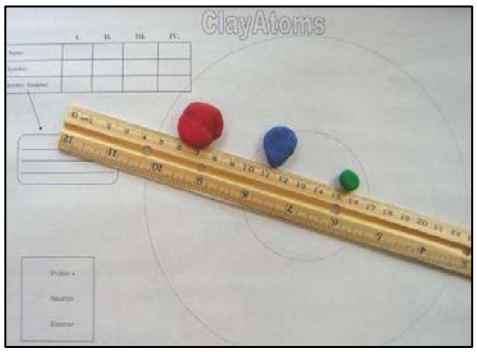
# Teacher Notes- "Clay Atoms- Taming Our Fear Of The Invisible"

If you asked each of your students what an atom is, what would they say? Most students are uncomfortable with the concept of atoms because they mistakenly believe that since atoms are so small they must be hard to understand.




This fun activity will disprove that as students use clay to mold protons, neutrons, and electrons that they'll combine to make atoms. It won't be long into this activity before students will be saying to themselves "Is that all there is to it?"

**Materials per student:**
Red, blue, and green clay (or any 3 colors of your choice)
1-ruler
1-student handout

**Additionally:**
PowerPoint- "Making Clay Atoms"
A sample of carbon-useful when talking about the carbon atom (optional)

**Beforehand:**

1. Set out the clay and rulers and run copies the day before. In the morning look over the notes and slides one last time. Relax and have fun along with your students. Remember- you're only as effective as your plan.

2. Locate on what page a periodic table is in your textbook. This will be referred to during the lesson.

3. This activity can last between 25 minutes and 1 ½ class periods, depending on your needs and how you present it. If your goal is to get your students comfortable with atoms and for them have a solid understanding of them, be willing to sacrifice some time. If it takes you 2 days to get through this, that may inconvenience your schedule, but your students will be very well prepared for whatever else you do with atoms.

4. Go into this lesson prepared just for the major points you want to make. One thing you don't want to do is overdo this lesson with too many comments and facts. Remember- it's just an introduction to atoms. Keep it simple. When speaking today, be in "observation" mode. Notice all the little things. That's where your students are at in their understanding, and they need that.

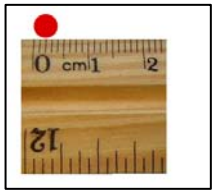
5. Before the lesson, make some clay atoms of your own so that you know what your students will be thinking and experiencing. This will also help you see the whole lesson before you even present it. And keep some clay up front during the lesson, and build things right along with your students. Students are more willing to do things that you yourself do, and what you build gives you examples to hold up to students.

6. Depending on how you distribute the clay, and on how impulsive your students are, you might want to put a sign on the clay for students not to touch it. That will keep the new class coming in from smashing all the red, blue, and green clay into a useless purple gob. The signs can be cut into strips and then taped across the top of a materials box.

**Procedure:**

1. If you are using the PowerPoint "Making Clay Atoms", start it now. It will guide you and your students through the class period.

2. As indicated by slide #2, have each student form 8 **red** clay particles, each with a diameter of 4 mm. These will be our protons. Why 4 mm and not 5 or 10? It could have been (and you can certainly change if you want), but the idea was to get students even focused more by choosing an "off" number that requires more attention.




   Tell students to make the first red particle and size it with the ruler, and then make 7 more "about as big". Exactness would be nice, but it's not essential. Watch students- sometimes they misunderstand and think the *group* needs 8 red particles, which is not true. Each *person* needs 8 red protons of their own. Walk around the room with a 4mm proton in your hand that you've and let them see it.

3. Caution students about keeping their red-stained hands away from their clothing, especially those wearing white. Reassure them that they'll have time to wash hands later.

4. Advance the PowerPoint slide and have each student form 8 **blue** clay particles that are also about 4mm in diameter. These will be our neutrons. "Blue" and "neu"-tron sort of rhyme, which will help everyone remember what's what.

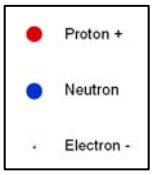
5. Then have each student form 8 **green** specks they can barely see. These will be electrons. Why specks? Electrons are much smaller than protons and neutrons*[1] (see "Accessories" at the end for more information). After students have made a couple of electrons and are wondering about the size for themselves, say to them:

> "Students, we're use clay today to make atoms. Right now, most of the information you know about them is memorized. But if I asked you to

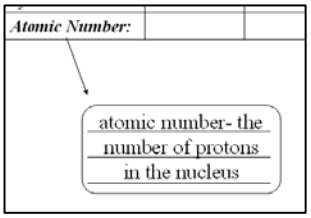
visualize one, most of you couldn't. That will all change very soon. In just a few minutes you'll be making atoms. Then it will all make sense and be no big deal.

It may seem like all we've done today is play with clay, but you've already learned some important things. 10 minutes ago most of you couldn't tell me the 3 parts of an atom. Now you can. You also know their relative sizes. And you thought we were just playing!"

6. When everyone is finished making their protons, neutrons, and electrons have students locate the key in the lower-left portion of the handout. Tell them to put one of the red clay particles next to "Proton +", a blue one next to "Neutron", and a green one next to "Electron –". There's now 7 of each left.

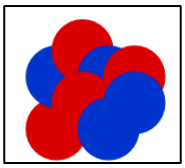



7. Advance the slides until you come to where it explains atomic number. Have students write on the lines coming off Atomic Number- **"the number of protons in the nucleus".** You could have printed this on the paper they got, but by writing it they're paying more attention, and they will remember it better now. Now we're ready to build some atoms!




8. Ask how many of each kind of particle they still have. (7- we made 8, but put one of each in the key)

9. Tell them to *lightly* press 6 red protons and 6 blue neutrons together into a cluster, and set that on the black dot in the center of the handout. Hold your 6 proton, 6 neutron nucleus up so they can all see it. All you want is for the little particles to just stick. Say:



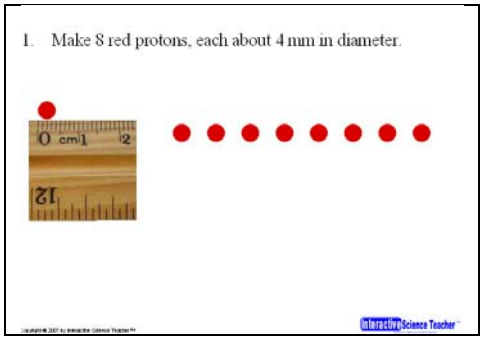
"This is a nucleus. It doesn't look very scary, does it? What two particles are there in a nucleus? (protons and neutrons)
Just protons and neutrons. Good. That's it. That's all there is.
Now, the *number* of protons and neutrons can change. And later, we'll have more than and less than 6 protons, but the important thing for you to remember right now is that the nucleus is made of protons and neutrons.

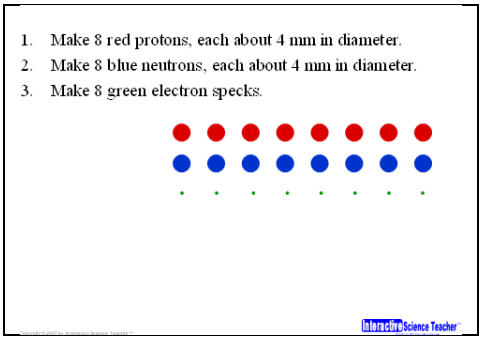
Do you notice about how the *number* of protons and neutrons are compared to each other? (they're the same)
And that will also be true most of the time. You have 6 protons and 6 neutrons, right? (yes)
Element number 9, fluorine, has 9 protons and 9 neutrons in its nucleus.
And it's the same with element 99- 99 and 99.

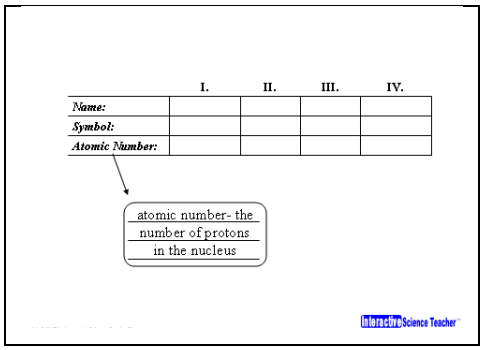
***(end of Teacher Notes preview)***

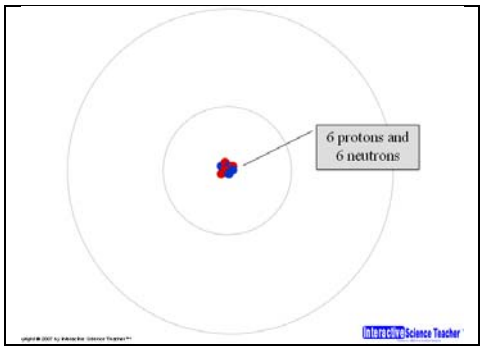
**Come back and visit InteractiveScienceTeacher.com and for just .99¢ you can download the entire set of Teacher Notes right now, along with:**

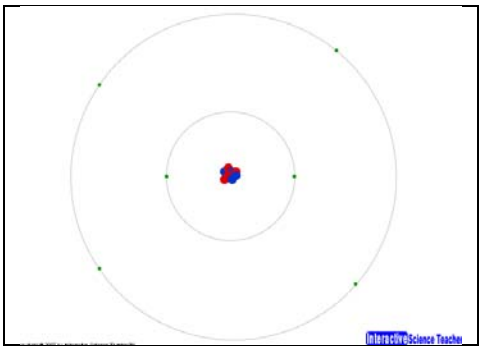
## ♦ PowerPoint (20 slides) Don't have PowerPoint? Download it FREE: Mac / PC

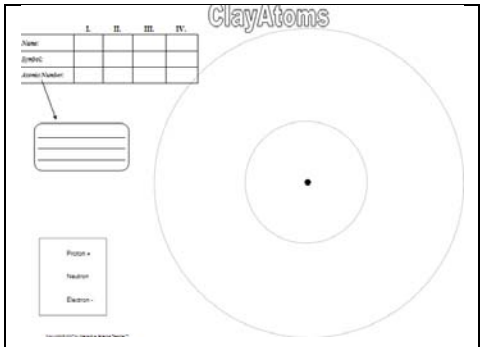



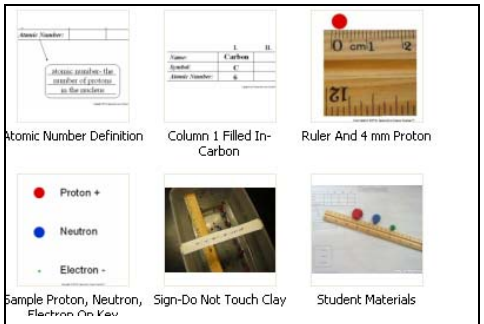



## ♦ Student Handout




## ♦ Drawings & Pictures




## ♦ *Quick* Notes

**Teacher *Quick* Notes- "Clay Atoms- Taming Our Fear Of The Invisible"**

**Materials per student:**
Red, blue, and green clay (or any 3 colors of your choice)
1-ruler
1-handout- Student Handout-"Clay Atoms" (located in the *Resources* folder)

PowerPoint- "Day 1-Making Clay Atoms" (also in the *Resources* folder)

**Procedure:**

1. Begin the "Making Clay Atoms" PowerPoint.
2. Have each student form 8 red clay particles each with a diameter of 4 mm.
3. Have each student form 8 blue clay particles about as big as the reds.
4. Have each student form 8 green clay "specks" that they can barely see.
5. Have students put a red clay particle next to the word "Proton +", a blue one next to "Neutron", and a green one next to "Electron –".
6. Tell them to gently press the 6 red protons and 6 blue neutrons together into a cluster and set that on the dot in the center of the handout. Put 6 electrons around the nucleus- 2 on the first ring, 4 on the second.
7. Walk around the room and look for students who do not have this atom correctly made.
8. Fill in column 1 on the chart for carbon.
9. Tell students to add 1 red proton to the nucleus, then a blue and green also. Identify what it is (nitrogen) and fill in column 2.
10. Create 2 more atoms and fill in the information for them in their columns.



InteractiveScienceTeacher™.com