



## Building an Electromagnet

### Introduction

An electromagnet is a device that uses an electric current to generate a magnetic field.

To learn more about electromagnets and the man who discovered them, check out the following web sites:

### Tools & Materials:

The electromagnet materials suggested below are specifically used for the magnetic relaxation experiment. Items that can be substituted for more general purposes are noted in parentheses.

- 1.5 Volt Battery
- 1 meter (about 3 feet) of 22 gauge insulated wire
- An unfolded paperclip
- Wire strippers
- Tape (this item is not necessary for magnetizable objects that have a definite "top" and "bottom" like a nail.)
- About a dozen staples



### The Experiment:

**Warning: If the wire gets hot to the touch at any point, immediately disconnect the wire from the battery!**

1. Unfold one paper clip.
2. Put tape around one end (so you can distinguish which side of the paperclip is which).
3. Remove one inch of the insulation at each end of the wire.
4. Wrap the paperclip snugly with the wire. Start about 15cm from one end of the wire. Make small concentric loops starting at the taped end of the paperclip. Continue until you have reached the bottom tip of the paperclip.
5. Connect the one end of the wire closest to the tape side of the paperclip to the positive terminal of the battery.
6. Connect the other end of the wire to the negative terminal of the battery for 10 seconds. (Although the time is somewhat arbitrary, it should be kept constant for the experiment!) The paperclip is considered an electromagnet as long as there is current running through the wire.

The paperclip is now magnetized. To test this, you can try to pick up individual staples with the nail. Make sure you remove the staples before continuing with the experiment.