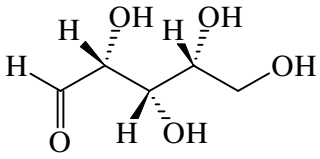
Chapter 7-9 Problems

1. Consider the compound **(*S*) 3,4-dimethyl-1-pentene**. Upon reduction with H_2 on a 1% Pt/C catalyst, the resulting product is pure **(R) 2,3-dimethylpentane**. Draw the equation for this reaction, *clearly* drawing the starting alkene and the product alkane and explain why the absolute configuration is completely inverted in this reaction.

2. D(+)-Xylose is shown below and has an $[\alpha]_D = +92^o$.

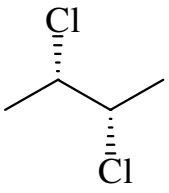


   a) Determine the absolute configuration of each asymmetric center.

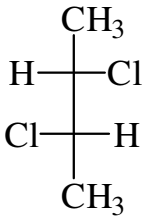
   b) Draw D(+) xylose in a Fischer projection with the aldehyde on top and the primary alcohol on the bottom.

   c) Draw L(-) xylose in a Fischer projection next to D(+)-xylose above. What is its specific rotation?_____

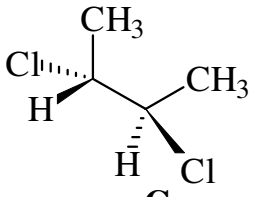
3. Determine the stereochemical relationship (enantiomers, diastereomers or identical) between compounds A & B; A & C; and B & C. Also determine the absolute configuration of each chiral center. Which one(s) is (are) optically inactive?_____



A



B



C

Stereochemical relationships

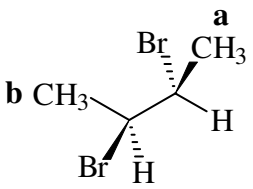
A & B _____

A & C _____

B & C _____

4. An unknown hydrocarbon **A (C_7H_{10})** undergoes a standard catalytic hydrogenation to give **B (C_7H_{14})**. Upon treatment of compound **A** with H_2 on Lindlar's catalyst, there is no reaction. Hydrocarbon **C (C_6H_{12})** can be used to prepare **B** using CH_2I_2, Zn(Cu). Compounds **A** and **B** both have 2 asymmetric centers and both are meso. Identify **A**, **B**, and **C** and show your thought processes.

5. The compound below has a $[\alpha] = +14^{o}$. Draw the compound in a Fischer projection with the methyl group **a** on the top and **b** on the bottom. Draw a stereoisomer of this compound (Fischer) that has the same melting point and density as the compound shown. In what physical property do your two stereoisomers differ? What is the stereochemical relationship?



6. An unknown hydrocarbon **A** has a molecular formula of C_8H_{16}. Hydrogenation of **A** with H_2, Pt/C gives compound **B** with a formula of C_8H_{18}. Cyclopropanation of **A** with CH_2I_2, Zn(Cu) gives a compound **C**, C_9H_{18}. Both **B** and **C** have 2 asymmetric centers and are *meso*. Additionally, ozonolysis of **A** affords only 2-butanone. Propose structures for **A**, **B**, and **C** that are consistent with these data.