

## Oxygen Analyzer – Magnetism Student Handout

If we wanted to determine what percentage of the **air** is comprised of **oxygen**, we need some way to distinguish air from other gases in our **atmosphere**. Unfortunately, the gases of our atmosphere are odorless and colorless, they also are composed of molecules with similar masses so it is not obvious how we can measure the **concentration** of oxygen in the air that we breathe. Fortunately, Oxygen is unique in our atmosphere's gases in one critical way, it is **magnetic**. In fact, it has a special kind of magnetic property known as **paramagnetism**. This means that while it can be attracted to magnets, it itself will not become magnetic on its own. This is different from **ferromagnetism**, which is the property that some materials have which allow them to act as temporary magnets.

### Experiment:

Each group should have a sample of iron, a sample of aluminum, a bar magnet, and a pile of paper clips. (The iron and aluminum might appear similar, but the iron is denser)

- 1) Make sure your magnet is working, does it attract the other metal samples? Does it attract the iron or the aluminum more strongly?
  
- 2) Stroke the end of the magnet along the iron sample many times, this may take some time but start with 50 strokes. This will align the many domains in the iron in the same direction, turning the iron sample into a temporary magnet. Attempt to use the iron sample to attract the paper clips.
  
- 3) Repeat step 2, but this time stroking the aluminum sample with the magnet. Then attempt to attract the paper clips with the aluminum sample.

Did the iron sample attract the paper clips? Did the aluminum sample?

From the reading above, what type of magnetism does the iron sample have?  
 The aluminum sample?