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VCE Chemistry ½
Isomerism in Organic Chemistry [0.18]
Workshop

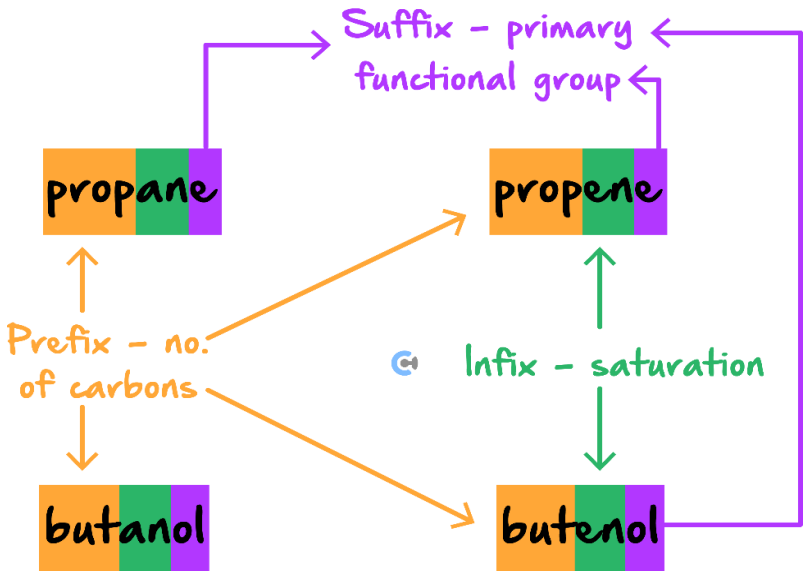
Error Logbook:

New Ideas/Concepts	Didn't Read Question
Pg / Q #: _____ Notes:	Pg / Q #: _____ Notes:
Algebraic/Arithmetic/ Calculator Input Mistake	**Working Out Not Detailed Enough**
Pg / Q #: _____ Notes:	Pg / Q #: _____ Notes:

Section A: Recap

Learning Objective: [2.6.1] – Apply IUPAC Conventions to Identify, Draw & Write Names of Straight-Chained & Branched Alkenes

- A _____ is a group of organic compounds which differ from each other by a -CH_2 – unit.
- An **alkene** is a hydrocarbon containing one or more **carbon-carbon** [single] / [double] bonds.
- **Infix:**
- **Functional group name:**
- Molecules that have carbon-carbon **single** bonds are considered to be [saturated] / [unsaturated].
- Molecules with carbon-carbon **double** or **triple** bonds are considered [saturated] / [unsaturated].
- Each organic molecule's name is comprised of **3 parts:**
- **Prefix:** Indicating the number of _____.
- **Infix:** Indicating the level of _____.
- **Suffix:** Indicating the primary _____.



- When naming alkenes, the alkenyl functional group [takes priority] / [does not take priority] over halogens and alkyl chains, and thus receives the [biggest] / [smallest] number possible.
- When there are multiple double bonds, remember to add an _____ for pronunciation purposes.

Learning Objective: [2.6.2] – Identify & Explain What Structural Isomers Are

- Structural isomers have the [same] / [different] molecular formula, but [same] / [different] structural formulas.
- [Chain] / [Positional] / [Functional] isomers are a consequence of carbon's ability to **branch.**
- Chain isomers have relatively [similar] / [different] names to one another.
- [Chain] / [Positional] / [Functional] isomers occur when functional groups exist in different **positions.**
- Positional isomers have relatively [similar] / [different] names to one another.
- [Chain] / [Positional] / [Functional] isomers have the same molecular formula, but have **different functional** groups.

Learning Objective: [2.6.3] – Find Possible Structural Isomers (Chain, Positional, Functional) of Alkanes, Alkenes & Haloalkanes From a Given Molecular Formula

- When finding different isomers:

1. Find what _____ groups it can have by looking at the **general molecular formula.**
2. Select one [chain] / [positional] **isomer**, then **move** the functional groups around to find all [chain] / [positional] isomers.
3. Find another [chain] / [positional] isomer and find all possible [chain] / [positional] **isomers** of this new chain!

Space for Personal Notes

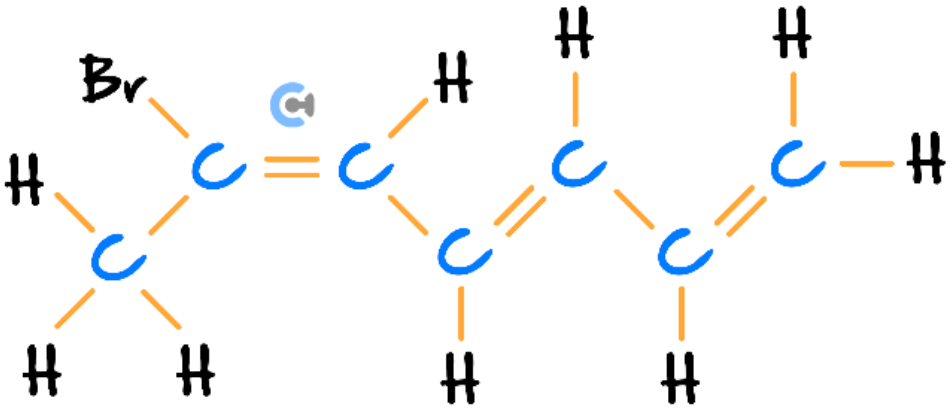
Learning Objective: [2.6.4] – Apply IUPAC Conventions to Identify, Draw & Write IUPAC Names of Straight-Chained & Branched Alcohols

- An alkanol / alcohol is an organic compound that carries at least one _____ functional group _____.
- **Class / Homologous Series:** _____
- **Functional Group Name:** _____
- **Suffix:** _____
- **Priority:** _____
- Multiple hydroxyl groups: The letter _____ is added in between to aid with pronunciation!

Question 1 Walkthrough.

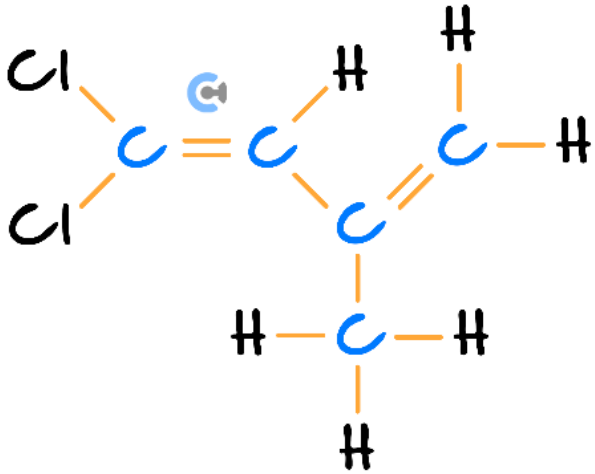
Name each of the following and draw the semi-structural formula.

a.



Name	Semi-Structural Formula

b.



Name	Semi-Structural Formula

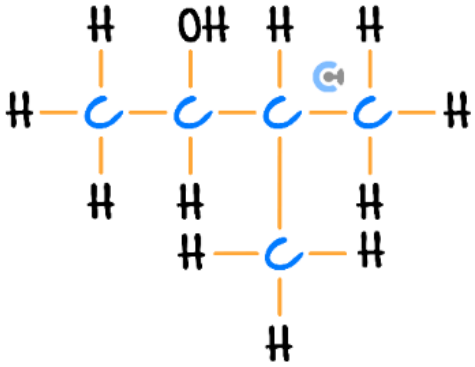
Question 2 Walkthrough.

Draw out all potential isomers of C_4H_9Br.

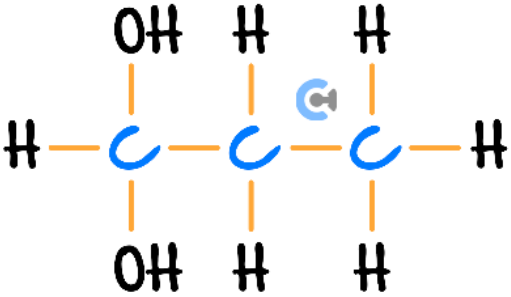
Question 3 Walkthrough.

For each of the following, name the molecule:

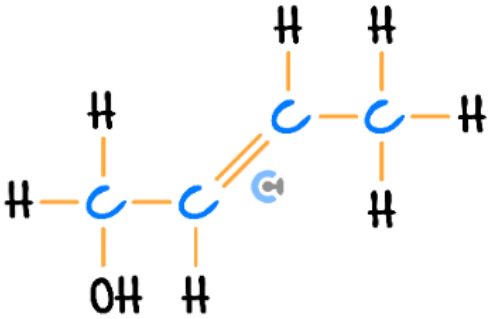
a.



b.



c.



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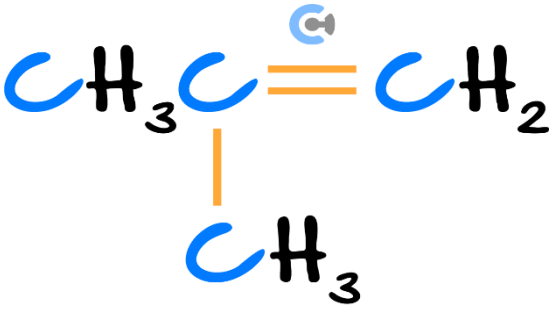
Section B: Warm Up (13 Marks)

INSTRUCTION: 13 Marks. 8 Minutes Writing.

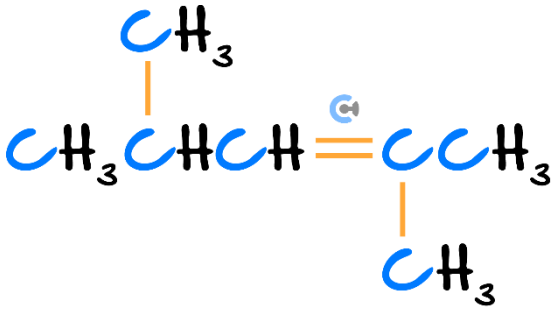
Question 4 (4 marks)

Write out the IUPAC name for each of the following organic molecules.

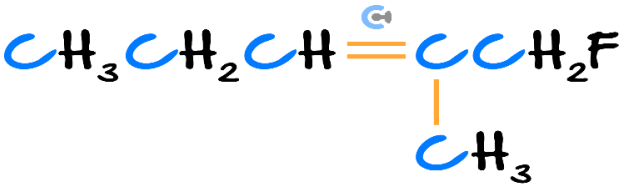
a. (1 mark)



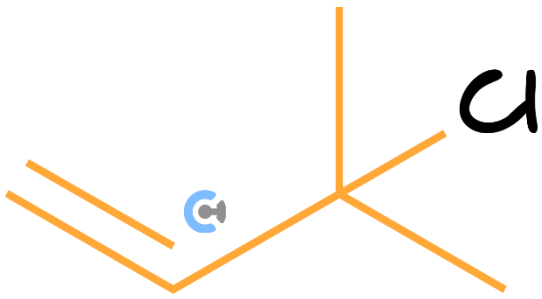
b. (1 mark)



c. (1 mark)



d. (1 mark)



Question 5 (4 marks)

For each of the following, draw out the skeletal structure of each of the following molecules.

a. Pentan-3-ol. (1 mark)

b. 3-methylbutan-1-ol. (1 mark)

c. 2-methylbutan-2-ol. (1 mark)

d. 1-chloropentan-1-ol. (1 mark)

Space for Personal Notes

Question 6 (5 marks)

Draw the skeletal formulae for each of the following molecules.

a. Methylpropane. (1 mark)

b. 3-hexen-2-ol. (1 mark)

c. 2-methylpent-2-ene. (1 mark)

d. 2-methylcyclohexanol. (1 mark)

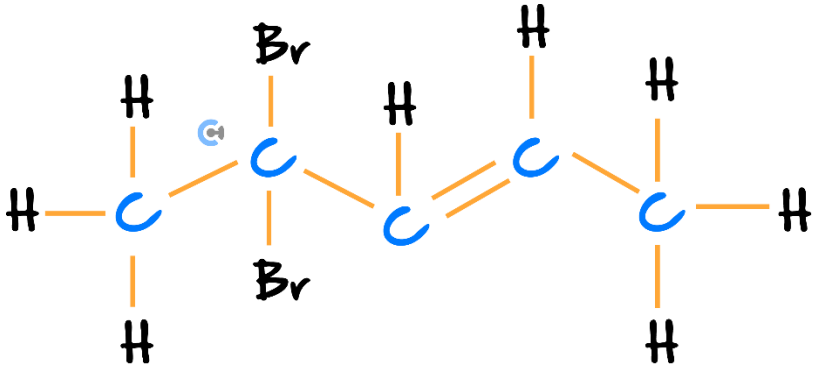
e. 1,3-hexanediol. (1 mark)

Section C: Ramping Up (11 Marks)

INSTRUCTION: 11 Marks. 8 Minutes Writing.

Question 7 (1 mark)

Name the following molecule.



A. 4,4-dibromopent-3-ene

B. 4,4-dibromopent-2-ene

C. 2,2-dibromopent-4-ene

D. 2,2-dibromopent-3-ene

Question 8 (1 mark)

Consider the molecule of 2-methylhexane. Which one of the following is considered a chain isomer?

A. Octane

B. 3-methylhexane

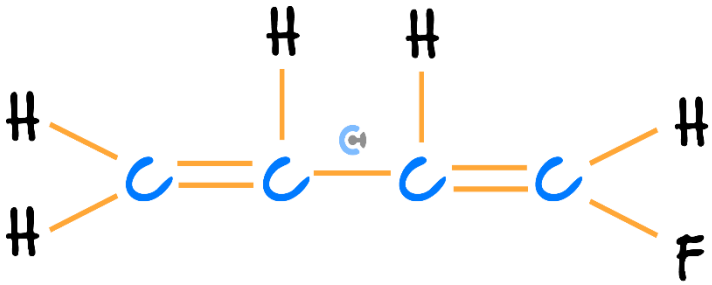
C. Pentane

D. Heptane

Question 9 (9 marks)

For the following molecules, give the name, semi-structural formula and skeletal diagram.

a.



i. Name. (1 mark)

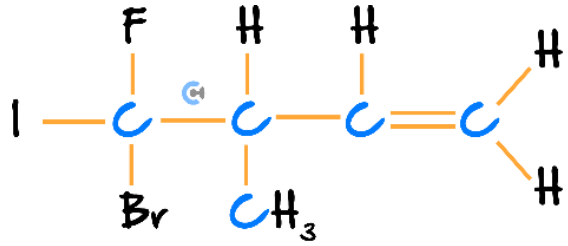
_____

ii. Semi-structural formula. (1 mark)

_____

iii. Skeletal diagram. (1 mark)

b.



i. Name. (1 mark)

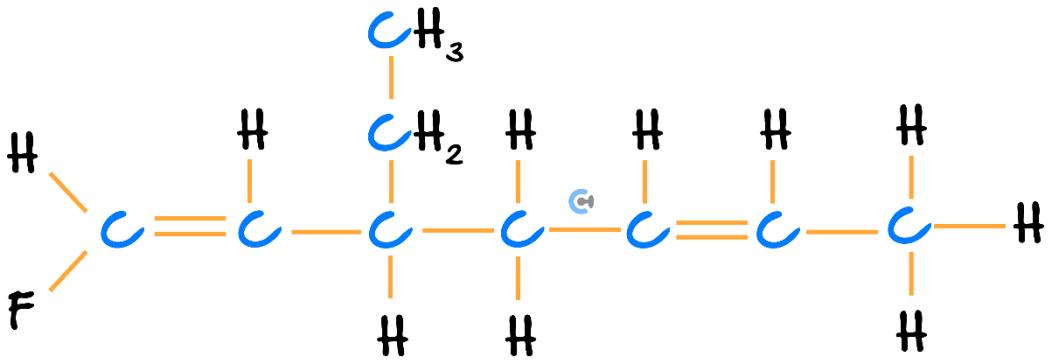
_____

ii. Semi-structural formula. (1 mark)

_____

iii. Skeletal diagram. (1 mark)

c.



i. Name. (1 mark)

_____

ii. Semi-structural formula. (1 mark)

_____

iii. Skeletal diagram. (1 mark)

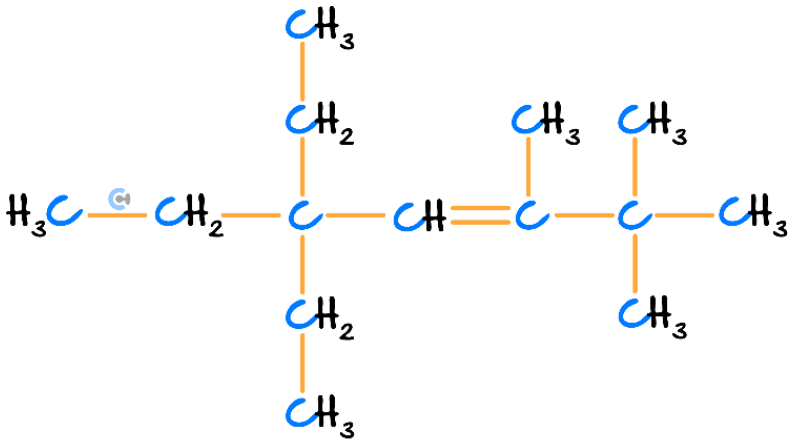
Space for Personal Notes

Section D: Getting Trickier I (14 Marks)

INSTRUCTION: 14 Marks. 11 Minutes Writing.

Question 10 (6 marks)

In preparation for her organic chemistry SAC at school, Bhuvie is exploring the different chemicals which can be found in her house. One of these chemicals, which she finds, is shown below:



a. What is a homologous series? (1 mark)

_____

b. Circle and name the main functional group present in this molecule. (1 mark)

_____

c. Circle one alkyl chain in this molecule, and provide its prefix name. (1 mark)

_____

d. Name the full molecule. (1 mark)

_____

e. According to Bhuvie's notes, the shape of the above molecule is not correct. Explain why and how the drawing can be fixed to represent the shape accurately. (2 marks)

_____

_____

_____

_____

Question 11 (8 marks)

Consider the alcohol of 3-fluoro-2,2-dimethylpentan-1-ol.

a. Draw the structural formula. (1 mark)

b. State the **primary** functional group of the compound. (1 mark)

_____

c. It is to be considered whether the molecule would be best suited for transport in a solution that is comprised either of water or of hexane.

i. Which of the two choices of solution would fit the compound better? Justify your answer. (3 marks)

_____

_____

_____

_____

ii. Find the molar mass of the compound. (1 mark)

_____

iii. There was a 12.00 g sample of the solution and 75% of the solution was comprised of 3-fluoro-2,2-dimethylpentan-1-ol. Find the amount, in moles, of the compound that was present. (2 marks)

_____

_____

_____

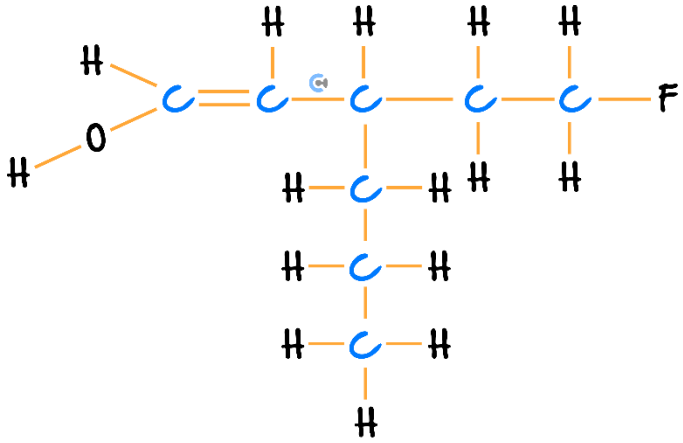
Space for Personal Notes

Section E: Getting Trickier II (12 Marks)

INSTRUCTION: 12 Marks. 11 Minutes Writing.

Question 12 (6 marks)

Consider the following molecule.



a. Provide the IUPAC name of this molecule. (1 mark)

_____

b. Write the semi-structural formula of this molecule. (1 mark)

_____

c. Why couldn't the molecule be named 3-fluoroethylhex-1-en-1-ol instead, as it provides the longest carbon main chain? Justify your answer. (2 marks)

_____

_____

_____

d. Find the percentage composition of each element in this molecule. (2 marks)

_____

_____

_____

_____

Question 13 (6 marks)

Consider the molecule 1,2-dibromobutan-1,3-diol.

a. Draw the structural formula. (1 mark)

b. What is the main functional group of the molecule? (1 mark)

_____

c. Give its semi-structural formula. (1 mark)

_____

d. If there was instead a molecule of *Y*, what type of isomer would the molecule be classified as, if any? Draw its structural formula. (3 marks)

_____

_____

_____

Let's take a BREAK!

Space for Personal Notes

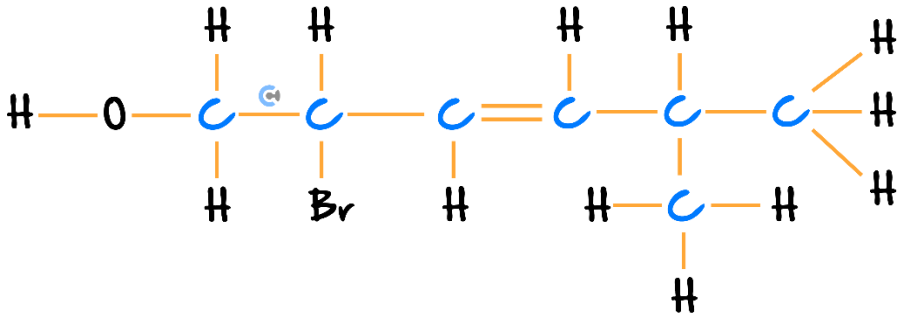
Section F: VCAA-Level Questions I (9 Marks)

INSTRUCTION: 9 Marks. 30 Seconds Reading. 9 Minutes Writing.

Question 14 (9 marks)

For each of the following molecules, name them and give their semi-structural and skeletal diagram.

a.



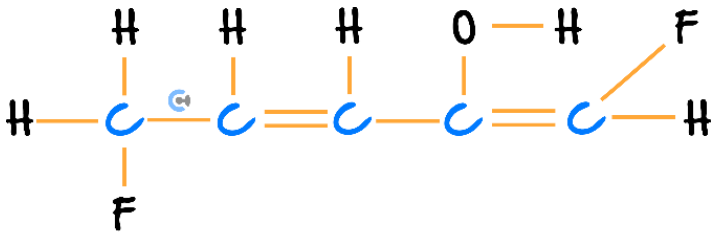
i. Name, and semi-structural formula. (2 marks)

_____

_____

ii. Skeletal diagram. (1 mark)

b.



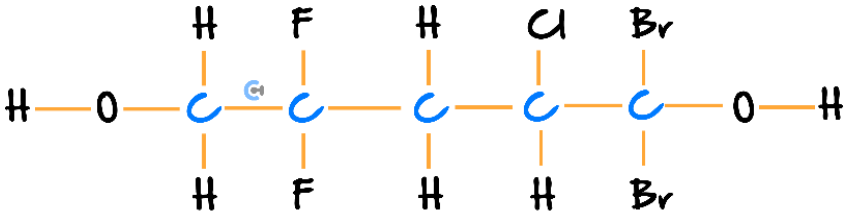
i. Name, and semi-structural formula. (2 marks)

_____

_____

ii. Skeletal diagram. (1 mark)

c.



i. Name, and semi-structural formula. (2 marks)

_____

_____

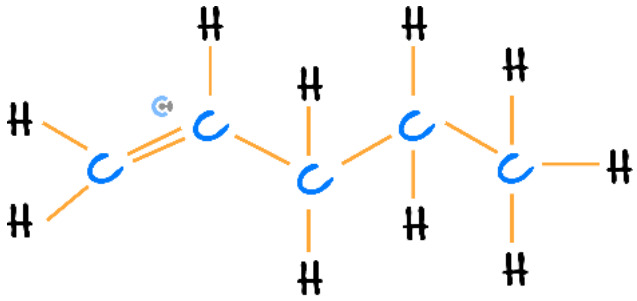
ii. Skeletal diagram. (1 mark)

Section G: Multiple Choice Questions (8 Marks)

INSTRUCTION: 8 Marks. 8 Minutes Writing.

Question 15 (1 mark)

Name the following molecule.



A. Pent-4-ene

B. Pent-2-ene

C. Pent-3-ene

D. Pent-1-ene

Question 16 (1 mark)

Which of the following is the general formula for the homologous series of alkenes?

A. C_nH_{2n+2}

B. C_nH_{2n}

C. C_nH_{2n-1}

D. C_nH_{2n+1}

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Question 17 (1 mark)

Consider the molecule of 2-iodo-3-fluorobutane. Which one of the following is considered a positional isomer?

A. 2-iodo-3-fluoropentane

B. 2-iodo-3-fluoromethylpropane

C. 3-fluoro-2-iodobutane

D. 3-iodo-2-fluorobutane

Question 18 (1 mark)

How many possible isomers does C_5H_{12} have?

A. 1

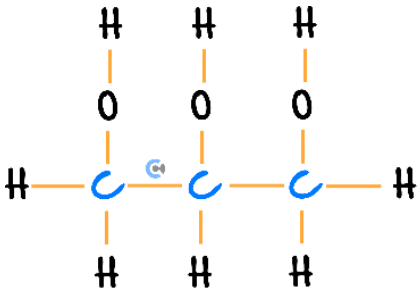
B. 2

C. 3

D. 4

Question 19 (1 mark)

What is the IUPAC name of the following alcohol?



A. Propan-1,2,3-triol

B. Propan-1,2,3-ol

C. Propantriol

D. Tripropanol

Question 20 (1 mark)

What is the semi-structural formula for 2-methylbutan-2-ol?

A. $CH_3C(CH_3OH)CH_2CH_3$

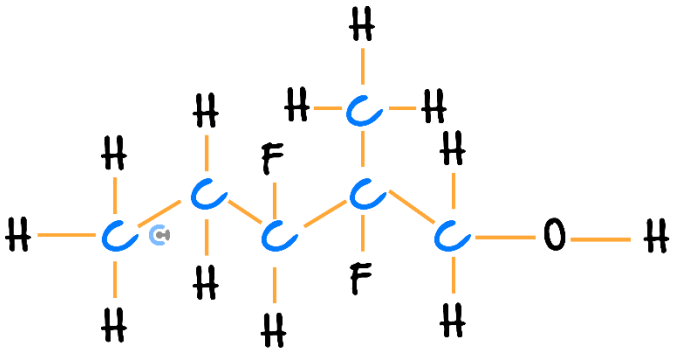
B. $CH_3C(CH_3)OHCH_2CH_3$

C. $CH_3CH_2CH_3OHCH_2CH_3$

D. $CH_3CH(OH)(CH_3)CH_2CH_3$

Question 21 (1 mark)

What is the IUPAC name of the following alcohol?



A. 2,3-difluoro-3-methylpentan-1-ol

B. 2,2-difluoro-3-methylhexan-1-ol

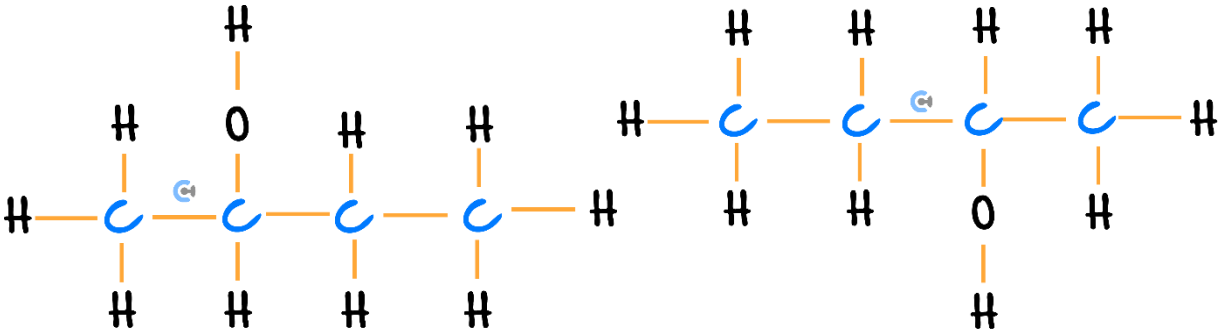
C. 2,3-difluoro-2-methylpentan-1-ol

D. 3,4-difluoro-4-methylpentan-1-ol

Space for Personal Notes

Question 22 (1 mark)

Consider the two following molecules.



How are they related?

A. They are positional isomers.

B. They are chain isomers.

C. They are functional isomers.

D. They are the same molecule.

Space for Personal Notes

Section H: VCAA-Level Questions II (8 Marks)

INSTRUCTION: 8 Marks. 30 Seconds Reading. 8 Minutes Writing.

Question 23 (8 marks)

Consider the following two molecules: Hex-3,4-dien-2-ol and 3-methylpent-1,3-dien-1-ol.

a. Draw their structural formula. (2 marks)

b. State which molecule has a higher molar mass. (1 mark)

_____

c. What type of isomers are these two molecules? Explain your answer. (3 marks)

_____

_____

_____

d. Consider the molecule of 3-methylhex-3,4-dien-1-ol. Is this an isomer of either of the molecules above? Explain. (2 marks)

_____

_____

_____

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