



Intro to Chemistry Test - Lesson 4 - Electrical Charges - Answer Key Page 1

1. Which statement about electrons is untrue?

- A) Electrons have a negative electrical charge.
- B) Electrons repel each other.
- C) Electrons spin as they circle the nucleus.
- D) Because electrons repel each other, each electron circles the nucleus alone.**

The correct answer is D. While electrons do have a negative electrical charge and they do repel each other, they still travel in pairs, because each electron in a pair spins in the opposite direction, creating opposite magnetic fields that pull the two electrons together.

2. Which statement about valence electrons is untrue?

- A) Valence electrons are the electrons in an atom's outer ring.
- B) Valence electrons shed energy when they are given to another atom, or shared with another atom.
- C) Valence electrons travel in pairs.
- D) Pairs of valence electrons spin in the same direction.**

The correct answer is D. Pairs of electrons always spin in the opposite direction. If they spun in the same direction, their two magnetic fields would repel each other and the electrons wouldn't be able to travel as a pair.

3. Which statement about electrical neutrality in an atom is untrue?

- A) Electrical neutrality means that the atom's positive and negative charges overlap each other.**
- B) Electrical neutrality means that the atom is neither positive nor negative.
- C) Electrical neutrality in an atom means that the positive charge in the nucleus equals the negative charge in the electrons.
- D) Electrical neutrality in an atom means that the electrical charge on the atom is zero.

The correct answer is A. The positive and negative electrical charges in an atom are always separated from each other. They don't overlap. Electrical neutrality means that the overall positive electrical charge equals the overall negative electrical charge, even when they are separated from each other.

4. Which statement about the van der Graaff generator is true?

A) The van der Graaff generator pulls protons off atoms in the base and delivers them to the dome up top.

B) The van der Graaff generator pulls electrons off atoms in the base and delivers them to the dome up top.

C) The van der Graaff generator pulls protons off atoms in the dome and delivers them to the base down below.

D) The van der Graaff generator pulls electrons off atoms in the dome and delivers them to the base down below.

The correct answer is B. A belt inside the van der Graaf generator pulls electrons off atoms in the base and carries them to the dome up top.

5. When electrons are pulled off atoms in the base of the van der Graaff generator, the atoms in the base become _____.

A) negative ions

B) positive ions

C) electrically neutral

D) radioactive

The correct answer is B. When an atom loses an electron, it has more positive charge in its nucleus than negative charge in its electrons. An atom with an imbalance of positive and negative charges is an ion. If it has more negative charge than positive charge, it's a negative ion, and if it has more positive charge than negative charge, it's a positive ion.

6. Which statement is true?

A) Electrically neutral atoms are attracted to negative ions.

B) Electrically neutral atoms are attracted to positive ions.

C) Electrically neutral atoms are attracted to other electrically neutral atoms.

D) Electrically neutral atoms are not attracted to any other atom.

Answer D is correct. Electrically neutral atoms are not attracted to any other atoms, whether they have an electrical charge or not.

7. When the van der Graaff generator was turned on and the small dome was brought close to the large dome up top, a spark jumped from the large dome to the small dome. Which statement is untrue about the spark between the large and small domes?

- A) The spark represented electrons on the large dome repelling each other enough to leap through the air.
- B) The spark represented electrons on the large dome being attracted to the positively charged small dome.
- C) The spark represented negative ions on the large dome leaping through the air to the small dome.**
- D) The spark developed when enough electrons were brought to the large dome and created a large enough electrical difference between the large dome and the small dome to overcome the resistance of the air.

The correct answer is C. The spark consists of flowing electrons, in other words, electricity. The electrons brought to the large dome up top by the rubber band inside the van der Graaff generator did attach to atoms in the large dome and turn those atoms into negation ions, but the electrons, not the ions, are what jumped through the air to the positively charged small dome. Also, air resists the flow of electrons. Air, rubber, and plastic are insulators that prevent electricity from flowing through them, but only up to a point. When the electrical difference is great enough, even air, rubber, and plastic cannot prevent electrons from flowing through them.

8. Which statement about batteries is untrue?

- A) A car battery keeps a car engine running.**
- B) A battery stores electrons in the form of ions inside the battery.
- C) Electrons flow out of a battery only when they have a way of returning to the battery.
- D) Electrons flow out of the negative terminal of a battery and return through the positive terminal.

The correct answer is A. Car batteries start the car but once the car engine is running, the engine runs on gasoline and generates its own electricity. In fact, a running car engine replenishes the car battery with electrons. As for answer 3, if you attach one end of a wire to a battery's negative terminal and the other end to the ground, no electricity will flow because without a way for electrons to return to the positive terminal of the battery, there is no circuit, and no way for electrons to return to the battery.

9. Electrons accumulating in one location are called static electricity. Static electricity can occur when you do all of the following, except _____.

- A) rub a balloon against your hair
- B) walk across a carpet in your socks
- C) insert a plug into a wall socket**
- D) rub a glass rod with a piece of fur

The correct answer is C. Inserting a plug into a wall socket causes electricity to flow. Static electricity does not flow because the electrons are staying together until they are able to flow – through a wire or through the air as a spark.

10. Are ions atoms?

- A) Yes**
- B) No

The correct answer is A. An atom with extra electrons or too few electrons doesn't change the fact that the atom is still an atom.