

DIY: p-atomic orbitals

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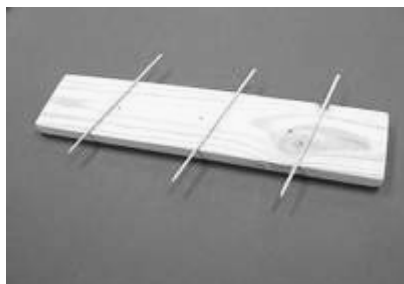
There are many high-tech depictions of atomic orbitals available in textbooks and online. However, nothing beats actual models you can hold in your hands. Below are instructions on how to make a model of a set of atomic p orbitals using craft store supplies. Some people think they are an eggcellent approximations of three-dimensional boundary surface diagrams. Visit the author's website: www.deadchemistssociety.com for other do-it-yourself projects.

Materials

You will need six styrofoam eggs (3-1/16 in. x 2-5/16 in.), seven lengths of 1/8 in. wooden dowel rods (one 16-in., four 7-in., two 3-in.), a 1x4 board (16-in.), kite string and glue. Once the board is cut and sanded, the only tools you will need is a drill with a 1/8 in. bit and a pencil sharpener or pocketknife.

Assembly

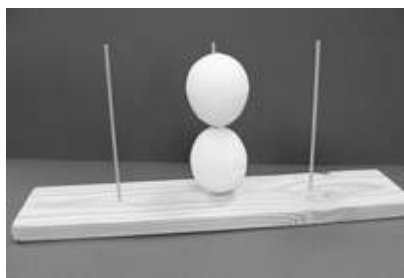
Drill three holes, four inches apart in the center of the 1x4 board. Three of the 7-in. dowels will be inserted in the holes.



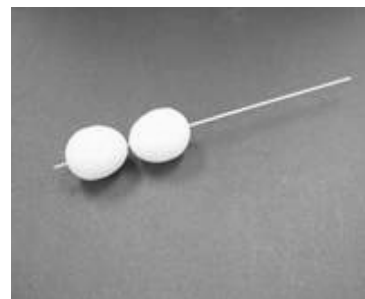
Sharpen one end of a 7-in. dowel and insert it about 1/4 inch into the end of an egg. Rotate the dowel between your thumb and fingers. If the egg wobbles, the stick isn't centered. Adjust the placement of the stick until the egg doesn't wobble much and push it through the egg. Impale a second egg in a similar manner. Be sure the small ends of the eggs point toward the center of the stick. These two eggs form the p_z orbital.



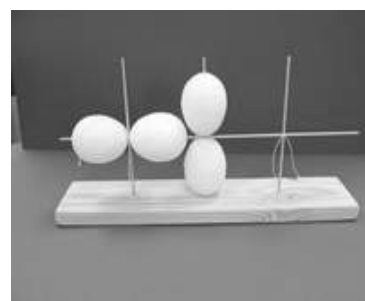
Glue the p_z orbital in the center hole. Glue a 7-in. dowel in each of the outer holes. Do your best to get all three dowels vertical.



Insert the 16-in. dowel through two eggs to form the p_x orbital. Remember, the smaller ends of the eggs point inward. You will want this orbital centered 4 inches from one end.

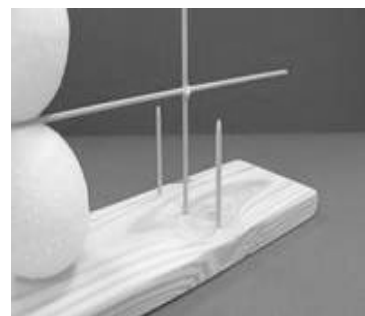


Slide the top egg of the vertical p_z orbital up slightly to make room for the horizontal dowel. Then push it down again to help hold the horizontal axis. Also, separate the eggs of the p_x orbital slightly to make room for the vertical dowel on that end.

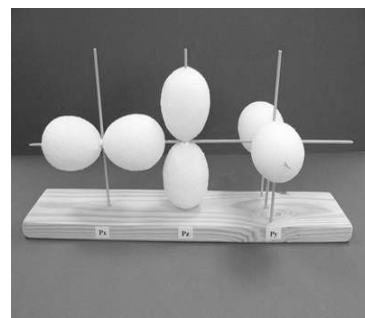


Adjust the 16-in. dowel until it is parallel to the 1x4 base. Secure the intersections of the dowels with kite string and add a drop of glue. Snip off the excess string.

Drill two holes in the base in line with the y-axis and glue the two 3-in. dowels in place as shown. These dowels will support the p_y orbital.



Insert the last 7-in. dowel into two eggs to make the p_y orbital. Separate the eggs slightly and position the orbital above the supports with the dowels touching. Align the orbital perpendicular to the x-axis and z-axis and push the orbital down onto the supports until all three axes touch. Secure the intersection of the dowels with kite string and add a drop of glue.



If you like, glue labels in front of the orbitals. Your styrofoam egg atomic p orbitals are ready for display. ■