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VCE Chemistry ½

Introduction to Organic Chemistry [2.5]

Homework

Admin Info & Homework Outline:

Student Name	
Questions You Need Help For	
Compulsory Questions	Pg 2-Pg 14
Supplementary Questions	Pg 15-Pg 30

Section A: Compulsory Questions (55 Marks)

Sub-Section [2.5.1]: Draw Structural, Semistructural & Skeletal Formulae of Straight-Chained & Branched Alkanes

Question 1 (2 marks)

For a molecule of ethane, represent it in the following ways:

a. Molecular formula. (1 mark)

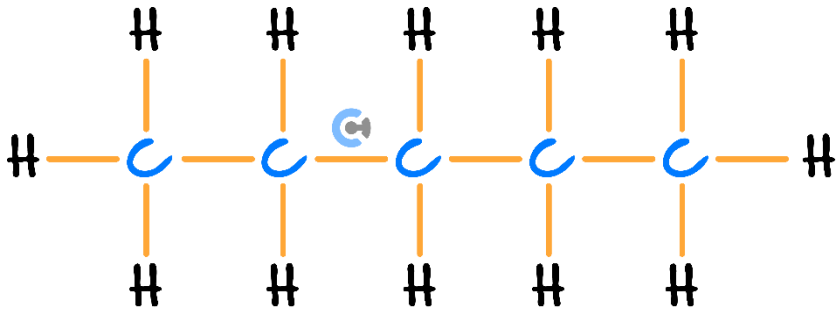
_____

b. Structural formula. (1 mark)

Question 2 (3 marks)

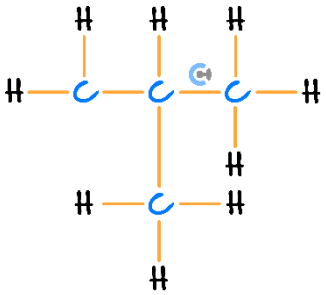
For the following structural formulae, write their semi-structural formulae:

a. (1 mark)



_____

b. (2 marks)



Question 3 (3 marks)

For the following semi-structural formulae, draw their structural formulae:

a. $CH_3CH_2CH_2CH_3$. (1 mark)

b. $CH_3C(CH_3)_2CH_3$. (2 marks)

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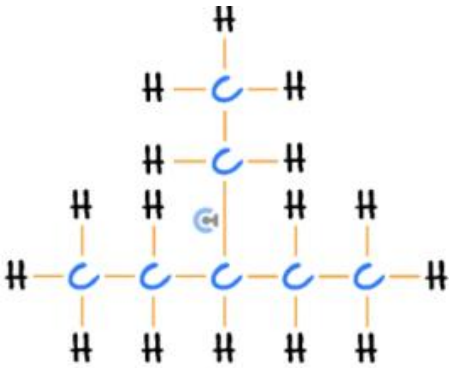
Sub-Section [2.5.2]: Write IUPAC Names of Branched/Unbranched Alkanes

Question 4 (2 marks)

Give the IUPAC name of the following compound:



_____

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Question 5 (4 marks)

Given the names of the following molecules, draw their structural formulas and provide the semi-structural formulas.

a. 2-methylpentane:

i. Structural formula. (1 mark)

ii. Semi-structural formula. (1 mark)

_____

b. Methylpropane:

i. Structural formula. (1 mark)

ii. Semi-structural formula. (1 mark)

_____

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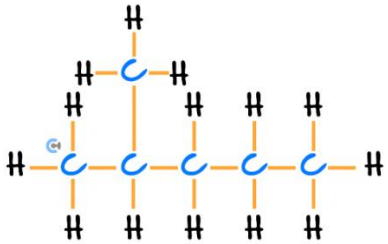
Question 6 (6 marks)

Name each of the following molecules & draw their semi-structural and skeletal formulae.

a. Compound *A*:

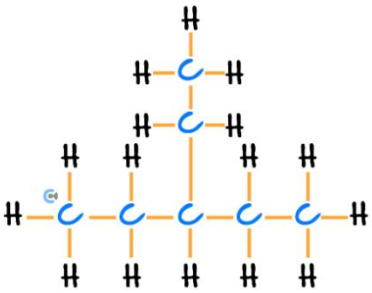


i. Name and semi-structural formulae. (2 marks)

_____

ii. Skeletal diagram. (1 mark)

b. Compound *B*:



i. Name and semi-structural formulae. (2 marks)

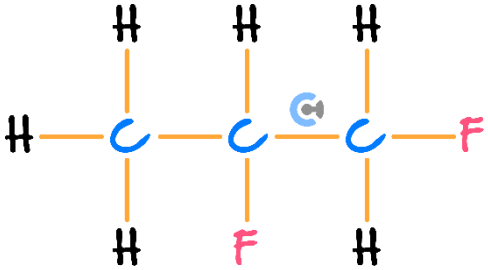
_____

ii. Structural formula. (1 mark)

Sub-Section [2.5.3]: Draw Structural, Semistructural & Skeletal Formulae of Straight-Chained & Branched Haloalkanes

Question 7 (2 marks)

Convert this structural formula of a haloalkane into its semi-structural and skeletal representations.



a. Semi-structural. (1 mark)

_____

b. Skeletal diagram. (1 mark)

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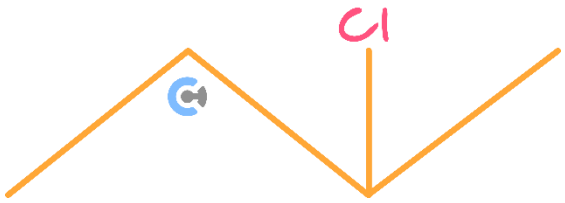
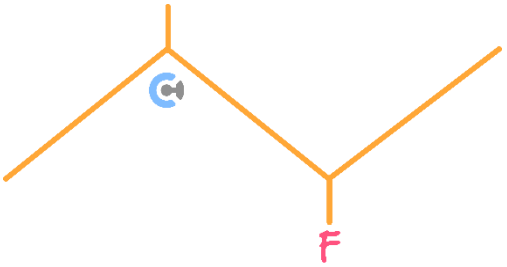
Question 8 (3 marks)

Given the following skeletal formulae, write their semi-structural formulae.

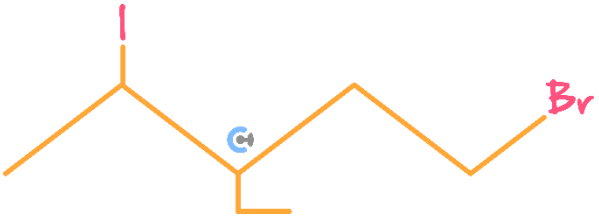
a. Compound *A*. (1 mark)



b. Compound *B*. (1 mark)



c. Compound *C*. (1 mark)



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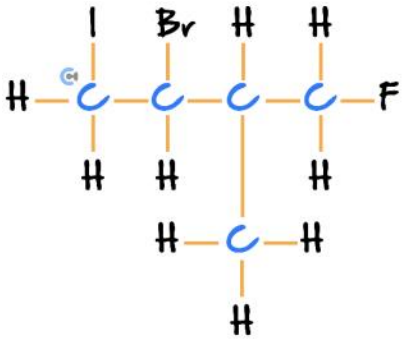
Question 9 (4 marks)

Consider the following compound:



a. Represent the compound as a skeletal diagram. (1 mark)

b. What are some advantages associated with a skeletal diagram as opposed to using the normal structural formulae? Explain. (3 marks)

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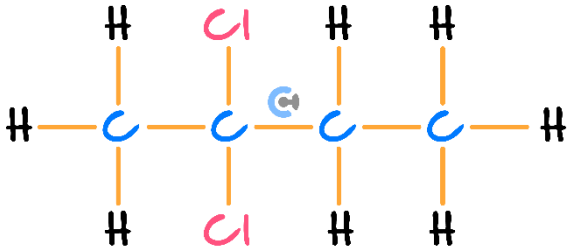
Sub-Section [2.5.4]: Write IUPAC Names of Branched/Unbranched Haloalkanes

Question 10 (2 marks)

Give the IUPAC name of the following compound:



_____

Question 11 (3 marks)

Consider the following haloalkane, 2-bromo-3-iodo-3-methylpentane.

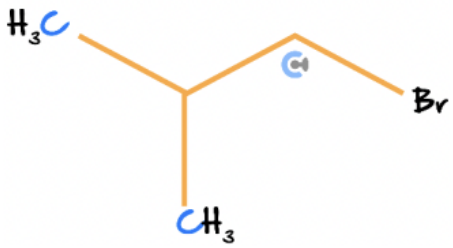
a. Draw its structural formula. (2 marks)

b. Draw its skeletal diagram. (1 mark)

Question 12 (4 marks)

Name each of the following molecules and give their semi-structural formula.

a. Compound *A*:



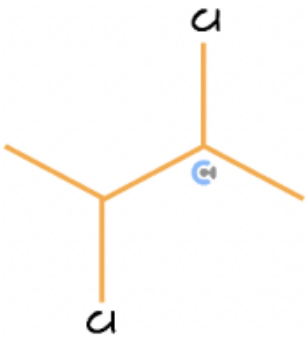
i. IUPAC name. (1 mark)

_____

ii. Semi-structural formula. (1 mark)

_____

b. Compound *B*:



i. IUPAC name. (1 mark)

_____

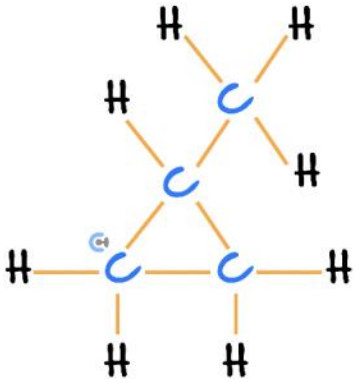
ii. Semi-structural formula. (1 mark)

_____

Sub-Section [2.5.5]: Identify, Draw & Write IUPAC Names of Simple Cycloalkanes

Question 13 (2 marks)

Consider the molecule below:



a. Give its IUPAC name. (1 mark)

_____

b. Draw the skeletal diagram. (1 mark)

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Question 14 (4 marks)

Answer the following questions regarding ringed molecules:

a. Name and draw the structural formula for a cyclic molecule with 4 carbons. (2 marks)

b. Given the formula C_4H_8, how many cyclic molecules can be formed? Justify your answer by naming the possible molecules. (2 marks)

Question 15 (3 marks)

How many cyclic molecules can you create with the molecular formula C_5H_{10}?

Sub-Section: The 'Final Boss'

Question 16 (8 marks)

A student is interested in unconventional organic molecules.

a. Explain what is meant by 'organic' molecules. (2 marks)

_____

_____

b. Draw the structural formula of 2, 3-dimethyl-4-ethyloctane. (2 marks)

c. Now, give its semi-structural formula. (1 mark)

_____

d. If we replaced a hydrogen with a chlorine atom at the first methyl branch that appears, how would this change the naming of the molecule? Explain. (3 marks)

_____

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Section B: Supplementary Questions (79 Marks)

Sub-Section [2.5.1]: Draw Structural, Semistructural & Skeletal Formulae of Straight-Chained & Branched Alkanes

Question 17 (2 marks)

For a molecule of propane, represent it in the following ways:

a. Molecular formula. (1 mark)

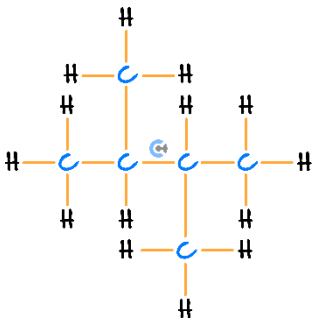
_____

b. Structural formula. (1 mark)

Question 18 (3 marks)

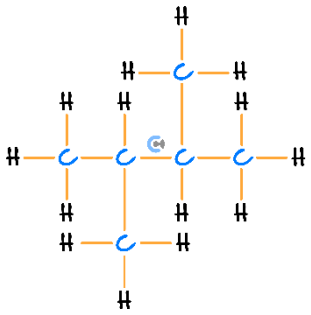
For the following structural formulae, write their semi-structural formulae.

a. (2 marks)



_____

b. (1 mark)



_____

Question 19 (3 marks)

For the following semi-structural formulae, draw their structural formulae.

a. $CH_3(CH_2)_3CH_3$. (1 mark)

b. $CH_3CH(CH_3)CH(CH_3)CH_3$. (2 marks)

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Question 20 (7 marks)

Consider the following semi-structural formulae:

$$CH_3CH(CH_2CH_3)CH(CH_3)CH_3$$

a. Draw its structural formula. (2 marks)

b. Now represent it as a skeletal diagram. (2 marks)

c. Define what an alkane is, and why we observe 4 bonds to each carbon. (3 marks)

_____

_____

_____

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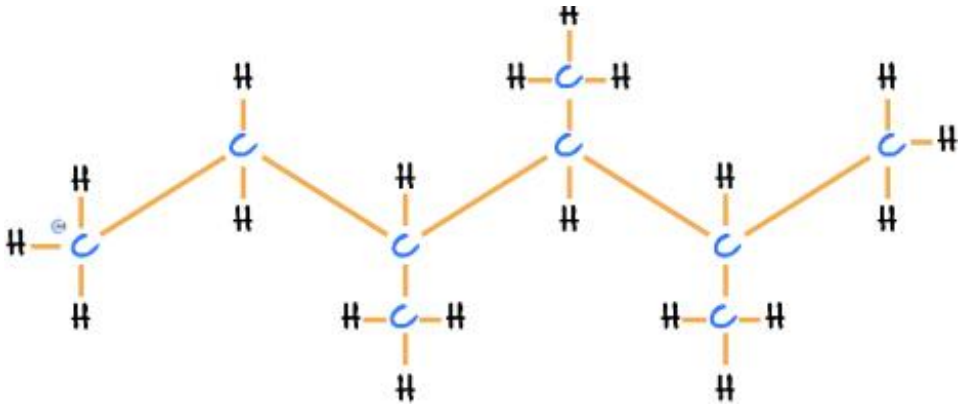
Sub-Section [2.5.2]: Write IUPAC Names of Branched/Unbranched Alkanes

Question 21 (2 marks)

Give the IUPAC name of the following compound:



Question 22 (5 marks)

For the following molecules, draw their structural formula and give the semi-structural formula.

a. 2, 2-dimethylhexane:

i. Structural formula. (1 mark)

ii. Semi-structural formula. (1 mark)

b. 2, 3, 3-trimethylpentane:

i. Structural formula. (2 marks)

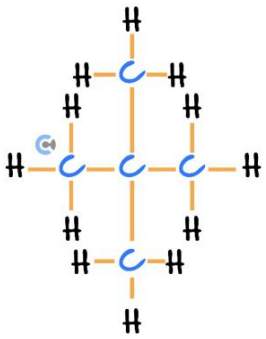
ii. Semi-structural formula. (1 mark)

_____

Question 23 (6 marks)

Name each of the following molecules & draw their semi-structural and skeletal formulae.

a. Compound *A*:



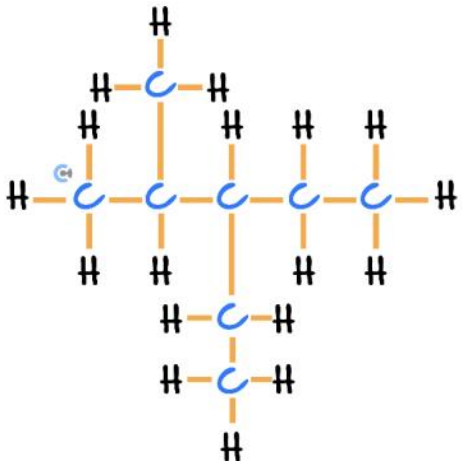
i. Name and molecular formula. (2 marks)

_____

_____

ii. Skeletal diagram. (1 mark)

b. Compound *B*:



i. Name and semi-structural formulae. (2 marks)

_____

_____

ii. Structural formula. (1 mark)

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Question 24 (7 marks)

Consider the compound of 3-ethyl-2-methylpentane.

a. Draw its structural formula. (2 marks)

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

_____

c. Now, consider if we changed the methyl group to another ethyl group.

i. How would the naming of the compound change? Justify and hence give the new name. (3 marks)

_____

_____

_____

ii. Find the mass of the excess reagent that is left over. (1 mark)

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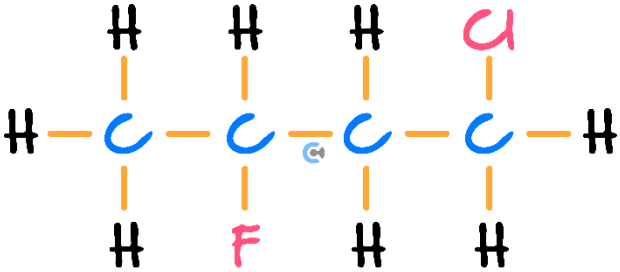
Sub-Section [2.5.3]: Draw Structural, Semistructural & Skeletal Formulae of Straight-Chained & Branched Haloalkanes

Question 25 (2 marks)

Convert this structural formula of a haloalkane into its semi-structural and skeletal representations:



a. Semi-structural. (1 mark)

b. Skeletal diagram. (1 mark)

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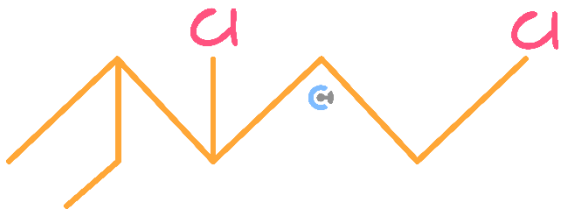
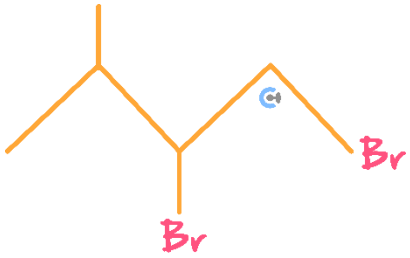
Question 26 (3 marks)

Given the following skeletal formulae, write their semi-structural formulae.

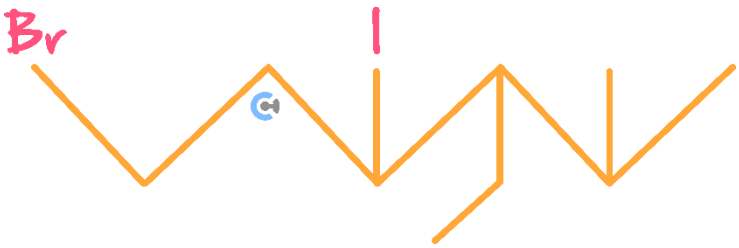
a. Compound *A*. (1 mark)



b. Compound *B*. (1 mark)



c. Compound *C*. (1 mark)



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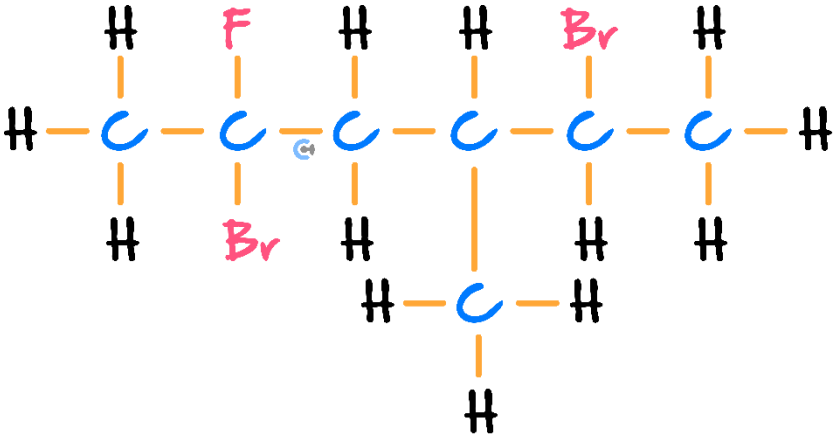
Question 27 (4 marks)

Consider the following compound:



a. Represent the compound as a skeletal diagram. (1 mark)

b. Compare a skeletal diagram to a semi-structural formula, giving a reason why you would prefer one over the other. (3 marks)

_____

_____

_____

_____

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Question 28 (6 marks)

Given the semi-structural formula below:

$$CH_3CF_2CH_2CH(CH_3)CHClCH_2CH_3$$

a. Draw its structural formula. (2 marks)

b. Give its skeletal diagram. (1 mark)

c. If we compared this molecule against $CH_3CBr_2CH_2CHFCH(CH_3)CH_2CH_3$, which representation would be best suited to compare them efficiently? Justify your answer. (3 marks)

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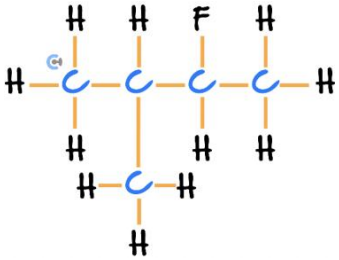
Sub-Section [2.5.4]: Write IUPAC Names of Branched/Unbranched Haloalkanes

Question 29 (2 marks)

For the following compound, identify its IUPAC name and semi-structural formula:



_____

_____

Question 30 (3 marks)

Consider the following haloalkane, 1-chloro-2-methylbutane.

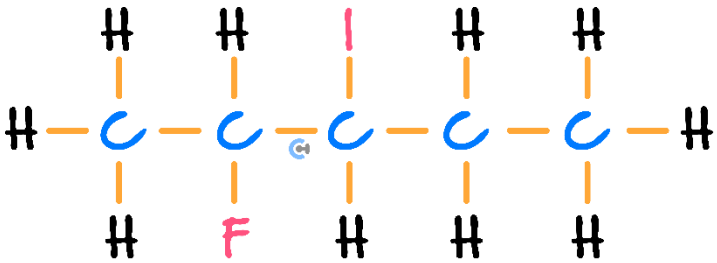
a. Draw its structural formula. (2 marks)

b. Draw its skeletal diagram. (1 mark)

Question 31 (4 marks)

Name each of the following molecules and give their semi-structural formula.

a. Compound *A*:



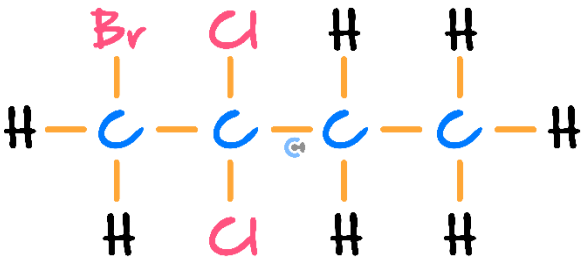
i. IUPAC name. (1 mark)

_____

ii. Semi-structural formula. (1 mark)

_____

b. Compound *B*:



i. IUPAC name. (1 mark)

_____

ii. Semi-structural formula. (1 mark)

_____

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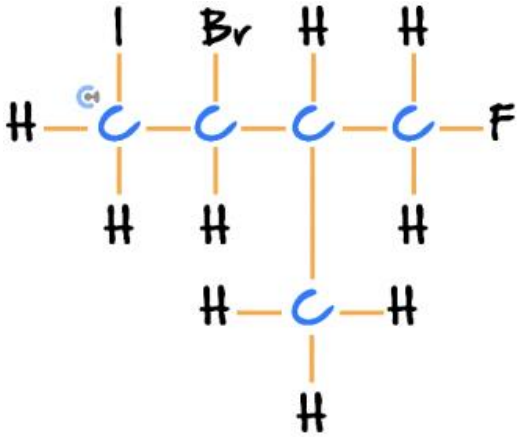
Question 32 (6 marks)

Consider the following compound below:



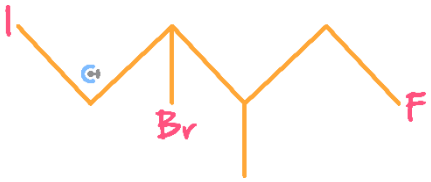
a. Give its IUPAC name. (1 mark)

_____

b. Now, give its semi-structural formula. (1 mark)

_____

c. Draw its skeletal diagram. (2 marks)



d. What would need to change for this compound to be a straight-chained haloalkane? Give the IUPAC name of the new compound you've chosen. (2 marks)

_____

_____

_____

_____

Sub-Section [2.5.5]: Identify, Draw & Write IUPAC Names of Simple Cycloalkanes

Question 33 (1 mark)

Give the IUPAC name of the following compound:

_____

Question 34 (4 marks)

a. Name and draw the structural formula for a cyclic molecule with 3 carbon atoms. (2 marks)

b. Given the number of carbons above, can you make any other cyclic molecules? Explain. (2 marks)

_____

_____

_____

Question 35 (3 marks)

A student says that, given that they have pentane, we can get cyclopentane by just rearranging pentane into a cyclic molecule. Evaluate this student's statement.

Question 36 (6 marks)

How many cyclic molecules can you create with the molecular formula C_6H_{12}?

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