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PHYS232-02

**Home Lab #3**

**Purpose**: The purpose of this experiment was to test an at home self-made electromagnet out of supplies found at home. I used a wire made of aluminum foil and tape in order to achieve the closest results possible to the default experiment. Using the bolt, nail, and wire, along with the battery and paperclips I was able to test the strength of the electromagnetic invention by how many paper clips it was able to pick up. Through this process I learned that the more contact you introduce through metal, the stronger the electromagnetism will get.

**Analysis**:

**Does the bolt attract any of the paperclips?**

Attaching the homemade wire to the battery and bolt attracted only 2 paperclips at a time. It was strong enough to move 3 or 4, but only visibly strong enough to have a profound effect on 2 paperclips at a time.

**What does that tell you about the magnetic properties of the bolt?**

This tells me that the flow of electric charges in the wire, bolt, and battery creates a small magnetic field.

After wrapping 20 coils of wire around the bolt, I was able to pick up 8 paperclips and it the magnetic field was visibly stronger from the number of paperclips being carried.

After wrapping 27 coils of wire around the bolt I was able to barely pick up 14 paperclips. I was only able to wrap 27 because 30 would not fit entirely, but the change and increase in strength was obvious.

**Wrap at least 10 coils of wire around a pencil. Hook it up to a battery. Does the pencil pick up any paperclips?**

The pencil was not able to pick up any paperclips. My inference is that the wood between the wire and lead inside does not conduct the electricity so the magnetic field either is incredibly small or does not exist at all.

**What does that tell you about the magnetic properties of wood versus metal?**

This tells me what wood insulates too much of the voltage from the battery compared to the metal in the bolt, so much so that the pencil could not even carry a single paperclip.

**Conclusion**: In conclusion, I can confidently say that metal is a better conductor of electricity compared to wood. Wood in fact does not conduct electricity, if any, at all, based on what I saw in the experiment. The bolt however will continuously get stronger if more metal is introduced and put into contact to conduct more and more electricity to fund a magnetic field. I wonder if I had more equipment, how strong could the metal bolt and wire get? Would it eventually plateau at a certain point or would it continuously grow in magnetic field strength? If I had to make a hypothesis, I would say that the magnetic field grows but in a ratio that steadily declines as more metal is introduced in contact with the bolt. I have seen YouTube videos of professional scientists working with large electromagnetic conductors and although they are much stronger than what I created here in this experiment, they look like they are incredibly strong yet not as strong as you’d expect them to be at that size (the size of an elephant from my assumptions). It would have been interesting to have seen what would have happened if I was able to supply a foot-long bolt with enough wire and a car battery! Although it does sound like it might get dangerous, I hope to maybe one day be able to conduct an experiment like that to test the hypothesis I made today.