

- In Rutherford's gold foil experiments, some alpha particles were deflected from their original paths but most passed through the foil with no deflection. Which statement about gold atoms is supported by these experimental observations?
  - Gold atoms consist mostly of empty space.
  - Gold atoms are similar to alpha particles.
  - Alpha particles and gold nuclei have opposite charges.
  - Alpha particles are more dense than gold atoms.
- Which group of atomic models is listed in historical order from the earliest to the most recent?
  - hard-sphere model, wave-mechanical model, electron-shell model
  - hard-sphere model, electron-shell model, wave-mechanical model
  - electron-shell model, wave-mechanical model, hard-sphere model
  - electron-shell model, hard-sphere model, wave-mechanical model
- The modern model of the atom is based on the work of
  - one scientist over a short period of time
  - one scientist over a long period of time
  - many scientists over a short period of time
  - many scientists over a long period of time
- According to the wave-mechanical model of the atom, electrons in an atom
  - travel in defined circles
  - are most likely found in an excited state
  - have a positive charge
  - are located in orbitals outside the nucleus
- According to the electron-cloud model of the atom, an orbital is a
  - circular path traveled by an electron around the nucleus
  - spiral path traveled by an electron toward the nucleus
  - region of the most probable proton location
  - region of the most probable electron location
- An experiment in which alpha particles were used to bombard thin sheets of gold foil led to the conclusion that an atom is composed mostly of
  - empty space and has a small, negatively charged nucleus
  - empty space and has a small, positively charged nucleus
  - a large, dense, positively charged nucleus
  - a large, dense, negatively charged nucleus
- What was concluded about the structure of the atom as the result of the gold foil experiment?
  - A positively charged nucleus is surrounded by positively charged particles.
  - A positively charged nucleus is surrounded by mostly empty space.
  - A negatively charged nucleus is surrounded by positively charged particles.
  - A negatively charged nucleus is surrounded by mostly empty space.
- Experiments with gold foil indicated that atoms
  - usually have a uniform distribution of positive charges
  - usually have a uniform distribution of negative charges
  - contain a positively charged, dense center
  - contain a negatively charged, dense center

## Regents Chemistry

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9. In a calcium atom in the ground state, the electrons that possess the *least* amount of energy are located in the
- A) first electron shell
  - B) second electron shell
  - C) third electron shell
  - D) fourth electron shell
10. Which statement correctly describes the charge of the nucleus and the charge of the electron cloud of an atom?
- A) The nucleus is positive and the electron cloud is positive.
  - B) The nucleus is positive and the electron cloud is negative.
  - C) The nucleus is negative and the electron cloud is positive.
  - D) The nucleus is negative and the electron cloud is negative.
11. John Dalton was an English scientist who proposed that atoms were hard, indivisible spheres. In the modern model, the atom has a different internal structure.
- a* Identify one experiment that led scientists to develop the modern model of the atom.
- b* Describe this experiment.
- c* State one conclusion about the internal structure of the atom, based on this experiment.
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