

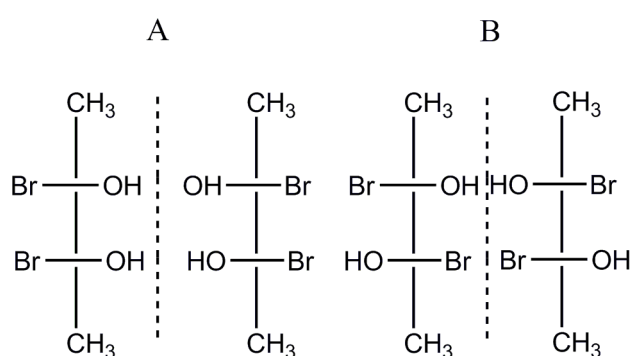
Answer on the question #54659 – Chemistry – General chemistry

Question:

- (a) Write down the enantiomers of a compound having two asymmetric carbon atom each having – Br, – OH and – CH₃ groups. Write down a structure for the meso form.
- (b) You are given a gaseous substance. Suggest an experimental method to find out whether it is polar or nonpolar. Discuss the steps to be used in this method

Answer:

- (a) The Fischer diagrams of stereoisomers is shown below:



The parts A and B present mirror images of two possible structures. According to the rules of manipulations of Fischer projections, one can rotate the projection by 180° without inversion of stereochemistry. One can note that right image of the part A will superimpose the left image if rotated by 180°. That means, that the compounds in the part A are not enantiomers. The cause of such a phenomenon is the plane of symmetry between the two carbons, perpendicular to the carbon-carbon bond. The compound, shown on the part A is known as the meso-form of the molecule. This molecule is optically inactive.

Contrarily, the part B shows two enantiomers, they are optically active. They are mirror images of one another and can't be superimposed. They are R, R and S, S isomers, respectively (left one is R,R and right one is S,S).

- (b) The difference between the polar and non-polar gaseous substances is their solubility in water. The polar gases will dissolve better in water (as water is polar solvent). The solubility of gas in water can be checked by the measurements of gas pressure above water in closed volume, as well as checking directly the concentration in water.

Thus, the non-polar gases can be distinguished by the comparison of the solubility in fats and in water. For example, the chloroform is better soluble in fats than in water and is classified as a non-polar gas.