

Magnetic field of an electromagnet can be manipulated in strength!

Abstract

The purpose of this investigation is to determine whether the magnetic field of an electromagnet can be manipulated in strength. Electromagnets are used in speakers, telephones, motors, doorbells, hairdryers, washing machines, battery-driven toy cars, etc.

In this investigation influence of the control variables: thickness of wire, number of winds, and voltage of batteries were considered. The materials I used were insulated wire, ferromagnetic material (iron nail), battery, and paper clips. I conducted 36 experiments by varying one control factor at a time. The thickness of the wire was kept at three levels: 14 gauge, 18 gauge and 20 gauge. The number of winds was 65, 45 and 25. D cell batteries at 1.5v, 3.0v, 4.5v and 6.0v were used.

Based on the results, I conclude:

- By using a battery with a greater voltage the strength of the electromagnet is increased because the higher the voltage of the battery, the more current will flow through the coil.
- By increasing the number of winds the strength of the electromagnet is increased. When the electrical current moves around the winds of the coil, it generates a magnetic field. More winds add up the magnetic field which increases the strength of the electromagnet.
- By increasing the thickness of the wire the strength of the electromagnet is increased. The electromagnetic force is proportional to the cross sectional area of wire. Therefore, increasing wire thickness increases the strength of the electromagnet.

Bibliography

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