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**wellcome
collection**

Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
<https://wellcomecollection.org>

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EARLY WORK: THE FOUNDATIONS OF STEREO-CHEMISTRY (1847-1856)

EXHIBITS BY THE WELLCOME HISTORICAL MEDICAL MUSEUM

PASTEUR'S EARLY WORK: THE FOUNDATIONS OF STEREO-CHEMISTRY (1847-1856)

Light which has passed through tourmaline develops a double refraction, and is said to be polarized. This becomes apparent when it passes through a second tourmaline. In one position of the second tourmaline no light is transmitted for a position perpendicular to this, a maximum amount of light is transmitted. Crystals of quartz and calcite also possess the property of changing the position of maximum and minimum illumination. These substances are known as optically active and are said to have the property of rotating the plane of polarization.

Maquenne was struck by the discovery that tartaric acid is optically inactive and was unable to explain this, except that one was optically active, the other was not. This discovery occurred because of a failure to notice that the tartaric acid which he used was not optically active, but a mixture of tartaric acid and meso-tartaric acid. He compared these with crystals obtained from natural ammonium tartrate. The latter gave two images of crystals, one said looks to the right, the other looks to the left. He obtained crystals with facets to the right mirrored the plane of polarization to the right and when in all respects identical with those described by Berzelius. Crystals with facets to the left, mirror the plane of polarization to the left, and were mirror-images of the first type. Pasteur formed the two compounds of tartaric acid, meso-tartaric tartaric acid (in tartaric acid) and meso-tartaric tartaric acid (in tartaric acid) respectively.

Pasteur concluded that these substances which exist in an absolute state of symmetry and which are identical with optically active forms, which are dependent on the arrangement of their atoms. His discovery marks the foundation of stereochemistry.



Small glass bottle with a stopper, likely containing tartaric acid.



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Properties of tartaric acid and its isomers. Tartaric acid is a white, crystalline substance, soluble in water, and is optically inactive. It is the most common form of tartaric acid, and is found in many fruits, particularly grapes. It is a diastereomer of meso-tartaric acid and is optically active.



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Four black, faceted crystal models on stands, likely representing tartaric acid crystals.