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**Basic Electronics – DC Magnetism**

**Lab Activity Handout #3 - Construct a simple electromagnet and check its operation.**

1. Equipment and Materials
   * 1. 1 ½ - volt battery (CAUTION: Use no more than 1.5 volts!)
     2. 4 feet hook-up wire (insulated)
     3. ¼” iron bolt, 3” long
     4. Compass
     5. Paper clips

II. Procedure

* + 1. Start at one end of the hook-up wire and wrap all of the wire around the bolt, leaving approximately eight inches on both ends so you can hook your coil to the battery.
    2. Before connecting the coil to the battery, check to see that the iron bolt is not a magnet.

(note: Do this by bringing the compass within four inches of each end of the bolt and observe little or no change in the compass needle.)

1. Connect the coil to the battery.
2. Bring the compass within four inches of the bolt ends and observe the needle indications for north and south poles.
3. See if the bolt will pick up the paper clips.

(note: Try both ends of the bolt.)

1. Disconnect the coil from the battery.
2. Carefully remove the bolt trying to keep the coil in its same shape.
3. Reconnect the coil to the battery.
4. Check for polarity and magnetism with the compass by bringing it close to the coil ends.
5. See if the coil will attract a paper clip.

(note: Try both ends of the coil.)

K. Disconnect the battery.

Answer the following questions and hand in for a grade.

1. Explain why both ends of the electromagnet, with the bolt in position, will pick up the paper clips.
2. Why was the coil weaker without the bolt?
3. Explain why the polarity observed with the compass was the same with or without the bolt.