

Problem 43, Chemistry 301X - 2006

You take a bottle from your – 200 °C freezer and discover that the label has been partially eaten by low-temperature rats. Enough of it is legible, however, so that you know that it contains either:

$(R,R)$ -1,2-dimethylcyclohexane

or

$(R,S)$ -1,2-dimethylcyclohexane.

To resolve (sorry!) the problem, you allow the bottle to warm to room temperature and measure the optical rotation of the contents, hoping to match it to the known rotation of one of the two possibilities. Surprisingly, you discover that there is no optical rotation whatsoever.

Which stereoisomer did you have? Explain carefully.