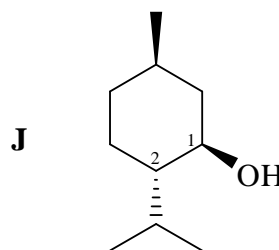


- The following questions pertain to the terpene natural product menthol (**J**), whose structure is shown. Carbons 1 and 2 are numbered to help you construct your answer.



Marks
10

Ignoring the stereochemistry, what is the systematic name for menthol?

2-isopropyl-5-methylcyclohexanol

2-(1-methylethyl)-5-methylcyclohexanol is also acceptable.

Assign the absolute configuration at C1 and at C2. Explain your reasoning.

C1 is (R)

Priorities: OH > C2 C(C,C,H) > C6 C(C,H,H) > H

With H at back, the order of -OH → -C2 → -C6 goes clockwise

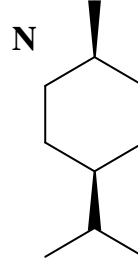
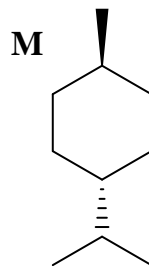
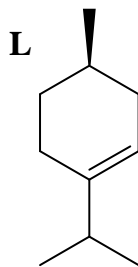
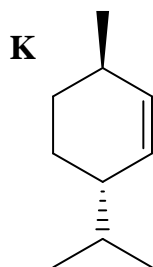
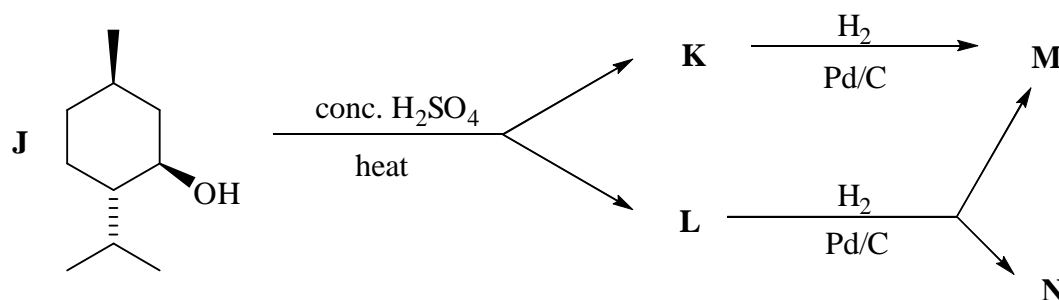
C2 is (S)

Priorities: C1 C(O,C,H) > isopropyl C(C,C,H) > C3 C(C,H,H) > H

Remember the H is pointing in front of the paper.

With H at back, the order of -C1 → -CH(CH₃)₂ → -C3 goes anticlockwise

When menthol (**J**) is heated with concentrated sulfuric acid, two isomeric products **K** and **L** are formed. When **K** and **L** are treated with excess H₂ in the presence of a Pd/C catalyst, two products **M** and **N** are observed: **K** gives only **M**, while **L** gives a mixture of **M** and **N**. Propose structures for **K**, **L**, **M** and **N**.



ANSWER CONTINUES ON THE NEXT PAGE

What is the isomeric relationship between **K** and **L**?

constitutional isomers

What is the isomeric relationship between **M** and **N**?

diastereoisomers

Which (if any) of the compounds **J**, **K**, **L**, **M** and **N** are optically active?

J, K and L