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| *ELECTRIC CHARGES*  CλeMis+ry [geneste@verona.k12.wi.us](mailto:geneste@verona.k12.wi.us)  The Thursday quiz never has something learned on Wednesday |  | Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Keep this in your notes. |

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| 1. The big rule in electric charge is: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. 2. When you rub two different materials together, one sometimes gains \_\_\_\_\_\_\_\_\_\_ and the other loses \_\_\_\_\_\_\_.   This causes them to have \_\_\_\_\_\_\_\_\_\_\_\_ charges because one is \_\_\_\_\_\_\_ and the other is \_\_\_\_\_\_\_\_   1. When styrofoam is rubbed on wool, the styrofoam becomes negatively charged. This means the styrofoam (gained / lost ) electrons during the rubbing. 2. When rubber balloons are rubbed on hair or fur, the balloon becomes negatively charged. This means the rubber (gained / lost ) electrons during the rubbing. | | | | | | |
| Gets a positive electric charge…  https://encrypted-tbn3.gstatic.com/images?q=tbn:ANd9GcSKSnAl9akMlc2Z7JXuG1Suk_CV2m_3mglw-rqyLfovpmxZs311Xw  …so it must have (gained / lost ) electrons | Rubbed against | Gets a negative electric charge…  https://encrypted-tbn1.gstatic.com/images?q=tbn:ANd9GcTlsjtlJVDhvmGgmqnwjKlcybo7kzbLfOrJAI5TmmlBPwUWUvkr  …so it must have (gained / lost ) electrons |  | Gets a negative electric charge…  https://encrypted-tbn1.gstatic.com/images?q=tbn:ANd9GcQHp_C8Ufn6QTnOP78ssKarPp7E619draSTTVntmX-AVZejIK5P  …so it must have (gained / lost ) electrons | Rubbed against | Gets a positive electric charge…  https://encrypted-tbn2.gstatic.com/images?q=tbn:ANd9GcS41IWilqUa_s3Cscu4VDev-9mqQYVWpBpf06Bk95z62znzoPeE  …so it must have (gained / lost ) electrons |

|  |  |  |  |
| --- | --- | --- | --- |
|  | proton | neutron | electron |
| Charge |  |  |  |
| Mass (in amu) |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Protons | Neutrons | Electrons | Total Charge? |  |  | Protons | Neutrons | Electrons | Total Charge? |
|  | 4 | 5 | 3 | (+ / neutral / - ) |  | 7. | 1 | 1 | 1 | (+ / neutral / - ) |
|  | 10 | 9 | 10 | (+ / neutral / - ) |  | 8. | 8 | 8 | 10 | (+ / neutral / - ) |

In everyday life there are three invisible forces that attract something:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | A) If one thing has \_\_\_\_\_\_\_ and the other thing has \_\_\_\_\_\_\_ they will be attracted. |  |  | B) If one thing has \_\_\_\_\_\_\_ and the other thing has \_\_\_\_\_\_\_ they will be attracted. |  |  | C) If one thing has \_\_\_\_\_\_\_ and the other thing has \_\_\_\_\_\_\_ they will be attracted. |

A few atoms from the *top tape* and the *bottom tape* are represented in the diagram below. Add electrons to each atom to show what happens to the electrons when we make a tape stack out of neutral pieces of tape and then pull them apart.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | before |  | while touching |  | after |  |  |
| top  ( neutral) |  |  |  |  |  |  |  | top  ( charged +) |
|  |  |  |  |  |  |  |  |  |
| bottom  (neutral) |  |  |  |  |  |  |  | bottom  (charged -) |

Describe the *macroscopic* changes in the tapes and then provide a *microscopic* explanation based on Thomson’s model of the atom and your drawings.

**Behavior of Foil and Paper with Charged Tapes**

We observed that neither foil (metal atoms) nor paper (non-metal atoms) would attract each other. But foil and paper are **both** attracted to **both** the charged tapes (top and bottom).

***How can we use the pudding model of atoms to explain the differences we observed?***

Several atoms from the paper and foil are drawn on the next page. The ones on the left have no charged object near them. The ones on the right are next to a top tape   
(+ charge).

Add force vectors to the non-metal (paper) atoms and the top tape in the first row to show the attraction between the paper and the tape. Then do the same for the foil and the tape in the second row. Be sure the *size of the vectors* shows the relative strengths of the attractions.

Now draw the electrons in each atom “bowl” to show their arrangements when no charged object is near present and then when a charged object is brought near.

Top Tape

Metal (Al foil)

*no charged object near*

Metal (Al foil)

*top tape near*

Top Tape

Explain why these arrangements of electrons would produce the observed attractions.