Sticky Tape Lab Name:_____Block:_____ Date:_____

Part I – Preparing the Setup

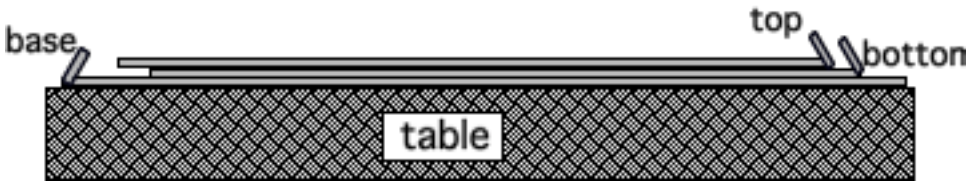
1. Cut <u>two</u> ~15 cm pieces of paper <u>and</u> foil. Tape one piece of paper and foil to the ruler so it can swing freely. Set the other two pieces to the side.

2. Take a ~15 cm piece of transparent tape and make a handle on the end by folding under the first cm of tape, sticky side to sticky side. Place this tape on the lab table. This is the base tape.

2. Attach a second similarly prepared strip of tape onto the base tape. Label this tape "B" for bottom.

3. Repeat steps 1 and 2 so that you have two sets of base and bottom tapes.

4. Place another 15 cm tape with handle on top of each of the tape sets. You now have two sets of 3-layer tapes.

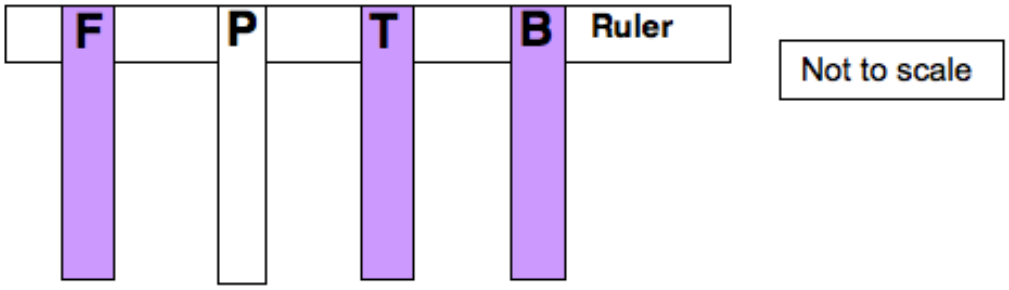


5. Label uppermost tape "T" for top. See picture below.

6. From one set of tapes, grab the B tape and quickly peel the T and B tapes together from the base by pulling the handle of the B tape.

7. Rub the non-sticky side of the T/B tape combo on your nose.

8. Quickly pull apart the T and B tapes and hang them from the ruler. See picture below.



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Part II – Data Collection

9. Bring the cut paper close to each of the hanging paper, foil, and T/B tapes and record your observations and a proper force diagram for each object in the table provided.

10. Bring the cut foil close to each of the hanging paper, foil, and T/B tapes and record your observations and a proper force diagram for each object in the table provided.

11. Prepare another set of T and B tapes as outlined in the setup procedure. (Steps #5-#7)

12. Bring the T tape close to each of the hanging paper, foil, and T/B tapes and record your observations and a proper force diagram for each object in the table provided.

13. Bring the B tape close to each of the hanging paper, foil, and T/B tapes and record your observations and a proper force diagram for each object in the table provided.

Part III - The Atom and the assignment of (+) and (-) charges

Our current model of the atom is consistent with the existence of 2 types of charge. An atom has a positively charged nucleus surrounded by mobile negatively charged electrons. Materials become charged by the gain or loss of these mobile electrons. Based on observations you will see later we assign the label of

- negative to the PVC pipe when rubbed with fur and
- positive to the Lucite (acrylic) rod when rubbed with a plastic bag.

14. Rub the PVC pipe with fur and approach each of the four hanging objects. *Describe what you see. Note the strength of the interactions*

15. Rub the Lucite rod with plastic and approach each of the four hanging objects. *Describe what you see. Note the strength of the interactions*

16. Based on your observations from using the two rods, label the T and B tapes with either a (+) or (-). Restate the interaction between T and B tapes, T and T tapes, and B and B tapes using the terms positive and negative instead of top and bottom.

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Summary Page

#9: Describe paper on paper interaction	#10: Describe foil on foil interaction
#9 &#10: Describe paper on foil interaction	#10 & #12: Describe top tape and foil interaction FBD for object on stick:
#9 & #12: Describe top tape and paper interaction FBD for object on stick:	#12: Describe top tape and top tape interaction FBD for object on stick:
#10 & #13: Describe bottom tape and foil interaction FBD for object on stick:	#9 & #13: Describe bottom tape and paper interaction FBD for object on stick:
#12 & #13: Describe bottom tape and top tape interaction FBD for object on stick:	#13: Describe bottom tape and bottom tape interaction FBD for object on stick:

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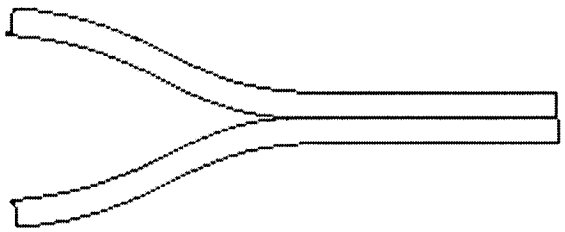
#14: Describe PVC pipe and paper interaction	#14: Describe PVC pipe and foil interaction
#14: Describe PVC pipe and top tape interaction	#14: Describe PVC pipe and bottom tape interaction
#15: Describe Lucite rod and paper interaction	#15: Describe Lucite rod and foil interaction
#15: Describe Lucite rod and top tape interaction	#15: Describe Lucite rod and bottom tape interaction
#16: Indicate the charge on the T tapes and state T-T interaction	#16: Indicate the charges on T & B tapes, state T-B interaction
#16: Indicate the charge on the B tapes and state B-B interaction	

If you group has time, try these "Full of Thought" Questions:

17. Imagine you could see the differences between the top and bottom tapes at the atomic level. On the partially separated T and B tapes invent a way of representing how the tapes change as they are separated.

T tape



B tape

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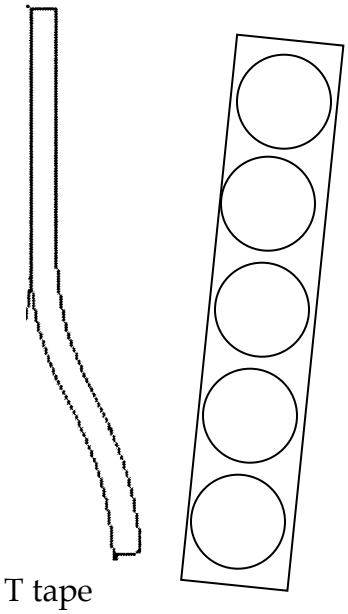
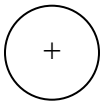
18. Invent a way for the paper to be attracted to both a top and a bottom tape while keeping these facts in mind. The paper is neutral and electrons can't move away from the nucleus

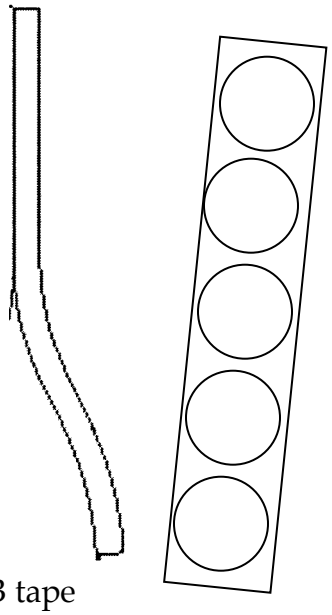


T tape

Piece of paper with five huge atoms



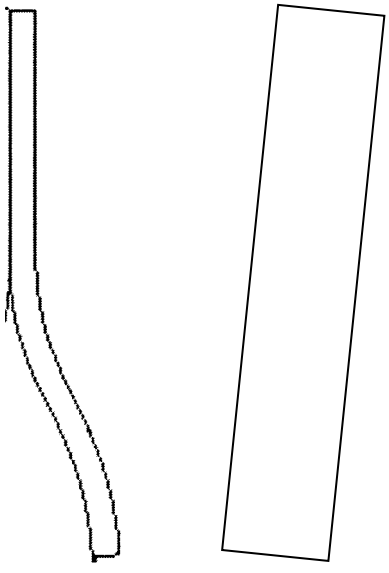
Hint: Here is a normal atom with a positive nucleus and an electron cloud evenly spread around it.



B tape

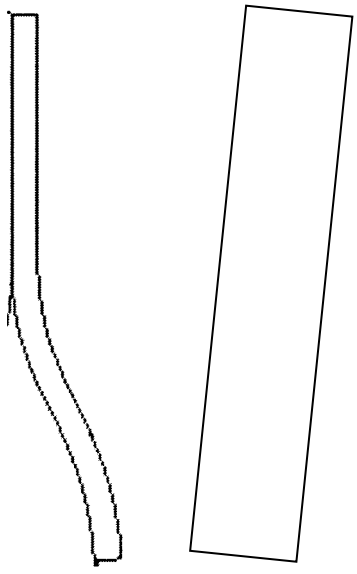
Piece of paper with five huge atoms

19. Invent a way for the foil to be attracted to both a top and a bottom tape while keeping these facts in mind. The foil is neutral and each atom has a free electron that can move around



T tape

Piece of foil



B tape

Piece of foil