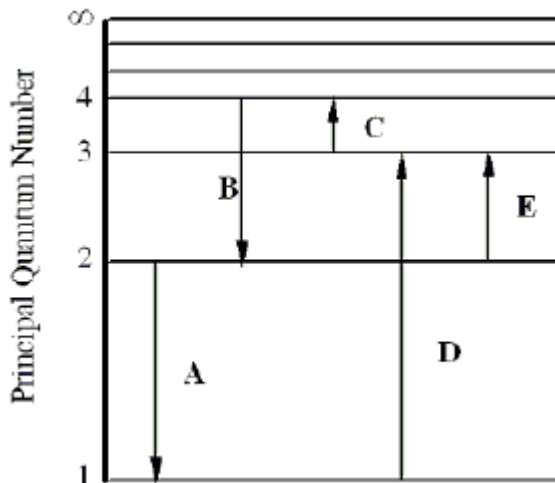
Determine the energy of the photon involved in transition **E**.

- a) 1.5 eV
- b) 12.1 eV
- c) 3.4 eV
- d) 10.2 eV
- e) 1.9 eV

Question 6

2 / 2 points

The figure shows an energy level diagram for the hydrogen atom. Several transitions are shown and are labeled by letters.



Note: The diagram is not drawn to scale.

Reference: Ref 30-4

Which transition will occur when a hydrogen atom is irradiated with radiation of wavelength 103 nm?

- a) **A**
- b) **D**
- c) **B**
- d) **E**

e)

C

Question 7

2 / 2 points

Which one of the following factors best explains why the six electrons of a carbon atom are not all in the 1s state?

- a) electron spin
- b) Rutherford model of atomic structure
- c) Pauli exclusion principle
- d) Coulomb's law
- e) Heisenberg uncertainty principle

Question 8

2 / 2 points

An atom will emit photons when one of its electrons goes from

- a) the M shell to the N shell.
- b) the K shell to the M shell.
- c) the K shell to the L shell.
- d) the N shell to the L shell.
- e) the K shell to the N shell.

Question 9

2 / 2 points

Use the Bohr model to estimate the K_{α} X-ray wavelength for a gold atom ($Z = 79$).

- a) 2.47×10^{-13} m
- b) 2.00×10^{-11} m
- c) 3.60×10^{-11} m
- d) 5.13×10^{-10} m
- e) 8.54×10^{-10} m

Question 10

2 / 2 points

The kinetic energy of the ground state electron in hydrogen is +13.6 eV. What is its potential energy?

- a) +27.2 eV
- b) -27.2 eV
- c) -13.6 eV
- d) zero eV
- e) +56.2 eV