Laboratory Investigation Name _____

Chemistry: Form L2.2A Date _____ Period _____

Developing a Model of the Atom

PROBLEM

How do you generate a picture of something you can't see?

INTRODUCTION

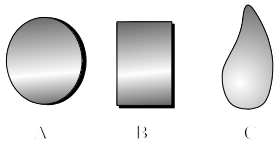
Models are used to help visualize atoms. Atoms are so small that it is impossible to see them. Scientists develop a mental picture of the atom by subjecting them to various tests and observing what happens. For example, in 1911, Rutherford aimed a beam of alpha particles at a solid sheet of gold foil. When almost all the alpha particles passed through the foil as if nothing were there, Rutherford concluded the atom was mostly space. Rutherford used alpha particles to probe the inside of atoms he could not see. In this laboratory investigation, you will use pins to probe the inside of a ball of clay with an object buried inside. By making indirect observations of this sort, you will determine the shape of objects you can't see.

MATERIALS (*per group*)

Dissecting pins; metal shot; plasticine (modeling clay); ruler; sheet metal (cut)

PROCEDURE

1. Obtain one or two metal objects and hide them in a piece of modeling clay. If you use more than one object, the objects may be of the same shape or different shapes. Also, if there is more than one object hidden, make sure to arrange the objects so they are not touching.



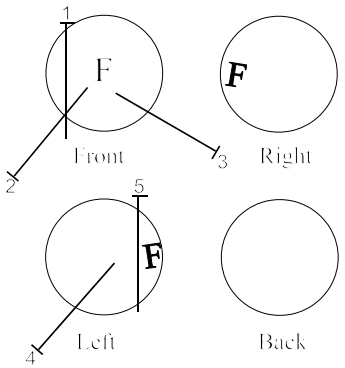
Different shaped metal objects such as [a] a disk, [b] part of a cut sheet, or [c] a piece of metal shot can be concealed in clay

2. After you conceal the objects in the clay, roll the clay into a sphere. Exchange your piece of clay for one from another laboratory group so you will not know what is concealed in the clay.

3. Using a pin, scratch a letter "**F**" in the front of the clay sphere for reference.

4. With a ruler, measure the length of a pin. Record the length in your data table on the next page.

5. Probe the clay sphere with a pin. Press the pin into the sphere as far as it will go. Record your observations in the data table on the next page. If the pin goes all the way through the sphere, write "THROUGH". If the pin hits an object, measure the length of the pin sticking out of the sphere. Subtract this value from the length of the pin to determine how far the pin was inserted. Record your result. Draw a marker on the circles provided on the next page to indicate the location of the probe as shown in the diagram to the right. Number the probe.



6. Repeat Step 5 as often as needed to determine the size, shape, and number of objects embedded in the clay.

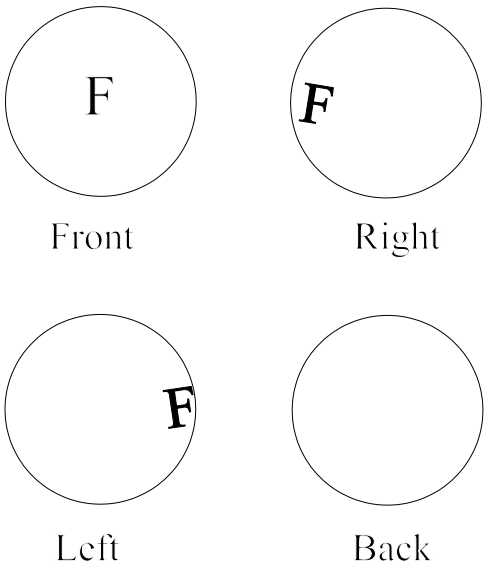
7. Once you reach your conclusion, double check with your trading partners to see if you are correct. If you are incorrect, continue probing until you reach a new conclusion. Then, check again.

OBSERVATIONS

Pin Length . . . . . _____

Probe No.	Description	Probe No.	Description
1		11	
2		12	
3		13	
4		14	
5		15	
6		16	
7		17	
8		18	
9		19	
10		20	

Location of Probes



CONCLUSIONS

1. Write a short description of what was hidden in the clay sphere. _____

2. Was your first conclusion about what was in the sphere correct? If not, how many additional guesses did it take to identify the contents of the sphere? _____

3. If a pin passes through the sphere, what inferences can you make? _____

4. Describe how your conclusion takes your observations into account. _____

5. How do you generate a picture of something you can't see? _____