



Professional 1-1 Chemistry Tuition

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Dr Simon Orchard

Alcohol Exam Style Questions

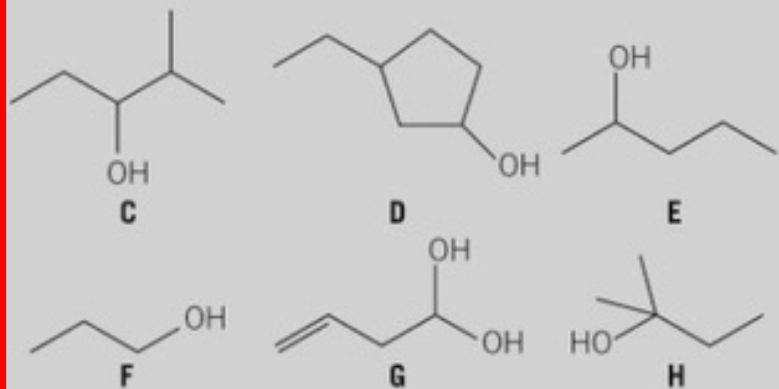
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Exam Style Questions

coming up



The skeletal formulae of six alcohols, **C**, **D**, **E**, **F**, **G**, and **H**, are shown below.



- a (i) Which two alcohols are structural isomers of one another? (1 mark)
- (ii) Which alcohol is a tertiary alcohol? (1 mark)
- (iii) Which alcohol can be oxidised to a carboxylic acid using acidified $K_2Cr_2O_7$? (1 mark)
- b (i) What is the molecular formula of alcohol **G**? (1 mark)
- (ii) What is the name of alcohol **C**? (1 mark)
- c The alcohols are members of a homologous series.
Explain the term homologous series. (2 marks)

Question 1

Pentan-2-ol is a secondary alcohol.

- a Pentan-2-ol can be converted into three alkenes, **A**, **B**, and **C**, by the elimination of water.
- Two of the alkenes, **A** and **B**, are stereoisomers.
 - The third alkene, **C**, is a structural isomer of both **A** and **B**.

This elimination often uses a catalyst.

- (i) What is a suitable catalyst for this reaction? *(1 mark)*
- (ii) Construct an equation, using molecular formulae, for the elimination of water from pentan-2-ol. *(1 mark)*
- (iii) Explain what is meant by the terms structural isomers and stereoisomers. *(4 marks)*
- (iv) Draw the structures of stereoisomers **A** and **B** and the structure of compound **C**. *(3 marks)*
- (v) Stereoisomers **A** and **B** show *E/Z* isomerism. State two features of these molecules that enable them to show *E/Z* isomerism. *(2 marks)*

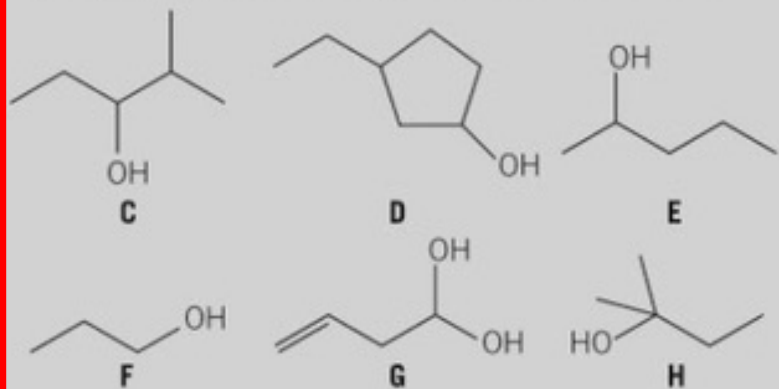
- b Pentan-2-ol can be oxidised by heating under reflux with acidified aqueous potassium dichromate(VI). Write the equation for this oxidation. Use skeletal formulae. Use [O] to represent the oxidising agent. *(2 marks)*
- c Pentan-1-ol can also be oxidised but it gives two different products. Show the structures of the two organic products formed. State the reagents and different conditions for each oxidation. *(3 marks)*

Question 2

Answers coming
up



The skeletal formulae of six alcohols, **C**, **D**, **E**, **F**, **G**, and **H**, are shown below.



- a (i) Which two alcohols are structural isomers of one another? (1 mark)
- (ii) Which alcohol is a tertiary alcohol? (1 mark)
- (iii) Which alcohol can be oxidised to a carboxylic acid using acidified $\text{K}_2\text{Cr}_2\text{O}_7$? (1 mark)
- b (i) What is the molecular formula of alcohol **G**? (1 mark)
- (ii) What is the name of alcohol **C**? (1 mark)
- c The alcohols are members of a homologous series.
Explain the term homologous series. (2 marks)

Question 1

E and H

H

F

$\text{C}_4\text{H}_8\text{O}_2$

2-methylpentan-3-ol

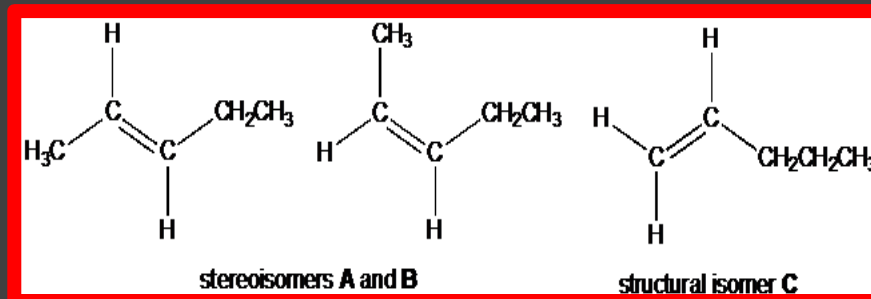
A homologous series is a family of compounds with the same functional group and similar chemical properties whose successive members differ by the addition of a $-\text{CH}_2-$ group

Question 2

Acid catalyst (e.g. conc H_2SO_4)



Structural isomers are compounds with the same molecular formula but different structural formulae. Stereoisomers have same structural formulae but different arrangements in space.

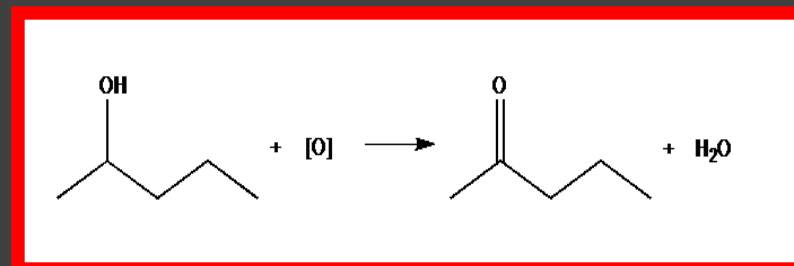


The molecules have a double $\text{C}=\text{C}$ bond which does not rotate, Isomers **A** and **B** needs two different groups attached to each carbon atom of $\text{C}=\text{C}$ bond

- (i) What is a suitable catalyst for this reaction? (1 mark)
- (ii) Construct an equation, using molecular formulae, for the elimination of water from pentan-2-ol. (1 mark)
- (iii) Explain what is meant by the terms structural isomers and stereoisomers. (4 marks)
- (iv) Draw the structures of stereoisomers **A** and **B** and the structure of compound **C**. (3 marks)
- (v) Stereoisomers **A** and **B** show *E/Z* isomerism. State two features of these molecules that enable them to show *E/Z* isomerism. (2 marks)

b Pentan-2-ol can be oxidised by heating under reflux with acidified aqueous potassium dichromate(VI). Write the equation for this oxidation. Use skeletal formulae. Use [O] to represent the oxidising agent. (2 marks)

c Pentan-1-ol can also be oxidised but it gives two different products. Show the structures of the two organic products formed. State the reagents and different conditions for each oxidation. (3 marks)



Reagents: $\text{H}^+/\text{Cr}_2\text{O}_7^{2-}$

Distillation produces the aldehyde $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CHO}$

Reflux produces the carboxylic acid $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$

Question 2

A ball-and-stick molecular model is shown in the background, rendered in a semi-transparent, dark grey style. It features a central blue sphere connected to several black spheres, which are further connected to white spheres. The model is positioned behind the text, creating a layered effect.

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