**Additional questions on Level 3 Isomers**

**1.** Lactic acid is a [carboxylic acid](http://en.wikipedia.org/wiki/Carboxylic_acid) with the [chemical formula](http://en.wikipedia.org/wiki/Chemical_formula) C3H6O3, the IUPAC name for lactic acid is 2-hydroxypropanoic acid.

**i)** During vigorous exercise our bodies makes lactic acid, which splits into the lactate ion and hydrogen ion. The burn felt during exercise is caused by hydrogen ion buildup. Draw a sketch of the lactate ion.

**ii)** Lactic acid is a an enantiomer, draw a 3D diagram of the mirror images of lactic acid

**iii)** Lactic acid extracted from meat is known as dextro-lactic acid and lactic acid produced during fermentation of sugar by Bacillus aceti is known as laevo-lactic acid. Discuss the similarities and differences in the properties of the two enantiomers of lactic acid.

**2. i)** Draw (an expanded structural diagram) and name a secondary alcohol that is a stereoisomer.

**ii)** Draw a 3d diagram of the two mirror images of the isomer named above.

**iii)** Explain why the secondary alcohol you have drawn is a stereoisomer.

**iv)** Describe how to make a racemic mixture of the stereoisomer

**3.** 2-aminopropanoic acid (alanine) has two enantiomers (optical isomers) because it has a chiral

molecule containing an asymmetric carbon atom. One enantiomer is a non-superimposable mirror

image of the other. The two enantiomers rotate the plane of polarisation of plane polarised light in opposite directions, but 2-aminopropanoic acid can also be found as a racemic mixture which has no effect on the plane of polarisation.

**i)** Draw the structures of the two enantiomers. Use your diagram to explain what is meant by the

term *non-superimposable mirror image*.

**ii)** Explain what is meant by a *chiral molecule* and say how you would recognise an *asymmetric*

*carbon atom*.

**iii)** Why doesn't a racemic mixture have any effect on the plane of polarisation of plane polarised

light?

*question 3 question referenced from chemguide* [*http://www.chemguide.co.uk/basicorg/questions/q-optisomerism.pdf*](http://www.chemguide.co.uk/basicorg/questions/q-optisomerism.pdf)

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