Static Electricity Grade 4 Quiz

Teacher's Answer Key

1. What charge do the proton, neutron, and electron have? *The proton has a positive charge, the neutron has no charge, and the electron has a negative charge.*
2. What happens when you bring two like charges together? Two opposite charges? *Like charges repel (push away) one another and unlike charges attract one another.*
3. What charge are most things? *Generally things are neutrally charged. They aren't very positive or negative, rather have a balance of both.*
4. How do I know if an object is positively or negatively charged? *The Triboelectric Series is a list that ranks different materials according to how they lose or gain electrons.*
5. Why does hair stick to a balloon when you rub it on your head? *If you rub a balloon on your head, the balloon is now filled up with extra electrons, and now has a negative charge, leaving a lot of positively-charged protons on your head. Opposite charges attract, so the hair sticks to the balloon.*
6. Can you see electrons? Why or why not? *Nope. The radius of an electron is approximately 0.000000000000002 meters. Way too small for the human eye to detect.*
7. If you bring a charged balloon near a stream of orange juice, what happens and why? *Orange juice is made out of water. The water molecule is a polar molecule, meaning that it acts like a tiny bar magnet in that it has a positive and negative end. Water is a liquid, which means that these little water molecules can rotate and move easily. The charged balloon influences the direction that the mini-magnets line up as they flow past.*
8. I have a foam plate, plastic bag, a bottle of rubbing alcohol, and a piece of wool. How can I generate a positive electrical charge? How will I really know it's positive? *A balloon takes on a negative charge when rubbed on hair. When a foam plate is rubbed with wool, the plate takes on electrons and creates a negative charge on the plate. To give the plate a positive charge, rub it with a plastic bag. The rubbing alcohol is not used.*
9. What does an electroscope detect? How do you know when it has detected it? *An electroscope detects electrons, or negative electric charges. The negative charge hits the foil ball, which conducts down the paperclip to the foil leaves. Since the foil is now the same negative charge, they move apart and deflect into a V-shape, indicating the presence of a negative charge region.*
10. Why does a neon bulb light up when brought close to a static source? *Fluorescent lights, or any tube of gas from the noble gases column on the periodic table, will light up in an electric field. A fluorescent tube is lined with white stuff called phosphor, which gives off light whenever it's struck by UV rays. The tube is filled with a gas that gives off UV rays when placed in an electrical field. When the bulb is brought close to a static charge, electrons rip through the tube and go out the other side. As they go through, they smack into the gas vapor which releases light rays (UV in a fluorescent tube) that hit the phosphor on the inside of the tube, which then emits light.*
11. Why do the leaves in the electroscope take on the same charge as the foil ball? *Because the foil ball, the paperclip, and the foil leaves all conduct electricity.*
12. Draw a diagram that shows the yardstick Electrostatic Motor experiment set, and the location of the positive and negative charges on the balloon and the yardstick. Your diagram should clearly explain what's going on and why. You can use another sheet of paper if needed. *Kids should draw something that resembles a stick with plus signs on the end and minus signs toward the middle. Nearby should be a circle that represents the balloon, which has minus signs all over it. The negative charge in the balloon repels the electrons in the yardstick, exposing those positive protons, which are attracted to the balloon. Since the stick is free to rotate, it chases the balloon around in a circle, indicated by an arrow.*

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