

Icosahedral assembly of graphite CFUs with O-atoms

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24 September 2004—modified on 5 December 2005 to correct an error in the placement of the orange colored equatorial graphite units in the completed assembly shown in Figures 3 and 5

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

References

1. Octahedron1stEd.pdf

<http://homepage.mac.com/whitby/FileSharing103.html>

2. Sayes, C. M.; Colvin, V. L., *et al*; “Investigating the differential cytotoxicity of nanoscale water soluble fullerene species”; *Nano Letters*, submitted

<http://nanonet.rice.edu/research/Publications.htm>

3. Quasicrystals

<http://homepage.mac.com/whitby/Quasicrystals/Menu68.html>

Introduction

This document was prompted by the Sayes document [Reference 2].

Figures show how the open-faced tetrahedral graphite CFUs assemble to form a regular icosahedral assembly. Other figures show the ways in which an O-atom can join with a C-atom of a graphite CFU which is part of an icosahedral assembly.

Figure 1 shows the twenty graphite CFUs in their icosahedral orientations.

Figure 2 shows some of the CFUs along with their C-atoms.

Figure 3 shows the icosahedral assembly along with three of its subassemblies.

Figure 4 shows how O-atoms join with the C-atoms of the CFU.

Figure 5 shows an icosahedral assembly with an O-atom joined with a C-atom of three of its CFUs.

Figure 6 shows an O-atom joined to a C-atom of each of the four equatorial CFUs.

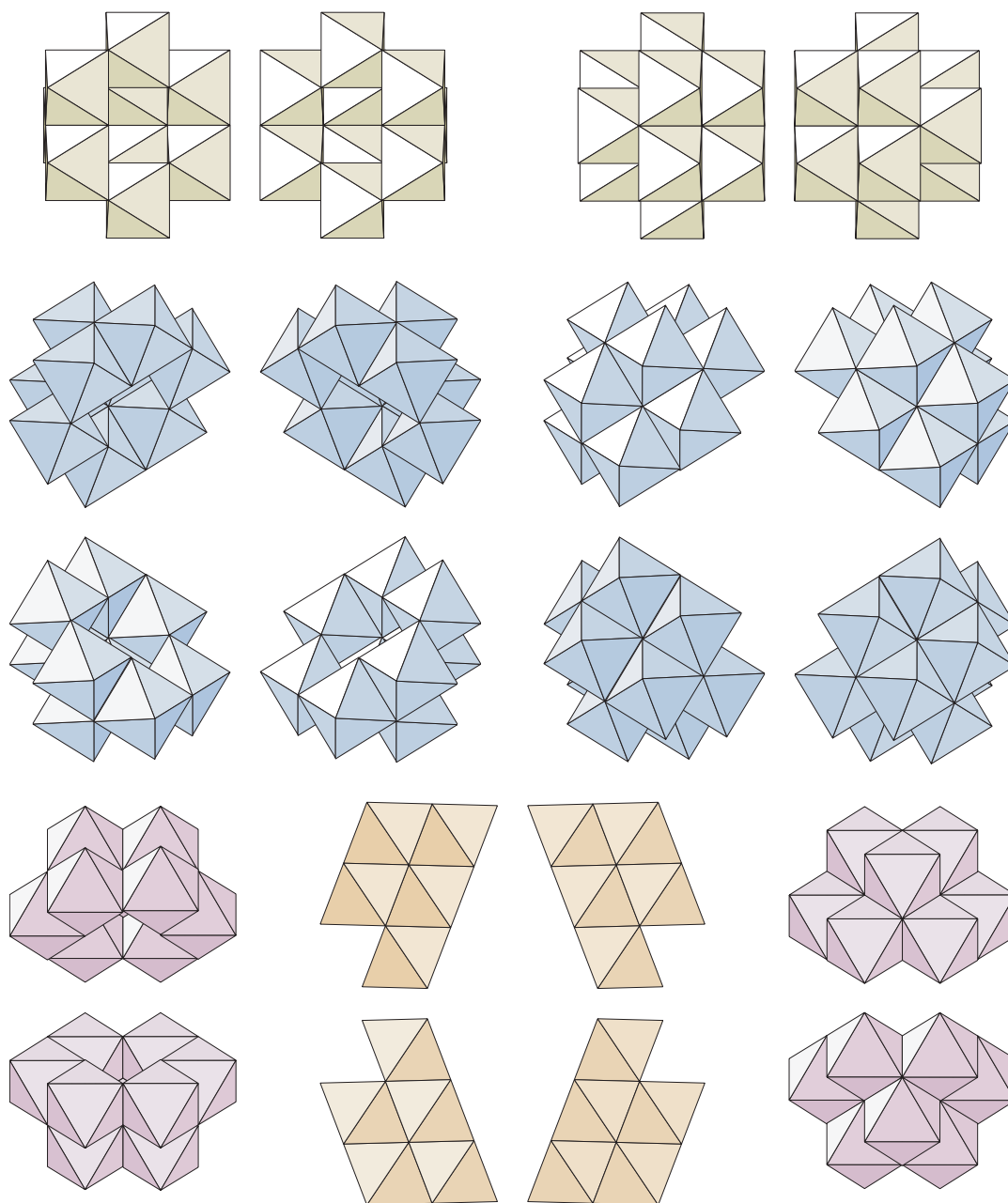


Fig. 1 Twenty graphite CFUs in icosahedral orientations.

The figure shows each of the twenty graphite CFUs of an icosahedral assembly as separate entities.

The two yellow colored units at top left, the four blue colored units in middle left, and the two violet colored units at lower left combine to make the lower portion. Their counterparts on the right combine to make up the upper portion.

The orange colored units are the bottom middle are the equatorial units of the final assembly.

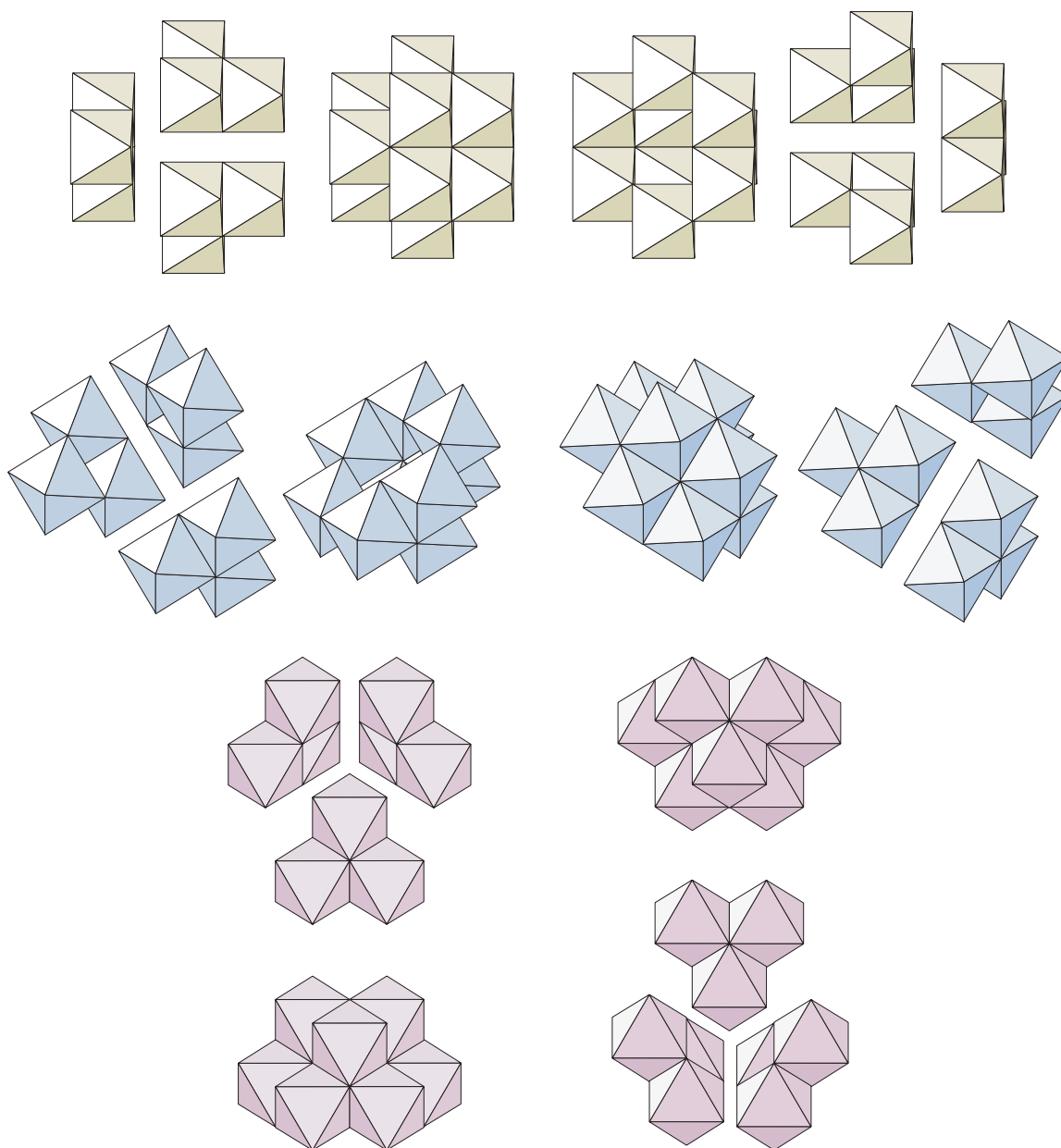


Fig. 2 Six icosahedrally oriented graphite CFUs showing C-atoms separately
The figure shows six of the icosahedrally oriented graphite CFUs of the assembly. Each of the depicted CFUs is accompanied by a depiction of the three C-atoms which compose it.

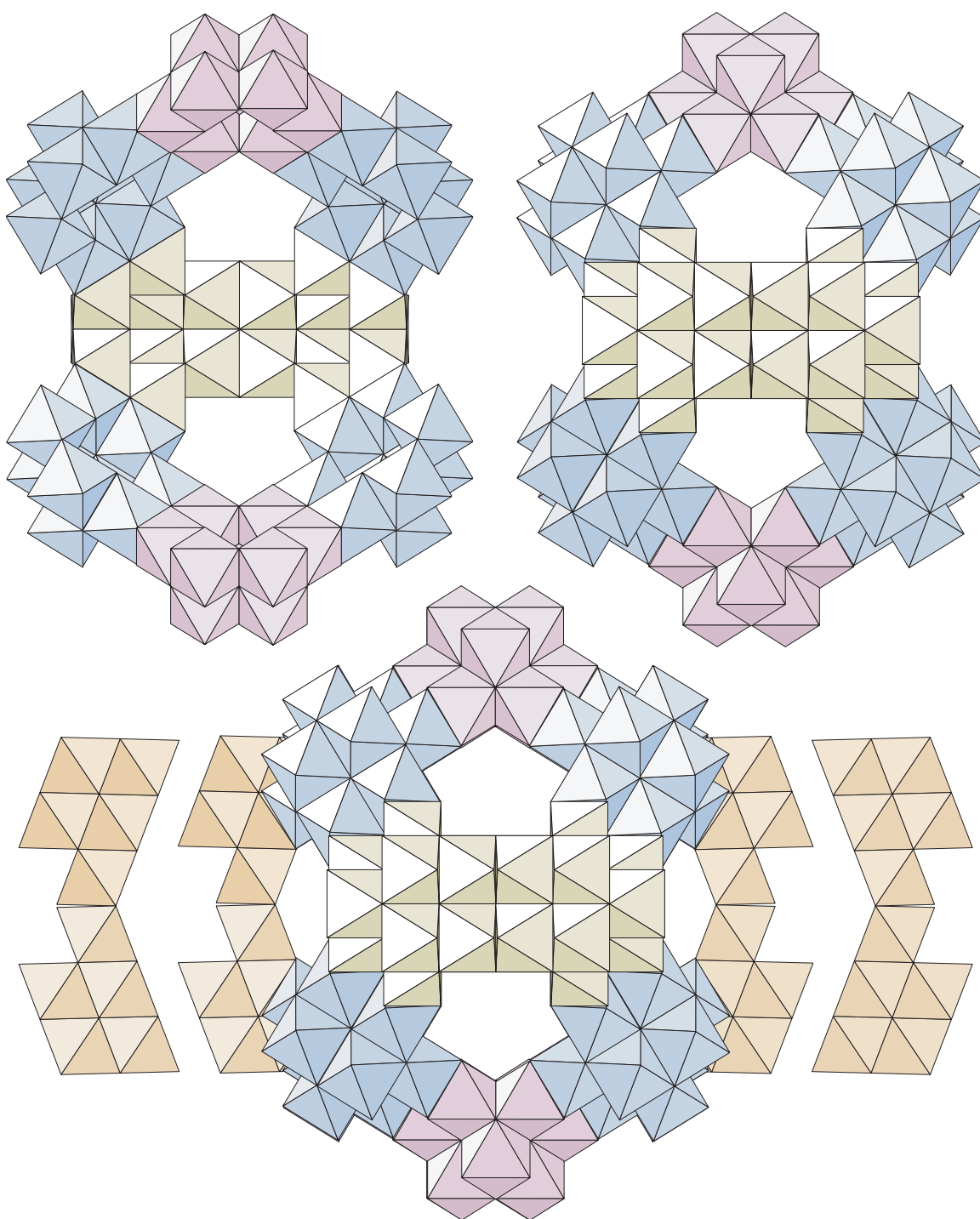


Fig. 3 Icosahedral assembly of twenty graphite CFUs

The figure shows an icosahedral assembly of twenty graphite CFUs at the bottom center of the figure. It is flanked by two equatorial units of two CFUs each. Above it are its upper and lower portions.

At the top left is an eight CFU subassembly which shows the inner surfaces of each of the CFUs.

At the top right, an identical subassembly has been rotated a half-turn about an axis parallel to the bottom of the page.

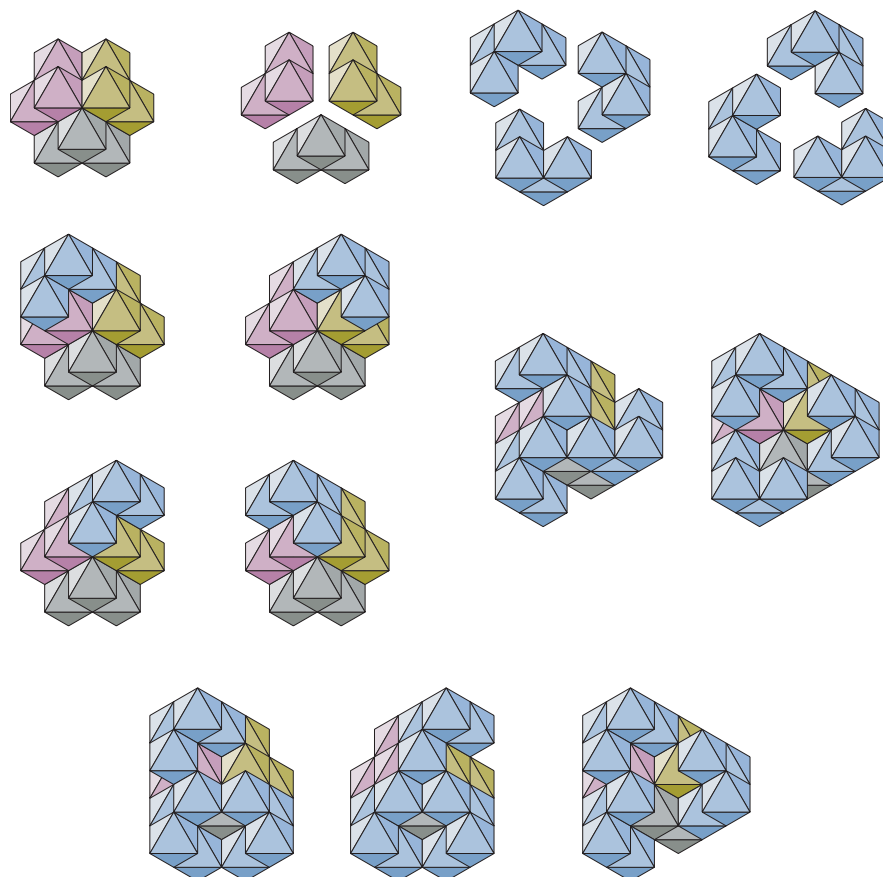


Fig. 4 Graphite CFU–accommodation of O-atoms

A graphite CFU is shown in the upper lefthand corner of the figure. Each of its three C-atoms is colored to differentiate it from the other two C-atoms. The atoms are shown separately just to the right of the CFU. Six O-atoms are shown to the right of the C-atoms in the top right of the figure. Each O-atom in one of the two groups of three differs from the other two O-atoms by a third of a turn about a perpendicular to the viewing plane.

Each of the four CFUs in the middle left of the figure has an O-atom joined to one of its three C-atoms. Each of the diagonally opposite (upper left and lower right) CFUs has an O-atom joined to its violet C-atom; each of the other two has an O-atom joined to its yellow C-atom

Each of the two CFUs in the middle right of the figure has an O-atom attached to each of its C-atoms. Each assembly has threefold symmetry. The pattern of joining of the O-atoms of the assembly on the right is more compact than the pattern of joining of the assembly on the left.

At the bottom of the figure, there are three assemblies in which the O-atoms are asymmetrically joined to the CFUs.

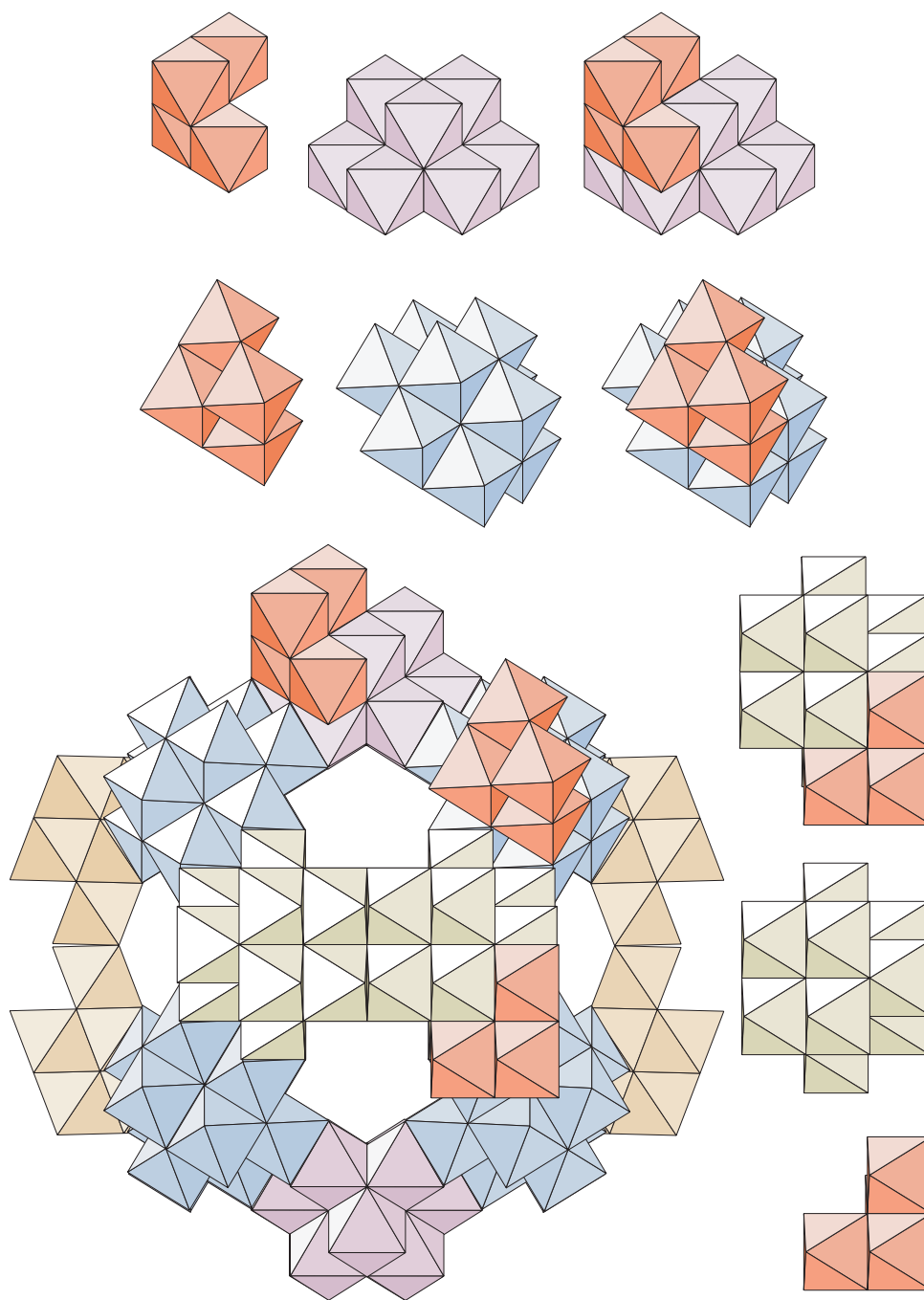


Fig. 5 Icosahedral assembly of graphite CFUs with three O-atoms

The figure shows three ways in which an O-atom can cleftly join with an icosahedral assembly of graphite CFUs. Each of the CFUs to which an O-atom is joined is shown separately either at the top of the figure or on the lower right. The icosahedral assembly with three O-atoms is in the bottom left of the figure.

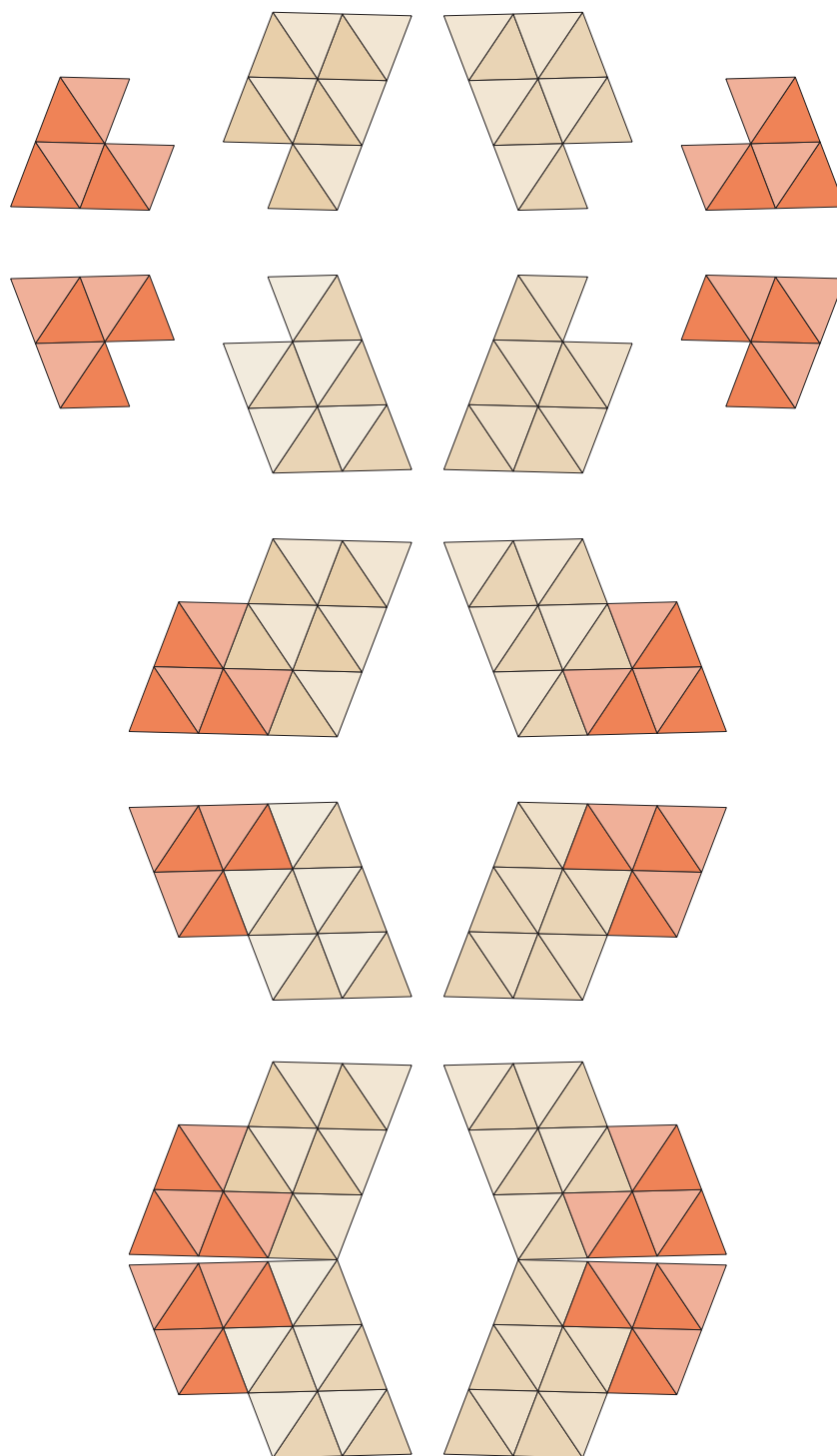


Fig. 6 Icosahedral assembly—equatorial graphite CFUs with O-atoms

At the top of the figure, each of the four equatorial graphite CFUs of an edgially viewed regular icosahedral assembly is shown with an O-atom whose He-octas are colored red.

In the middle of the figure, the O-atoms are cleftly joined to their respective CFUs.

At the bottom of the figure, each of the O-atom-CFU is joined to another in the same way that occurs in the icosahedral assembly. Each pairing shows the angular gap between the O-atoms of its CFUs.

