Name _____ # ____ Name _____ # ____

Lab # ___ Date _____

Induced Magnetism

Part 1: The Test Tube Magnet

Materials: test tube with iron filings, bar magnet, compass

Procedures:

( )1. Place your thumb over the stopper and shake the test tube for about 15 seconds

( )2. Examine your compass. What color on the needle indicates north?

( )3. Place your test tube on the tape marker that is on your table. Place your compass on the test tube. Draw what you see. Be sure to note where the needle of the compass is pointing.

( )4. Remove the compass. Rub the north end of the magnet over the test tube

as demonstrated by your instructor about 15 times.rub in one direction only.

( )5. Place the test tube back on the tape marker and place the compass on the test tube as in step 3

( )6. Draw what you see. Note where the needle of the compass is pointing now. Has the needle changed direction?

( )7. Repeat step 1. Place your compass on your test tube again and draw what you see. Which way is the compass needle pointing now?

Conclusion Questions:

( )1. What happens to the iron filings in the test tube when you rub it with the magnet?

( )2. After the test tube has been rubbed with the magnet, how does the compass needle seem to orient itself? Why?

( )3. When you shake the test tube, is the compass still affected by the iron filings?

EXPLANATION: When you rub the test tube with the magnet, you magnetize the iron filings. The iron filings have weak magnetic poles and appear to line up in the magnetic field of the magnet. All these tiny magnets properly aligned should act together to produce a strong magnetic field around the entire test tube. The compass needle is attracted and repeled by the tube of iron filings. The compass must therefore be interacting with a true magnet. When you shake the test tube, the iron filings are no longer magnetically aligned and the test tube magnet has been changed into a disorganized pile of magnetic iron.

Part 2: Induced Magnetism

Materials: nail, compass, bar magnet

Procedures:

( )1. Place the compass close to one end of a bar magnet. What happens to the compass needle?

( )2. Repeat step one with the other end of the magnet. What happens to the compass needle?

( )3. Bring the compass near to the nail. Do this for both ends of the nail. What happens to the compass needle? Does the nail act like a magnet?

( )4. Now place the magnet flat on the table and in contact with the head of the nail. Put the compass close to, but not touching, the point of the nail. What happens? Does the nail act like a magnet?

( )5. Bring the compass near to the nail. Do this for both ends of the nail. What happens to the compass needle? Does the nail act like a magnet?

Conclusion Questions:

( )1. Draw the arrangement of atoms of the nail when it is touching the magnet.

( )2. If the head of the nail is touching the north pole of the magnet, what pole is the end of the nail?

Explanation: Induced magnetism is magnetism caused by being near or touching a magnet. In this experiment the nail becomes a magnet through induction because it is touching the bar magnet. The nail is a temporary magnet.