

Symmetry element

A **symmetry element** is a point of reference about which *symmetry operations* can take place. In particular, symmetry elements can be identities, mirror planes, axes of rotation (both proper and improper), and centers of inversion.^[1] A symmetry element corresponds to a symmetry operation that generates the same representation of an object.

Contents

[Identity](#)

[Mirror planes](#)

[Rotational symmetry](#)

[Inversion](#)

[Gallery](#)

[See also](#)

[References](#)

Identity

The identity symmetry element is found in all objects and is denoted **E**.^[2] It corresponds to an operation of doing nothing to the object.

Mirror planes

Mirror planes are denoted by **σ**. In particular, a vertical mirror plane is denoted **σ_v**.

Rotational symmetry

Rotational symmetry, also known as radial symmetry, is represented by an axis about which the object rotates in its corresponding symmetry operation. A group of proper rotations is denoted as **C_n**, where n is the order of rotation.^[3] The **C_n** notation is also used for the related, more abstract, *cyclic group*. An *improper rotation* is the composition of a rotation about an axis and a reflection in a plane perpendicular to that axis. Its group is denoted by **S_n**.

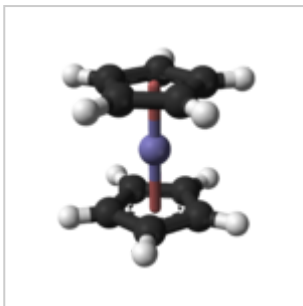
Inversion

For inversion, denoted **i**, there must be a point in the center of an object that is the inversion center. In the inversion operation for 3D coordinates, the inversion center is the origin (0,0,0). When an object is inverted, the position vector of a point in an object, **(x,y,z)**, is inverted to **(-x,-y,-z)**.

Gallery



Example of vertical mirror plane.



Ferrocene molecule, an example of S_{10} symmetry element.

See also

- [Symmetry](#)
- [Group theory](#)
- [Crystallography](#)
- [Hermann-Mauguin notation](#)
- [Schoenflies notation](#)

References

1. Robert G. Mortimer (10 June 2005). *Mathematics for Physical Chemistry* (<https://books.google.com/books?id=nGoSv5tmATsC&pg=PA276>). Academic Press. pp. 276–. ISBN 978-0-08-049288-9.
2. Glazer, Michael; Burns, Gerald; Glazer, Alexander. Space groups for solid state scientists.
3. Glazer, Michael; Burns, Gerald; Glazer, Alexander. Space groups for solid state scientists.

Retrieved from "https://en.wikipedia.org/w/index.php?title=Symmetry_element&oldid=1000483058"

This page was last edited on 15 January 2021, at 08:21 (UTC).

Text is available under the Creative Commons Attribution-ShareAlike License; additional terms may apply. By using this site, you agree to the Terms of Use and Privacy Policy. Wikipedia® is a registered trademark of the Wikimedia Foundation, Inc., a non-profit organization.