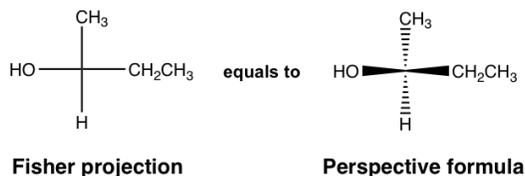


5.5: Fisher Projection

For the discussions so far, the perspective formula with solid and dashed wedges have been used to represent the 3D arrangement of groups bonded to a chirality center. Other than that, there is another broadly applied formula for that purpose, that is the Fisher projection. A Fisher projection is a shortcut for showing the spatial group arrangement of a chirality center, it is more easily to be drawn and recognized, and is particularly useful for showing the structures with more than one chirality centers.

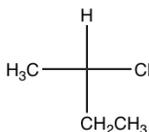
In Fisher projection, the chirality center is shown as the intersection of two perpendicular lines. **The horizontal lines represent the bonds point out of the plane, and the vertical lines represent the bonds that point behind the plane.**



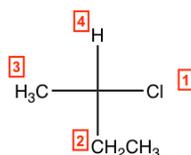
It is very important to keep in mind that the lines in Fisher projection are not just bonds, they represent the bonds with specific spatial arrangements and stereochemistry.

Assigning R/S Configuration in Fisher projection

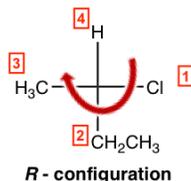
Taking the following compound as an example:



1. Assign group priority as we usually do.

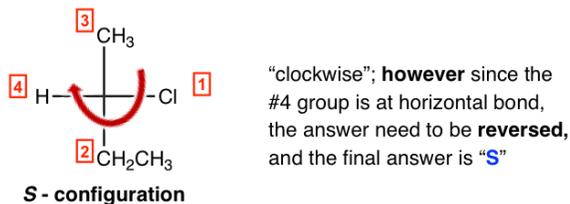


2. If the lowest priority group (#4 group) is on a **vertical** bond, determine the priority decrease direction from #1 → #2 → #3 as usual to get the configuration, clockwise is **R** and counterclockwise is **S**.
- 3.



So, the example here is a **R**-isomer, and the complete name of the compound is (**R**)-2-chlorobutane.

3. If the lowest priority group is on a **horizontal** bond (as the case in the following structure), determine the priority decrease direction as in step 2, then **reverse the answer to opposite** way, to get the final configuration.



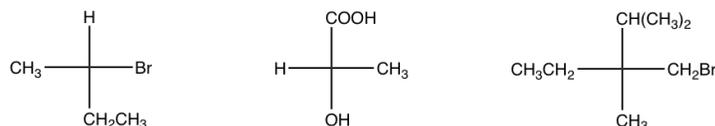
So, the example here is a **S**-isomer, and the complete name of the compound is (**S**)-2-chlorobutane.

Exercises 5.6

Explain that why in step 3 of the above procedure, the answer should be **reversed** to get the final (actual) configuration?

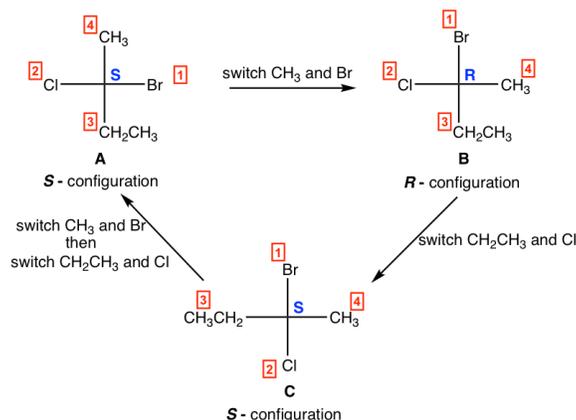
Answers to Practice Questions Chapter 5

Exercises 5.7: Indicate the configuration of the following structures.



Properties of Fisher projection:

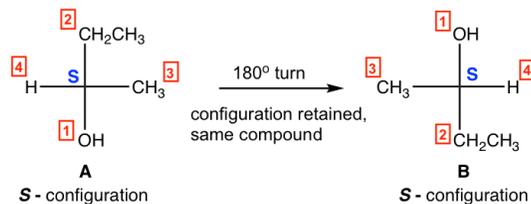
1. One switch (interchange) of two groups in a Fisher projection invert the configuration, two switches bring the original isomer back.



For above structures:

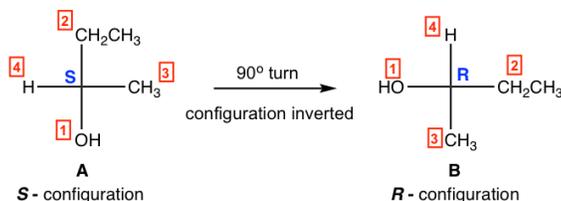
- one switch of **A** leads to **B**, **A** and **B** are enantiomers;
- one switch of **B** leads to **C**, **B** and **C** are enantiomers;
- two switches of **C** leads to **A**, **A** and **C** are identical.

2. Rotate the Fisher projection 180° get same structure, with the configuration retained.



- 180° rotation of **A** leads to **B**, **A** and **B** are identical.

3. Rotate the Fisher projection 90° get the configuration inverted.



- 90° rotation of **A** leads to **B**, **A** and **B** are enantiomers.

Do NOT rotate the Fisher projection 90° , unless you have to. Keep in mind that the configuration get inverted by 90° rotation.

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