Diamond–pentamantane

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http://web.me.com/whitby/Octahedron/Welcome.html

References

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Introduction

This paper has been prompted by Figure 1 of Reference 4 which shows a stick representation of "pentamantane [1(2,3)4]".

Diamond tetrahedron

Figure 2 shows how a face of a regular tetrahedron is defined by the outer C-atoms of the diamond CFUs of assemblies of triangular panels in the series–1-triangle, 2-triangle, 3-triangle....
Figure 3 shows two views of a 2-tetrahedron.
Figure 4 shows a 4-tetrahedron

Pentamantane

Figure 1 shows how pentamantane is produced by an assembly of triangular diamond panels.
Figure 4 shows a 4-tetrahedron of diamond CFUs. Pentamantane is a 4-tetrahedron which is missing a CFU from each of its four vertexes.

Diamond octahedron

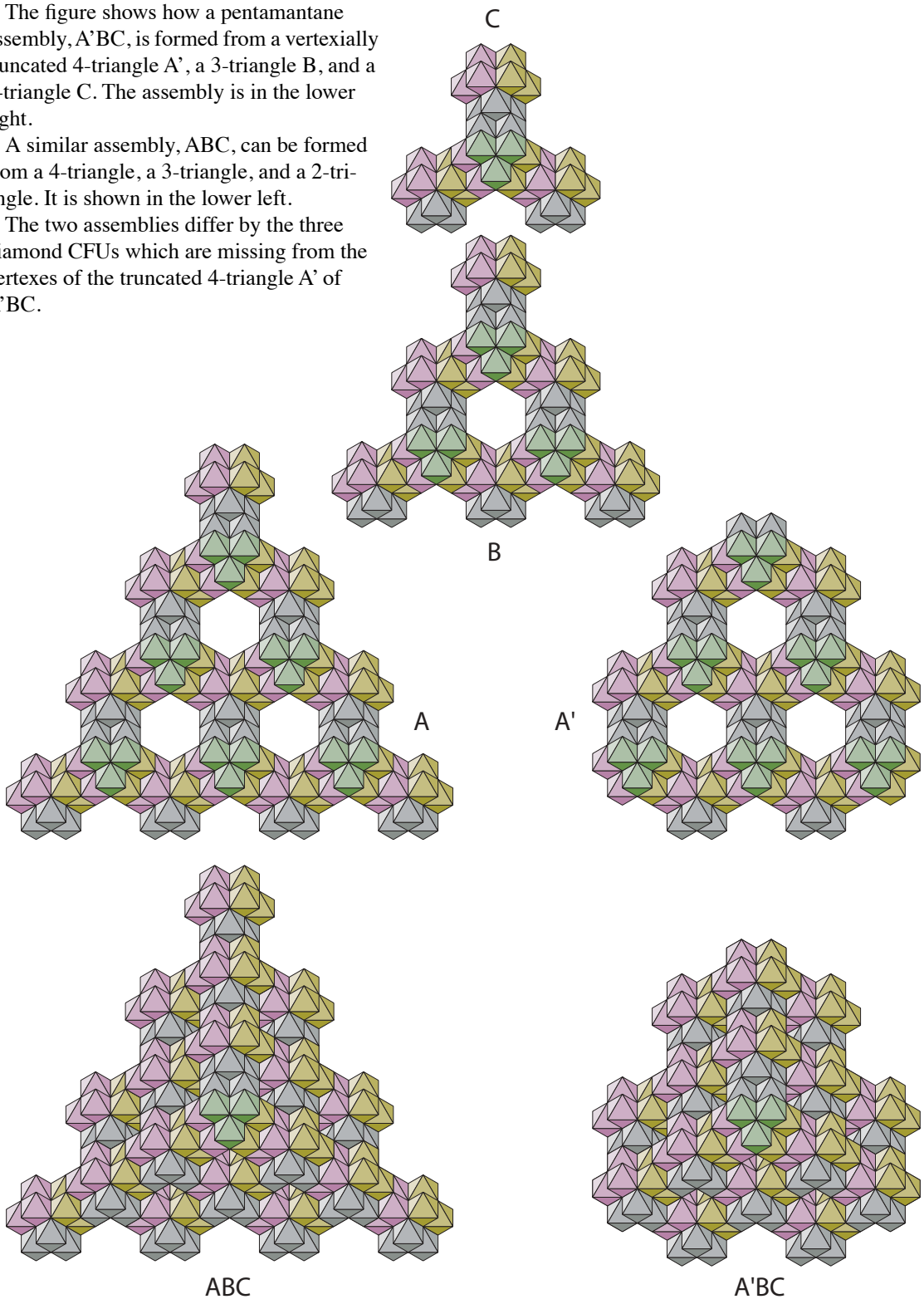
Figure 5 shows how four 2-triangles joined to a centroidal CFU results in a regular octahedral assembly in which each face of the octahedron is defined by groups of three He-octas. Each of four faces is defined by C-atoms in identical orientation. Each of the other four faces is defined by groups of three He-octas which belong to three different C-atoms.

Fig. 1 Pentamantane

The figure shows how a pentamantane assembly, A'BC, is formed from a vertexially truncated 4-triangle A', a 3-triangle B, and a 2-triangle C. The assembly is in the lower right.

A similar assembly, ABC, can be formed from a 4-triangle, a 3-triangle, and a 2-triangle. It is shown in the lower left.

The two assemblies differ by the three diamond CFUs which are missing from the vertexes of the truncated 4-triangle A' of A'BC.



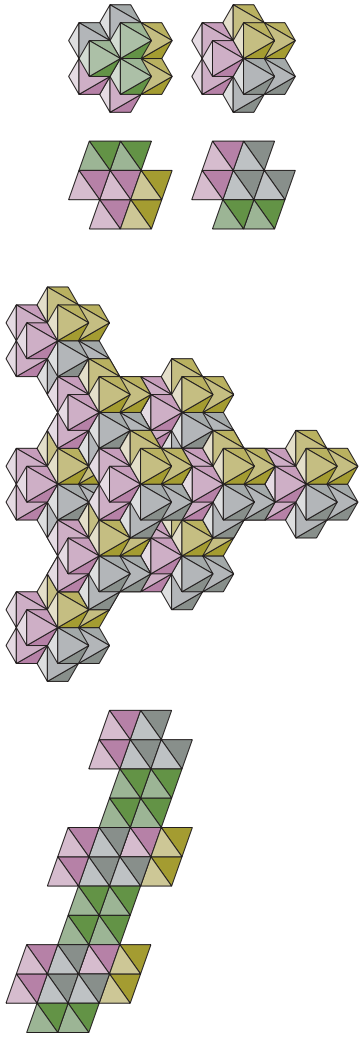


Fig. 2 Assembly of triangular panels as a regular tetrahedron

At the center of the figure is a threefold symmetrical assembly which consists of three triangular panels of diamond CFUs–1-triangle, 2-triangle, 3-triangle. At the bottom of the figure, six adjoining CFUs of the assembly viewed normally to the threefold axis show that the outermost violet C-atoms define an octahedral facial plane. The same is true for the outermost yellow C-atoms, the outermost gray C-atoms, and the outermost green C-atoms. The four planes define a regular tetrahedron.

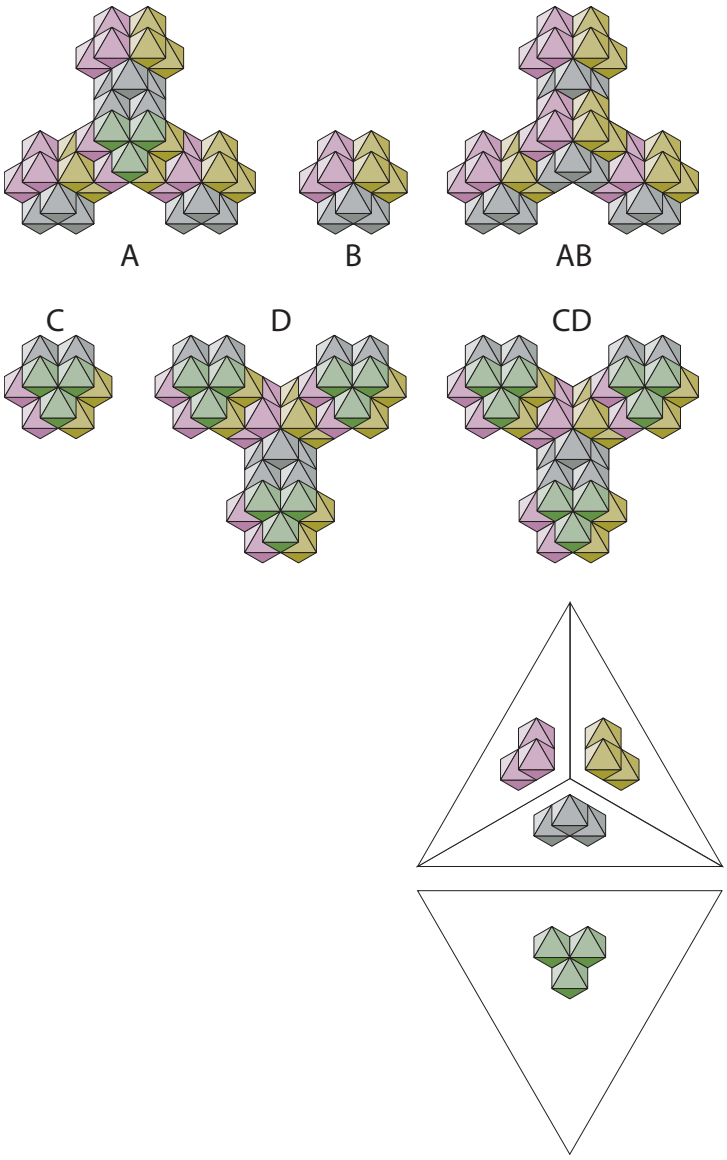


Fig. 3 Diamond 2-tetrahedron

The figure shows a 2-tetrahedron composed of diamond CFUs.

At the top, The 1-triangle B joins with the 2-triangle A to form the 2-tetrahedron AB.

The same assembly is shown inverted with the 2-triangle D joining the 1-triangle C to form the 2-tetrahedron CD.

At the bottom, a tetrahedron is shown with one of the C-atom which defines each face mounted upon it.

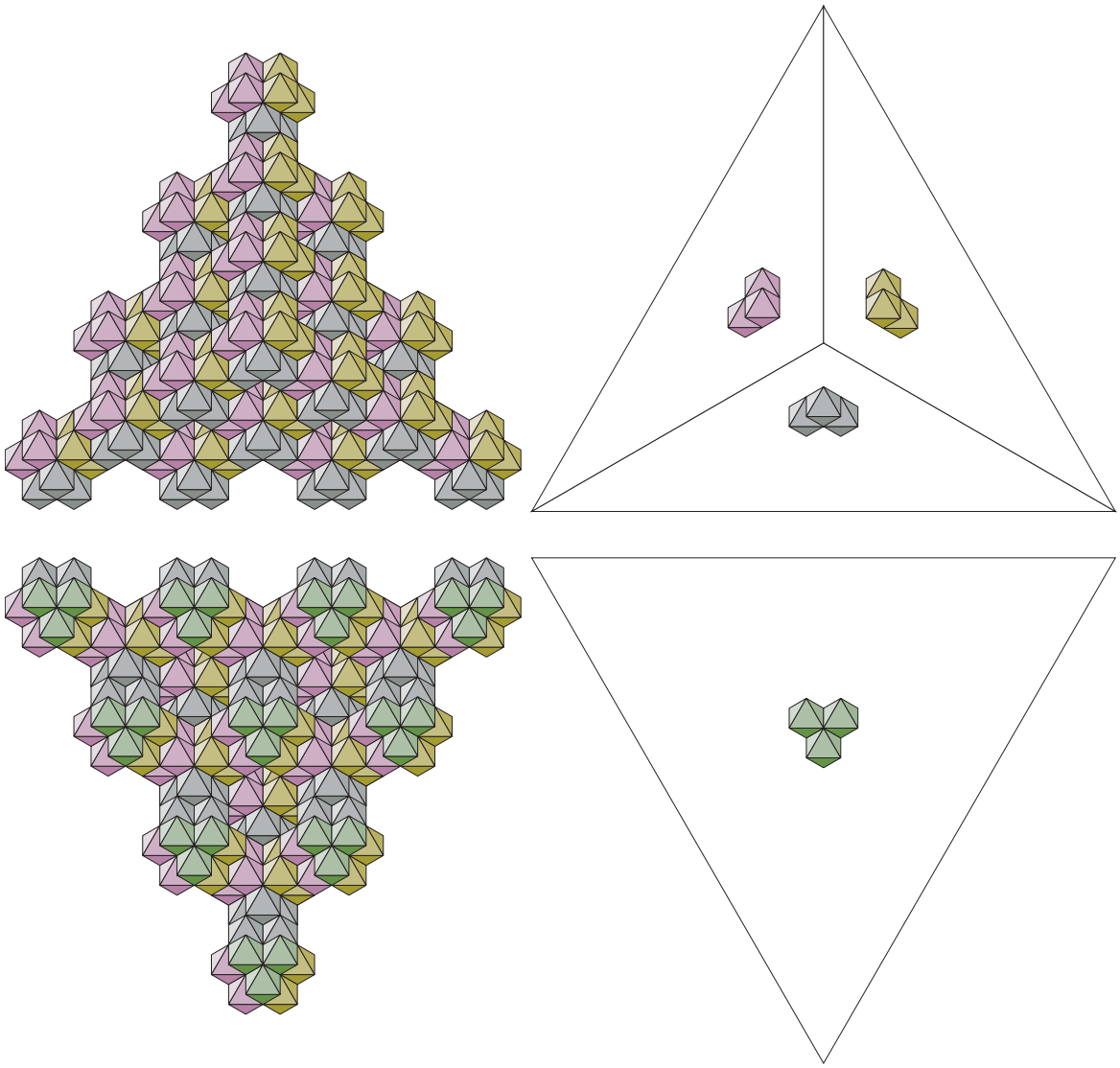


Fig. 4 Diamond 4-tetrahedron

The figure shows a 4-tetrahedron composed of thirty diamond CFUs of four C-atoms each. Each of the four faces of the 4-tetrahedron is defined by C-atoms which belong to CFUs of only one of two sets of identically oriented CFUs which constitute the assembly. The violet face is defined by violet C-atoms; the yellow face is defined by yellow C-atoms; the gray face is defined by gray C-atoms; and the green face is defined by green C-atoms. Pentamantane is a vertexially truncated 4-tetrahedron consisting of twenty-six diamond CFUs.

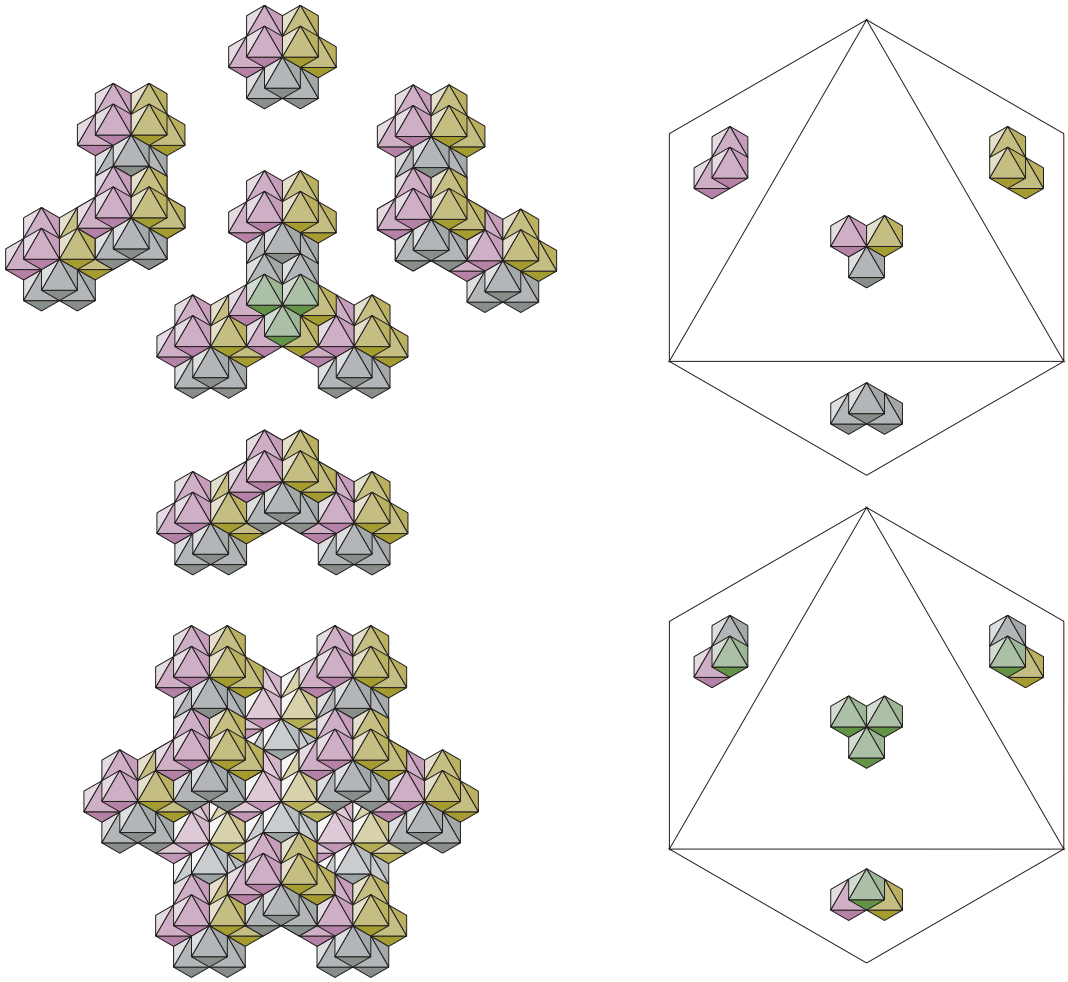


Fig. 5 Diamond octahedron

The figure shows how four 2-triangles of diamond CFUs can join to a 1-triangle to make an octahedral assembly. The 1-triangle is shown at the top left. The four 2-triangles are just below it, and the octahedral assembly is at the bottom left.

An octahedron and its obverse are shown on the right. One of the He-octa triplets which defines each face is mounted upon it. The color of the He-octa identifies the C-atom to which it belongs. Four of the octahedral faces are defined by C-atoms of the same color; four of the octahedral faces are defined by He-octas from each of three different C-atoms. Each set of four faces defines a regular tetrahedron.