As the current is increased in a wire, the strength of the magnetic field becomes greater and therefore more effective. An A.C current would demagnetise the core while a D.C. current would magnetise a core. This is because the D.C. current is direct and therefore all the electrons are arranged in the same order creating a magnetic field. When the current is A.C, the electrons are free to move where they want so there is no magnetic field. When an electromagnet has a current induced in it, it becomes magnetised and the greater the current induced the greater the strength. This is because the microscopic domains within the nail receive a greater current and so the strength and actions of these domains are increased. In addition, if the solenoid receives greater current then the field it generates will be stronger. . On the power pack, which I will be, using there is an option to change the voltage, which could be altered to change current with the aid of an ammeter.

The main implication of the domains is that there is already a high degree of magnetization in ferromagnetic materials within individual domains, but that in the absence of external magnetic fields those domains are randomly oriented. A modest applied magnetic field can cause a larger degree of alignment of the magnetic moments with the external field, giving a large multiplication of the applied field.

Aim

The target of my investigation is to find how varying the current in an electrical circuit affects the strength of an electromagnet.

The c-core that I will be using will be ferromagnetic, meaning that it quickly becomes demagnetised when the current is switched off and that it is very efficient at increasing the strength of the magnetic field created by the current in the wire. It is also known that if there are more coils around the core, the electromagnet is stronger. The type of wire is another factor which will affect an electromagnet's strength.

Prediction/Scientific reasoning

I predict that as the current increases, the strength of the electromagnet will also increase. I also suggest that there is a relationship of direct proportion between the two variables. For instance, if the current doubles, the strength of the electromagnet will also double.

This is possible to be demonstrated when analysing the following equation:

Power = Voltage Current → (P=VI)

This shows that if the current increases, so does the power, subsequently increasing the strength of the electromagnetic field. This means that as the electromagnetic field is stronger, a larger amount of iron fillings will be attracted to the magnetised core. I know that magnetic effects are produced by a moving electrical charge (current). This indicates to me that the current will cause the c-core to have a magnetic field.

To become magnetic in the first place, the electrons in the c-core will have to align themselves. In order to do so, they group together in domains. The majority of these domains are usually only partly aligned, and the strength of the magnetic field around the core will increase as the magnetic domains align. Therefore an electromagnet will keep getting stronger gradually as the magnetic domains become all aligned up. This can be demonstrated with the aid of the experiment which we will describe further on, in more detail. As the magnetic field around the c-core becomes stronger, a larger amount of iron fillings will be attracted to the magnetised core. Eventually though, I predict that the magnetic field around the core will stop getting stronger, (therefore the electromagnet will stop getting stronger). This happens because all the magnetic domains will be aligned up and the electromagnet will have reached its full potential and c

an be described as "*saturated*". This behaviour can be demonstrated graphically: the curve displaying the relationship between the two variables (current, strength of electromagnet) will eventually level off, showing that the amount of iron fillings attracted to the core will not grow anymore.