

Compact assembly of lactone-joined L-triplets

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

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References

1. Robert Whitby, [Octahedron1stEd.pdf](#)
2. Lubert Stryer, *Biochemistry* 2d ed., W. H. Freeman, San Francisco, 1981, Part 1, Chapter 9, "Connective tissue proteins" Figure 9-12 Formulas of ascorbic acid and ascorbate, page 192.

Introduction

Two L-triplets can join in a compact assembly in which an end C-atom of each is cleftly joined to the same O-atom. The resulting assembly is rotationally symmetrical. A second O-atom can cleftly join to the remaining cleft of either of the same two C-atoms to produce a join that is characteristic of a lactone ring. Each of the five ways of joining is shown in Figure 1. If the O-atom is cleftly joined to both of the C-atoms, the two C-atoms and the two adjoining O-atoms make a symmetrical group. It is the second from the left in the bottom row of Figure 1.

Figure 2 shows the assembly of lactone-joined triplets featuring the symmetrical group of Figure 1.

Figure 3 shows the atom by atom assembly of the lactone-joined L-triplets from a direction that is parallel to the axis of rotational symmetry. O-atoms are cleftly joined to each of the remaining C-atoms of the two L-triplets so as to maintain the twofold symmetry of the assembly.

Figure 4 shows an enlarged views of the joined L-triplets without O-atoms, the joined L-triplets with the two O-atoms joining them, and the joined L-triplets with the two atoms joining them and the four additional O-atoms attached to the other C-atoms of the assembly.

Each of the four O-atoms that do not participate in the join can accommodate an H₂-group.

Each of the two C-atoms at the non-joining end of the L-triplets is free.

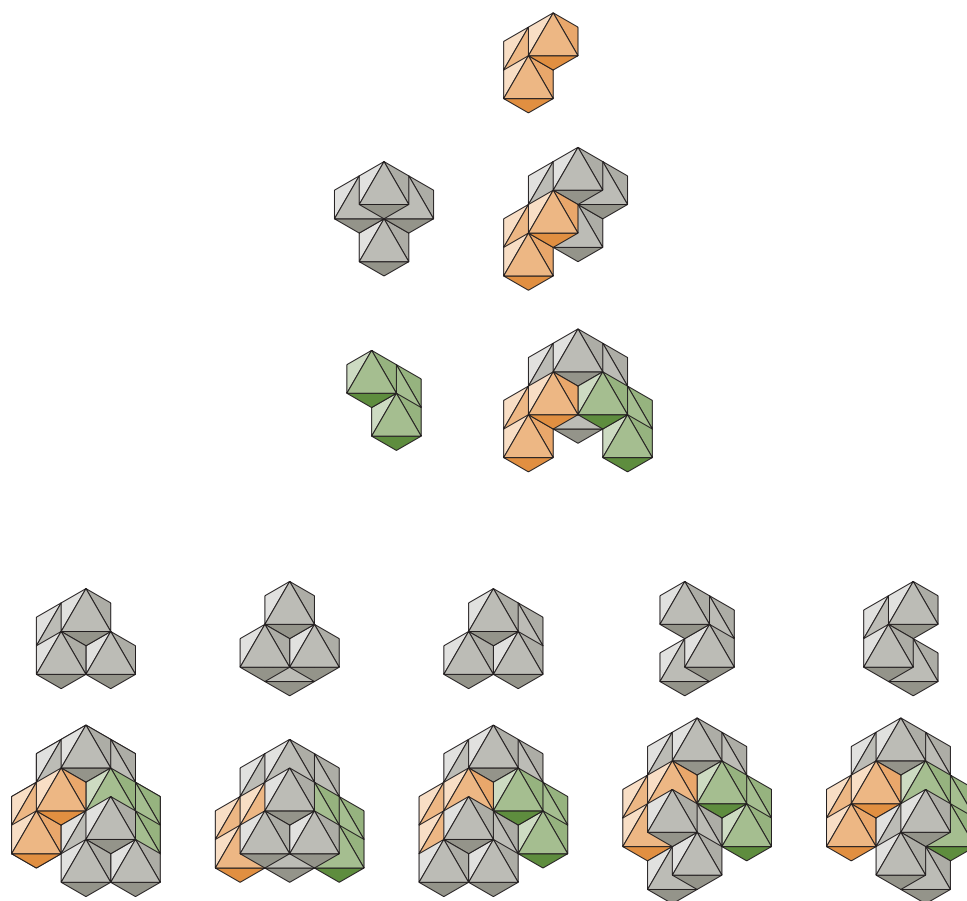


Figure 1. Lactone-join possibilities

The figure shows how each of two C-atoms can be cleftly joined to a single O-atom and how a second O-atom can be cleftly joined to either of the C-atoms without preventing either of the two C-atoms from cleftly joining with an additional C-atom.

The orange C-atom in the top row is cleftly joined to the O-atom in the second row.

The green C-atom in the third row is cleftly joined to the O-atom making a symmetrical C-O-C assembly.

The fourth row shows five O-atoms each in its own orientation. Each of these O-atoms can make a cleft-join to one or both of the near clefts of the C-atoms of the C-O-C assembly.

The fifth row shows the second O-atom cleftly joined to a C-atom of the C-O-C assembly. The leftmost join is to the green C-atom. The near cleft of the orange C-atom is blocked by the added O-atom.

In the second from the left assembly, the added O-atom is cleftly joined to both the orange C-atom and green C-atom. This makes a symmetrical assembly.

The added O-atom in the middle assembly is cleftly-joined to the orange C-atom and blocks the near cleft of the green C-atom.

The added O-atom of the assembly to the right of middle is cleftly joined to the orange C-atom and blocks the near cleft of the green O-atom.

The added O-atom of the rightmost assembly is cleftly-joined to the green C-atom and blocks the near cleft of the orange C-atom.

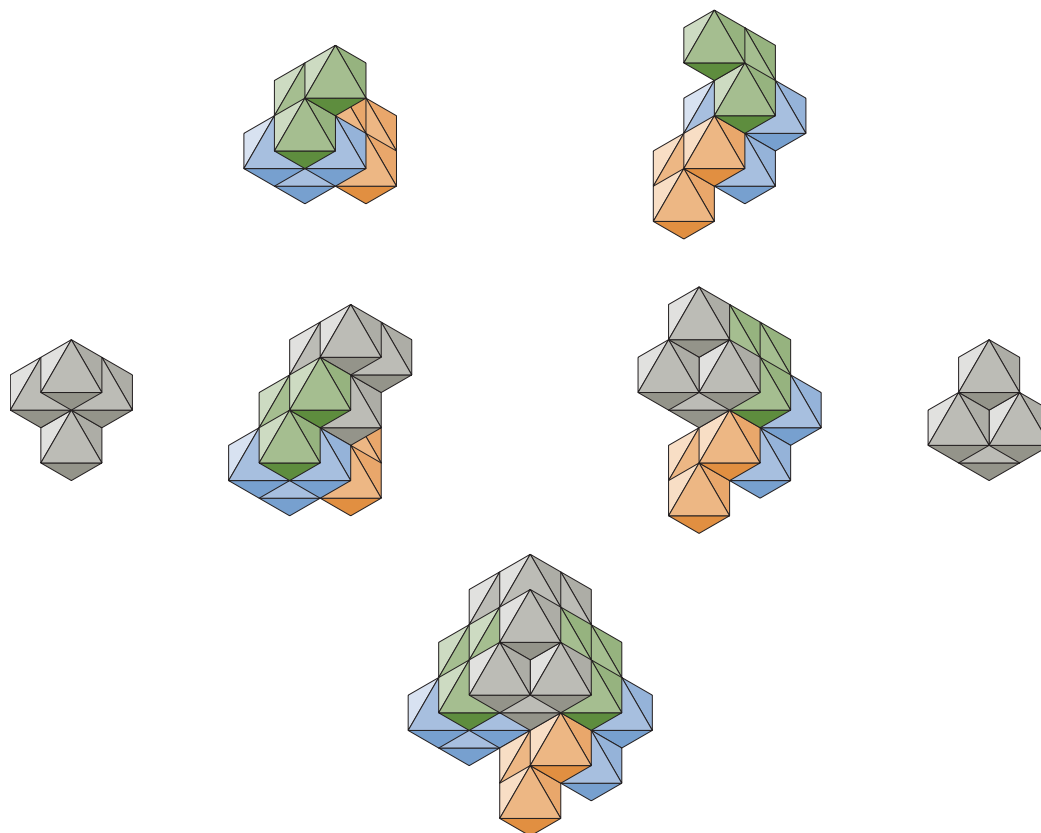


Figure 2. Lactone ring type joining of two L-triplets by two O-atoms

The figure shows how an end C-atom of each of two L-triplets can be joined by an O-atom in a lactone type join.

The two L-triplets are shown in the top row of the figure.

An O-atom is cleftly joined to the green colored C-atom at one end of each of the L-triplets in the second row.

The two L-triplets are joined at the bottom so that each green C-atom is cleftly joined to the O-atom of the other triplet.

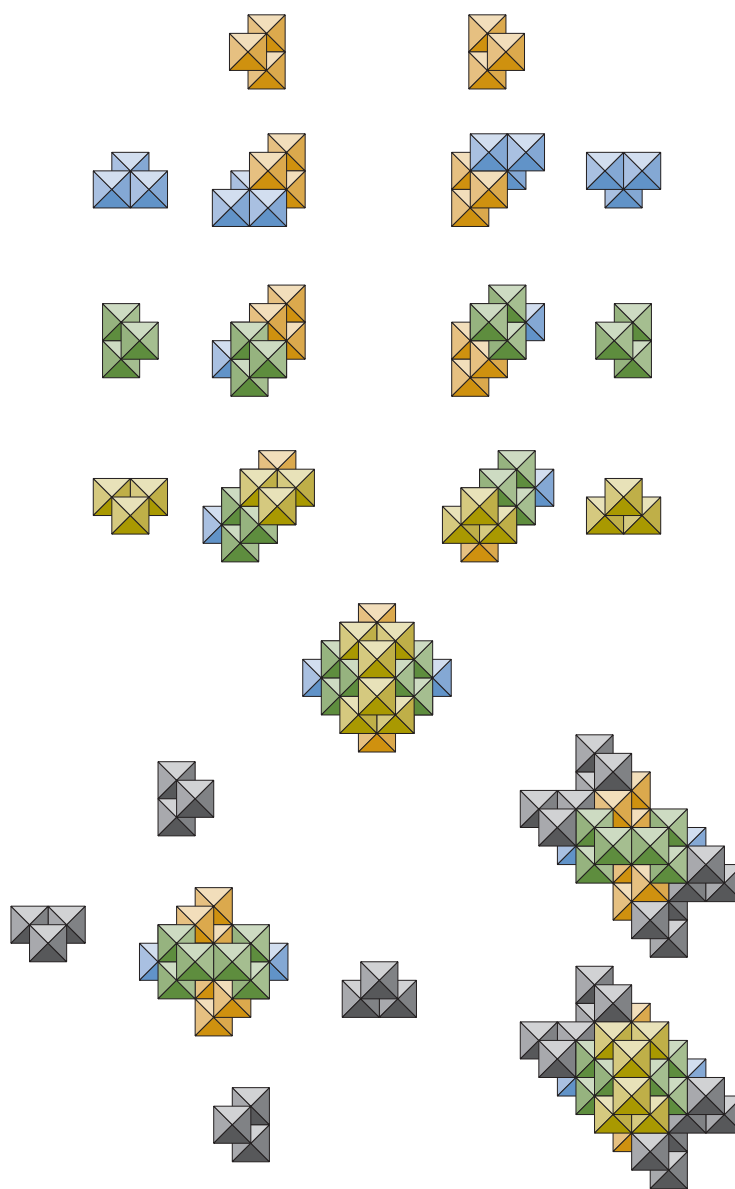


Figure 3. Lactone joined L-triplets

The figure shows the atomic arrangement of two L-triplets which are joined by two O-atoms to form a rotationally symmetrical assembly. It shows how an O-atom can join to each of the two remaining C-atoms of each triplet.

The upper part of the figure shows the assembly of two identical triplets whose orientations differ by one-half turn about an axis perpendicular to the projection plane. The nearest C-atoms that are colored green are each joined by an O-atom colored yellow.

The two L-triplets with O-atoms join to form the assembly of the fourth row.

At the bottom, O-atoms are joined to each of the two lower C-atoms of each L-triplet which are colored either blue or orange. The resulting assembly is shown both with and without the yellow colored O-atoms which are each cleftly joined to the green C-atoms of the two L-triplets. The completed assembly has a twofold rotational symmetry of one-half turn about the vertical diameter that is perpendicular to the projection plane.

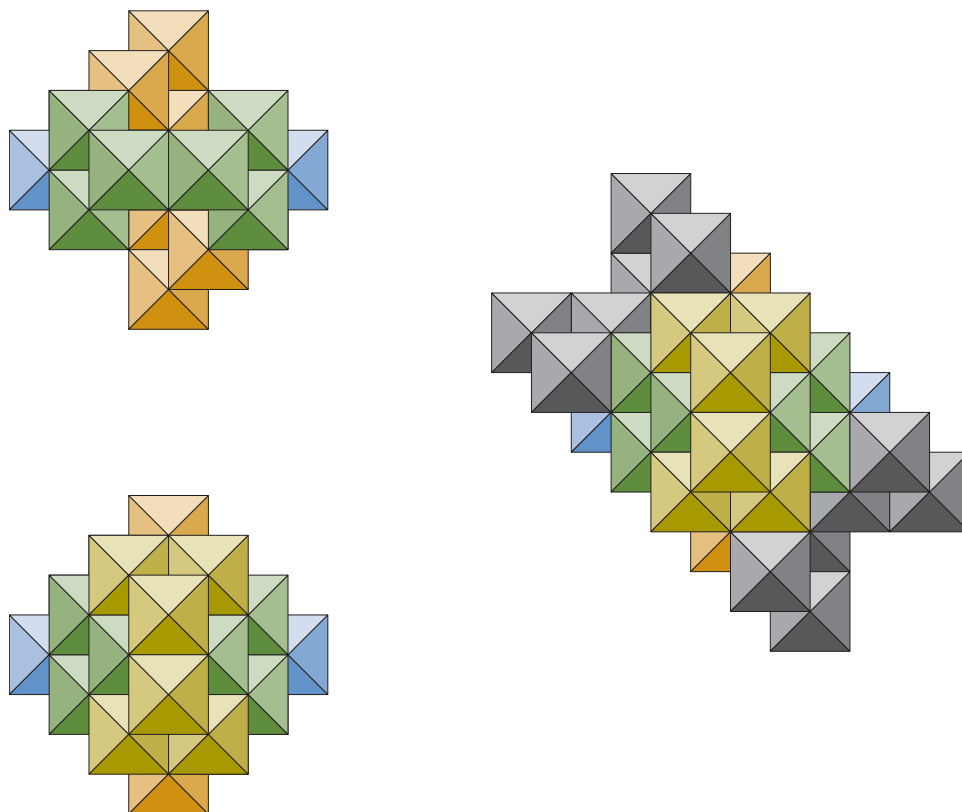


Figure 4. An ascorbate possible

The figure shows three views of an assembly of two L-triplets which are joined together by two O-atoms.

At top left, the two triplets are shown without any O-atoms.

At bottom left, the triplets are shown with the adjoining O-atoms which are colored yellow. Each of the yellow O-atoms is cleftly joined to each of the green colored C-atoms.

On the right, an additional O-atom has been cleftly joined to each of the remaining C-atoms which are colored blue or orange.