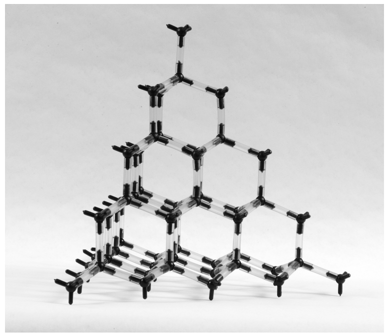
Super Models



Diamond
Molecular Model Kit

Recommended for ages 10 – adult.

Caution: Atom centers and vinyl tubing are a choking hazard. Do not eat or chew model parts.

Kit Contents:
57 black 4-peg carbon atom centers (2 spares)
82 clear, 1.25” bonds (2 spares)

Related Kits Avaiable:
C-60 Buckyball
C-222 Buckytube
Graphite

Phone: 806-438-6865
E-mail: etishler@rylerenterprises.com
Website: www.rylerenterprises.com
Address: 5701 1st Street, Lubbock, TX 79416

General Information

Allotropes are different forms of any one element. Carbon, is one of those elements that can be found existing, naturally, in a variety of allotropes.

These include 1) diamond, 2) graphite (stacked layers of graphene), 3) amorphous carbon (soot and charcoal), 4) fullerenes which can contain large numbers of carbon atoms arranged as spheres, ellipsoids, or tubes, and 5) several less common forms as well. Each allotrope has its own distinct chemical and physical property.

Diamonds are the most commonly recognized allotropic form of carbon due to their popular use in jewelry. They are highly prized for their durability, color, and light dispersion which gives rise to their sparkle.

Diamond is extremely hard and is resistant to compression. These properties are due to its covalent bonding and its cubic face centered unit cell, called a diamond lattice. Architectural truss systems use the same geometry to provide large structures with rigidity. Because they are so hard, diamonds are used in industrial cutting tools. On the Mohs hardness scale, diamond rates a ten, and on an absolute scale diamond is listed as 1600. Compare those values with a Mohs of 9 and an absolute hardness of 400 for corundum, another useful, common sanding, cutting and scraping mineral. Only some boron compounds can rival diamond for hardness.

Indestructible as they might appear, diamonds are less thermodynamically stable than graphite, although kinetically the rate of conversion from the gemstone to the black, slippery stuff is quite slow. Diamond can also burn.

The colors of diamond vary with the presence of contaminants or distortions in the crystal. The form we most often see is colorless. The following illustrations show nine varieties of colored diamonds.



Blue Green Orange



Pink Yellow Purple



Brown Black White

Diamond Assembly Instructions

1. Attach six black, tetrahedral carbons in a puckered ring structure. Set it on the table. Adjust it so that three of the carbons touch the table and three are raised as in Fig. 1. This is called a chair conformation. The three raised atoms should have a peg pointing straight up.

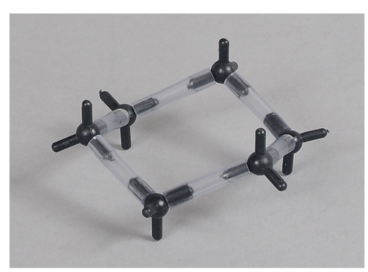


Fig. 1 A six carbon ring.

2. Attach carbons to the right side of the hexagon you constructed in Step 1 forming two more hexagons. (Fig. 2) Follow the same pattern of making puckered rings.

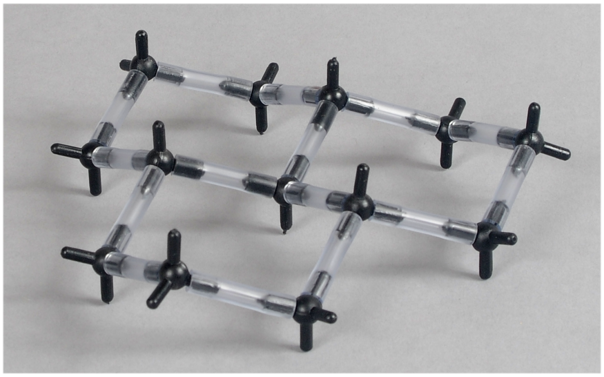


Fig. 2 Three coupled rings.

3. Continue to the edge closest to you so that you end up with a total of six hexagons. (Fig. 3).

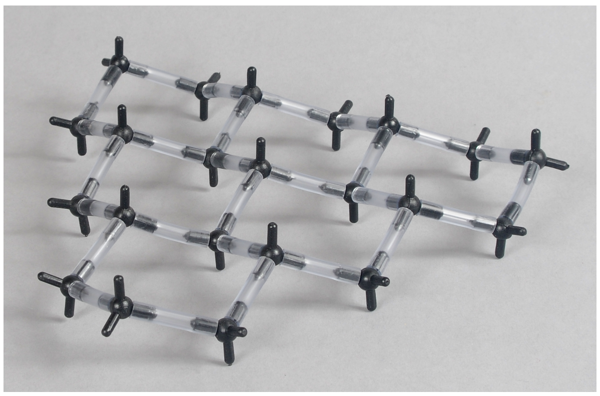


Fig. 3 Six hexagons.

4. Attach one black carbon atom center to each of the three corners of the structure you made in Step 3. (Fig. 4) This is now "Layer A."

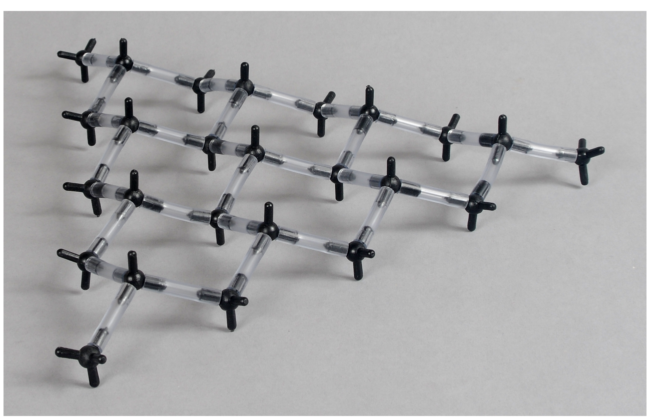


Fig. 4 Completed layer A.

5. Repeat Step 1 and Step 2 to make a copy of Fig. 2. Attach one carbon at each corner to make a structure resembling Fig. 5 "Layer B."

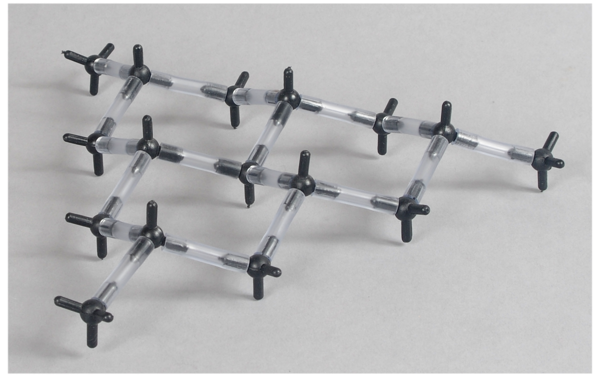


Fig. 5 Layer B

6. Repeat Step 1 to make a copy of Fig. 1. Attach one carbon at each corner to make a structure resembling Fig. 6 "Layer C."

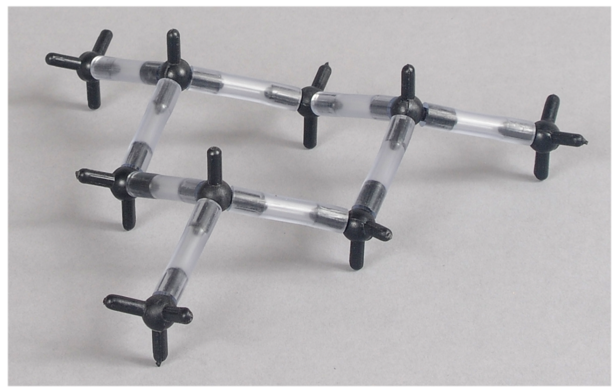


Fig. 6 Layer C

7. Attach four carbons to a central carbon. The central carbon. (Fig. "Layer D")

Fig. 7 Layer D

8. You should now have four layers.
Attach three bonds to the three "up" carbons of layer C as you can see in Fig. 8.

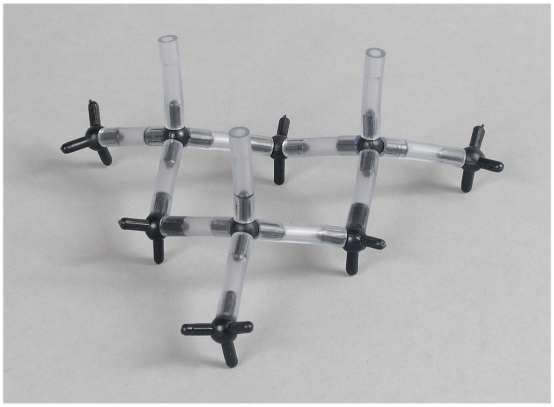


Fig. 8 Layer C with three vertical bonds.

Position Layer D on top of the bonds of Layer C, and attach. The result should be as you see in Fig. 9.

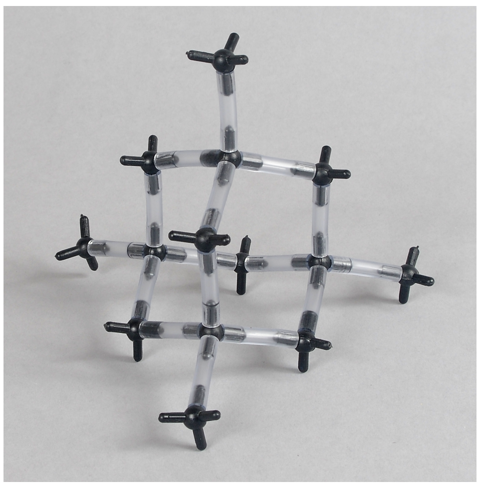


Fig. 9 Layers C and D attached.

9. Attach six bonds to the six "up" carbons of layer B as Fig. 10 illustrates.

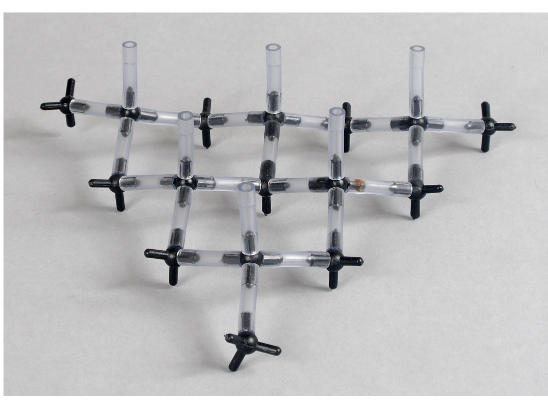


Fig. 10 Layer B with six vertical bonds.

10. Positioning Layer C on top of Layer B, and attaching to Layer C should result in the structure shown in Fig. 11.

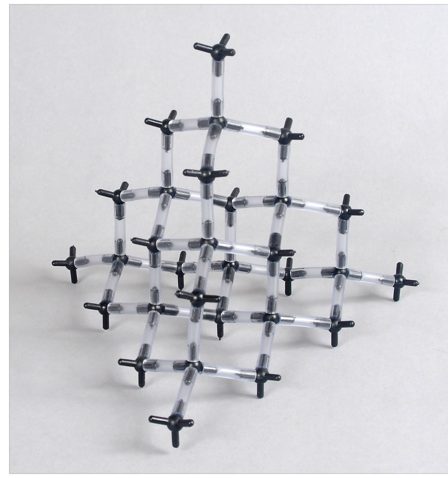


Fig. 11 Layer C lowered onto layer B.

11. Attach ten bonds to the ten "up" carbons of layer A as Fig. 12 illustrates.

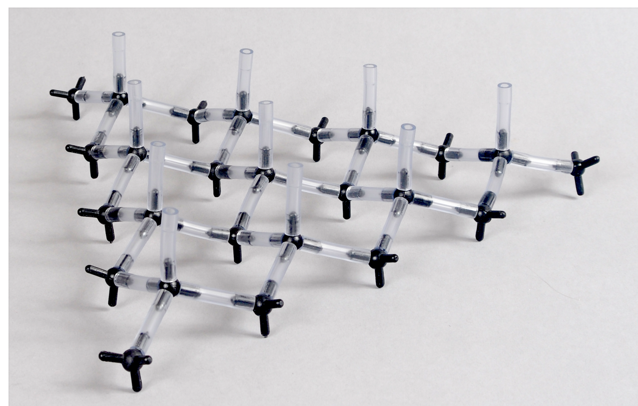


Fig. 12 Layer A with ten vertical bonds.

12. Place Layer B on top of Layer A, and attach Layer B to complete the model as you see below.