

Physics Investigation

Aim:

To investigate the variables which effect the strength of an electromagnet and find the effect of a particular variable.

The variables, which would effect the strength of an electromagnet, are:

- 1) Current
- 2) Number of turns
- 3) Type of core.

1) Current has an effect on the strength because a bigger current makes a stronger magnetic field.

2) Number of turns; the more turns on the nail the stronger the magnetic field. The number of turns depend on the length of wire. The longer the wire, the more turns.

4) Soft iron core to increase the strength of the magnetic field.

In this investigation, I am going to investigate what the effect of the number of turns will have on the strength of an electromagnet.

Prediction:

I predict that in this investigation, the higher the number of turns, the stronger the magnetic field. This assures that the other variables are kept constant.

Apparatus:

- 1) Insulated wire - wire to make the electromagnet.
- 2) Nail - to make the core.
- 3) Ammeter - to check if the current is constant.
- 4) Force meter - to check the Newtons.
- 5) Lead - to connect.
- 6) Crocodile clips - to join the leads together.
- 7) Clamp stand - to hold the nail.
- 8) Battery - to put on the volts.

Method:

After getting the apparatus ready we put 10 turns of the wire on the coil. Then we turned on the ammeter and wrote down the current and at the same time we noted down the force meter readings. We did the same for 20, 30, 40, 50, and 60 turns.

For each number of turns we wrote down 3 results and found out the average. Taking the average should eliminate any measurement errors.

Diagram:

Fair Test:

It is important to keep the other variables the same in order to make it a fair test. The same battery was used throughout; hence, the current was the same. Also, the same nail was used, hence, the same iron core. Therefore, of the three variables, only the number of turns was changed.

Safety:

Safety is always important when doing an experiment. When doing any type of experiment in science, you have to know more than just the basic rules of safety.

The basic rules are tie back long hair, ties should be tucked in, and bags should be under the tables.

For this experiment, I made sure that current was under 4 amps and that the power supply was not on for more than 10 second. I also made sure that all the lead connections were tight before switching on the battery.

Results:

Number of turns	Current (amps)	Force 1 (N)	Force 2 (N)	Force 3 (N)	Average force (N)
10	3.35		0.25		0.25
20	3.45		0.45	0.45	
30	3.51		0.51	0.51	0.68
40			0.95	0.85	0.85
50			0.95		0.98

Conclusion:

The graph shows that when I increased the number of turns, the force increases too.

My prediction was correct because as I increased the number of turns, the magnetic field increased. This than increased the magnetic force. The force increased too, which made the magnetic field stronger too.

Evaluation:

Yes, I think that it was a fair test, especially as I kept all other variables constant.

I took the average value to eliminate any experimental error.

From the graph, it can be seen that the number of turns increased, the force increased. This proves my predictions were correct.

If I got the chance to repeat the experiment, I would use a stronger force meter to allow 60, 70, 80 turns.