

## Optical Isomerism: Example lesson plan

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|------------------------|---|
| Age group:             | Post-16   |
| Learning Objectives:   | Students will discover that compounds containing chiral carbon atoms are non-superimposable on their mirror image.  |
| Key Words and Phrases: | optical isomerism, chiral carbon atom, non-superimposable mirror image, amino acids, plane-polarised light, Polaroid, laevorotatory, dextrorotatory, racemic mixture, stereoselective   |
| Resources Needed:      | Class set of student worksheets.<br>Molecular Model Kits – 10 sets of 1 carbon, 1 hydrogen, 1 fluorine, 1 chlorine, 1 bromine and 4 single bonds.<br>Demonstration – The optical activity of sucrose: A pair of polaroid sunglasses (or two polaroid filters), 1 x 400cm <sup>3</sup> beaker, overhead projector, about 250g of <i>D</i> -sucrose (table sugar). See the link below for full details. |

| Teacher activity   | Student activity   | Time    |
|--|--|---------|
| <p><u>Starter Activity</u><br/>Give out worksheets.<br/>Be prepared to write down displayed formulae as examples of structural and geometrical isomerism on the board.<br/>Quickly check that everyone has got the answers right.<br/>Ask students if they have any general questions about isomerism.</p>   | Students draw lines to match up formulae and type of isomerism.  | 10 min. |
| <p><u>Model Making Activity</u><br/>Initially students will probably think that their models are all identical. They may need to be prompted to compare their models very closely. A good way of doing this is to slot two models together so that the carbon atoms are touching. They should then see that two of the other atoms are 'the wrong way round'.<br/>Give everyone the opportunity to classify their model as one isomer or the other.<br/>Point out that the isomers are mirror images.<br/>Go through the idea of drawing the structures using wedge-shaped bonds on the board.<br/>Check students are drawing the 3D displayed formulae correctly.</p> | <p>Check they have the right number of atoms to start with.<br/>Build bromochlorofluoromethane.</p> <p>Compare their model with those of others.</p> <p>Draw the 3D structures of the two isomers using wedge-shaped bonds.<br/>Draw the 3D structures of the alanine isomers.</p> | 15 min. |
| <p><u>Demonstration</u><br/>Carry out the demonstration activity 'The optical activity of sucrose' from Classic Chemistry Demonstrations: <a href="http://media.rsc.org/Classic%20Chem%20Demos/CCD-13.pdf">http://media.rsc.org/Classic%20Chem%20Demos/CCD-13.pdf</a><br/>Question the students to check they have understood how this shows that the sucrose solution is a single optical isomer. Ask what would happen if we were to shine plane-polarised light through a racemic mixture. (Nothing, there would be no net rotation.)</p>   | <p>Watch the demonstration.<br/>Write down observations.</p>   | 20 min. |

Extension activity: Make models of alanine and thalidomide