

Question 1.

Set 1: Assign IUPAC names to the following hydrocarbons

1	$\begin{array}{c} \text{CH}_3 \\   \\ \text{CH}_3-\text{CH}_2-\text{CH}-\text{CH}-\text{CH}_3 \\   \\ \text{CH}_2 \\   \\ \text{CH}_3 \end{array}$	2	$\begin{array}{c} \text{CH}_3 \\   \\ \text{CH}_3-\text{CH}-\text{CH}-\text{CH}-\text{CH}_3 \\   \quad   \\ \text{CH}_3 \quad \text{CH}_2 \\   \\ \text{CH}_3 \end{array}$
IUPAC Name		IUPAC Name	
3	$\begin{array}{c} \text{CH}_3 \\   \\ \text{CH}_3-\text{C}-\text{CH}-\text{CH}_3 \\   \quad   \\ \text{CH}_3 \quad \text{CH}_2 \end{array}$	4	$\begin{array}{c} \text{CH}_3 \\   \\ \text{CH}_3-\text{CH}_2-\text{CH}-\text{CH}-\text{CH} \\   \quad   \quad   \\ \text{CH}_3 \quad \text{CH}_2 \quad \text{CH}_3 \end{array}$
IUPAC Name		IUPAC Name	
5	$\begin{array}{c} \text{CH}_3 \\   \\ \text{CH}_3-\text{C}-\text{CH}_3 \\   \\ \text{CH}_2 \\   \\ \text{CH}_3 \end{array}$	6	$\begin{array}{c} \text{CH}_3 \\   \\ \text{CH}_2 \\   \\ \text{CH}_3-\text{CH}-\text{CH}-\text{CH}_3 \\   \quad   \\ \text{CH}-\text{CH}_2-\text{CH}_3 \\   \\ \text{CH}_3 \end{array}$
IUPAC Name		IUPAC Name	
7	$\begin{array}{c} \text{CH}_2-\text{CH}_2-\text{CH}_3 \\   \\ \text{CH}_3-\text{CH}_2-\text{C}-\text{CH}_2-\text{CH}_3 \\   \\ \text{CH}_2-\text{CH}_3 \end{array}$	8	$\begin{array}{c} \text{CH}_2-\text{CH}_3 \\   \\ \text{CH}_3-\text{CH}-\text{CH}-\text{CH}_3 \\   \\ \text{CH}_3-\text{CH}-\text{CH}_3 \end{array}$
IUPAC Name		IUPAC Name	
9	$\begin{array}{c} \text{CH}_3 \\   \\ \text{CH}_3\text{CH}_2\text{CH}_2\text{CHCH}_3 \end{array}$	10	$\begin{array}{c} \text{CH}_3\text{CH}_2\text{CHCH}_2\text{CH}_3 \\   \\ \text{CH}_2 \\   \\ \text{CH}_3 \end{array}$
IUPAC Name		IUPAC Name	
11	$\begin{array}{c} \text{CH}_3 \\   \\ \text{CH}_3\text{CHCH}_2\text{CH}_3 \end{array}$	12	$\begin{array}{c} \text{CH}_3 \quad \text{CH}_3 \\   \quad   \\ \text{CH}_3\text{CHCH}_2\text{CHCH}_3 \end{array}$
IUPAC Name		IUPAC Name	
13	$\begin{array}{c} \text{CH}_3 \\   \\ \text{CH}_3\text{CHCHCH}_3 \\   \\ \text{CH}_2\text{CH}_3 \end{array}$	14	$\begin{array}{c} \text{CH}_3 \\   \\ \text{CH}_2 \\   \\ \text{CH}_3\text{CHCHCH}_3 \\   \\ \text{CH}_3 \end{array}$
IUPAC Name		IUPAC Name	

Set 2: Assign IUPAC names to the following hydrocarbons

<p>1</p> $\begin{array}{c} \text{H}_3\text{C}-\text{CH}-\text{CH}_3 \\   \\ \text{CH}_3 \end{array}$	<p>2</p> $\begin{array}{c} \text{H}_3\text{C}-\text{CH}-\text{CH}_3 \\   \\ \text{CH}_2-\text{CH}_3 \end{array}$
<p>IUPAC Name</p>	<p>IUPAC Name</p>
<p>3</p> $\begin{array}{ccccccc} & & & & \text{CH}_2-\text{CH}_3 & & \\ & & & &   & & \\ \text{H}_3\text{C}-\text{CH}_2-\text{CH}_2-\text{CH} & - & \text{CH} & - & \text{CH}_2-\text{CH}_3 \\ & &   & & \\ & & \text{CH}_3 & & \end{array}$	<p>4</p> $\begin{array}{ccccccc} & & & & \text{CH}_2-\text{CH}_2-\text{CH}_3 & & \\ & & & &   & & \\ \text{H}_2\text{C}-\text{CH} & - & \text{CH}_2 & - & \text{CH} & - & \text{CH}_3 \\   & & & &   & & \\ \text{CH}_3 & & & & \text{CH}_2-\text{CH}_2-\text{CH}_3 & & \end{array}$
<p>IUPAC Name</p>	<p>IUPAC Name</p>
<p>5</p> $\begin{array}{ccccccc} \text{H}_3\text{C}-\text{CH}_2-\text{CH} & - & \text{CH}_2 & - & \text{CH} & - & \text{CH}_2-\text{CH}_3 \\ & &   & &   & & \\ & & \text{CH}_3 & & \text{CH}_2-\text{CH}_2-\text{CH}_3 & & \end{array}$	<p>6</p> $\begin{array}{c} \text{H}_3\text{C} \quad \text{CH}_2-\text{CH}_2-\text{CH}_3 \\ \quad \quad   \\ \quad \quad \text{CH}-\text{CH}-\text{CH}_2-\text{CH}_3 \\ / \quad \quad   \\ \text{H}_3\text{C}-\text{CH} \\   \\ \text{CH}_3 \end{array}$
<p>IUPAC Name</p>	<p>IUPAC Name</p>
<p>7</p> $\begin{array}{ccccccc} \text{H}_3\text{C}-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2 & & & & & & \\ & & & & & &   \\ \text{H}_3\text{C}-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{C} & - & \text{CH}_2-\text{CH}_3 \\ & & & &   \\ & & & & \text{CH}_3 \end{array}$	<p>8</p> $\begin{array}{c} \text{H}_3\text{C}-\text{CH}_2 \\ \quad \quad   \\ \quad \quad \text{CH}-\text{CH}_3 \\ / \quad \quad   \\ \text{H}_2\text{C}-\text{CH}_2 \\   \\ \text{CH}_3 \end{array}$
<p>IUPAC Name</p>	<p>IUPAC Name</p>
<p>9</p> $\begin{array}{ccccccc} & & \text{CH}_2-\text{CH}_3 & & & & \\ & &   & & & & \\ \text{H}_3\text{C}-\text{CH} & - & \text{CH}_2 & - & \text{CH} & - & \text{CH} & - & \text{CH}_3 \\ & & & &   & &   \\ & & & & \text{CH}_2 & & \text{CH}_3 \\ & & & &   \\ & & & & \text{CH}_3 \end{array}$	<p>10</p> $\begin{array}{c} \text{CH}_2-\text{CH}_2 \\ / \quad \quad \backslash \\ \text{H}_2\text{C} \quad \quad \text{CH}-\text{CH}_2-\text{CH}_3 \\ \backslash \quad \quad / \\ \text{CH}_2-\text{CH}_2 \end{array}$
<p>IUPAC Name</p>	<p>IUPAC Name</p>
<p>11</p> $\begin{array}{ccccccc} & & \text{H}_3\text{C} & & \text{CH}_2\text{CH}_2\text{CH}_3 & & \\ & &   & &   & & \\ \text{H}_3\text{C}-\text{CH} & - & \text{C} & - & \text{CH}_2-\text{CH}_3 \\ & &   & & \\ & & \text{H}_2\text{C}-\text{CH}_3 & & \end{array}$	<p>12</p> $\begin{array}{ccccccc} & & \text{H}_2\text{C}-\text{CH}_3 & & & & \\ & &   & & & & \\ \text{H}_3\text{C}-\text{CH} & - & \text{CH} & - & \text{CH}_2-\text{CH}_2 \\ & &   & &   \\ & & \text{H}_2\text{C}-\text{CH}_3 & & \text{CH}_2-\text{CH}_3 \end{array}$
<p>IUPAC Name</p>	<p>IUPAC Name</p>
<p>13</p> $\begin{array}{ccccccc} & & \text{H}_2\text{C}-\text{CH}_3 & & & & \\ & &   & & & & \\ \text{H}_3\text{C}-\text{CH} & - & \text{CH} & - & \text{CH}_2-\text{CH}_3 \\ & &   & & \\ & & \text{H}_2\text{C}-\text{CH}_3 & & \\ & &   & & \\ & & \text{CH}_2-\text{CH}_2-\text{CH}_3 & & \end{array}$	<p>14</p> $\begin{array}{ccccccc} & & \text{H}_2\text{C}-\text{CH}_3 & & & & \\ & &   & & & & \\ \text{H}_3\text{C}-\text{CH} & - & \text{CH} & - & \text{CH}_2-\text{CH}_3 \\ & &   & & \\ & & \text{H}_2\text{C}-\text{CH}_3 & & \\ & &   & & \\ & & \text{H}_3\text{C}-\text{C} & - & \text{CH}_2-\text{CH}_3 \\ & &   & & \\ & & \text{CH}_3 & & \end{array}$
<p>IUPAC Name</p>	<p>IUPAC Name</p>

Set 3: Draw structures for the following compounds

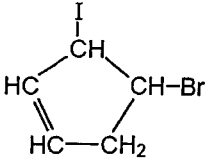
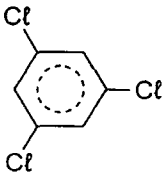
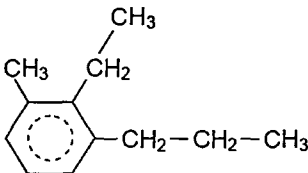
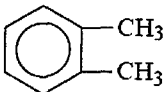
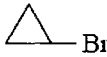
1	2
3-ethyl-4-methylhexane	2,3,4-trimethylhexane
3	4
3,3-diethylheptane	3-ethyl-3-methylpentane
5	6
3-ethyl-3,5,5-trimethyloctane	3,4-dimethylpentane
7	8
2,2,3,4,4-pentamethylpentane	3,5-diethylheptane
9	10
3-ethyl-2,2,4-trimethylpentane	3,3-diethyl-2,2-dimethylhexane
11	12
3-ethyl-2-methyl-3-propyloctane	3-ethyl-2,4,5-trimethyl-5-propyloctane

**Question 2.**

Set 1: Assign IUPAC names to the following hydrocarbons

1	$\text{CH}_3\text{-CH=CH-CH}_2\text{-CH}_2\text{-CH}_3$	2	
<b>IUPAC Name</b>		<b>IUPAC Name</b>	
3	$\text{CH}_3\text{CH}_2\text{CH=CH-C(CH}_3)_2$	4	$\begin{array}{c} \text{H}_3\text{C} \quad \text{H} \\   \quad   \\ \text{C} = \text{C} \\   \quad   \\ \text{H} \quad \text{CH}_3 \end{array}$
<b>IUPAC Name</b>		<b>IUPAC Name</b>	
5	$\begin{array}{c} \text{H}_2\text{C-CH}_3 \\   \\ \text{H}_3\text{C-CH-C=CH-CH}_3 \\   \\ \text{H}_2\text{C-CH}_3 \end{array}$	6	$\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{C} = \text{C} \\   \quad   \\ \text{H}_3\text{C-H}_2\text{C} \quad \text{CH}_2\text{-CH}_2\text{-CH}_3 \end{array}$
<b>IUPAC Name</b>		<b>IUPAC Name</b>	
7	$\begin{array}{c} \text{HC} = \text{C-CH}_2\text{-CH}_3 \\   \quad   \\ \text{H}_3\text{C} \quad \text{CH}_2\text{-CH}_3 \end{array}$	8	$\begin{array}{c} \text{H}_3\text{C} \\   \\ \text{C-CH-CH}_2\text{-CH}_3 \\    \quad   \\ \text{HC} \quad \text{CH}_2\text{-CH}_2\text{-CH}_3 \\   \\ \text{H}_2\text{C-CH}_3 \end{array}$
<b>IUPAC Name</b>		<b>IUPAC Name</b>	
9		10	$\begin{array}{c} \text{H}_3\text{C} \quad \text{H} \\ \diagdown \quad / \\ \text{C} = \text{C} \\ / \quad \diagdown \\ \text{H} \quad \text{CH}_2\text{-CH}_3 \end{array}$
<b>IUPAC Name</b>		<b>IUPAC Name</b>	
11	$\begin{array}{c} \text{H}_3\text{C} \quad \text{CH}_2\text{-CH}_3 \\ \diagdown \quad / \\ \text{C} = \text{C} \\ / \quad \diagdown \\ \text{H} \quad \text{CH}_2\text{-CH}_3 \end{array}$	12	$\begin{array}{c} \text{H}_3\text{C} \quad \text{CH}_3 \\ \diagdown \quad / \\ \text{C} = \text{C} \\ / \quad \diagdown \\ \text{H}_3\text{C} \quad \text{CH}_2\text{-CH}_2\text{-CH}_3 \end{array}$
<b>IUPAC Name</b>		<b>IUPAC Name</b>	
13	$\begin{array}{c} \text{H}_2\text{C} - \text{CH}_2 \\ / \quad \backslash \\ \text{H}_2\text{C} \quad \text{CH} \\ \backslash \quad // \\ \text{H}_2\text{C} - \text{C} - \text{CH}_2\text{-CH}_2\text{-CH}_3 \end{array}$	14	$\text{HC} \equiv \text{C-CH}_3$
<b>IUPAC Name</b>		<b>IUPAC Name</b>	
15	$\begin{array}{c} \text{H}_3\text{C-C} \equiv \text{C-CH-CH}_3 \\   \\ \text{H}_2\text{C-CH}_3 \end{array}$	16	$\text{H}_3\text{C-CH}_2\text{-C} \equiv \text{C-CH}_2\text{-CH}_3$
<b>IUPAC Name</b>		<b>IUPAC Name</b>	

Set 2: Assign IUPAC names to the following compounds

1	$  \begin{array}{c}  \text{H}_2\text{C} - \text{CH}_2 \\  / \quad \backslash \\  \text{H}_2\text{C} \quad \text{C} - \text{Br} \\  \backslash \quad // \\  \text{H}_2\text{C} - \text{C} - \text{Br}  \end{array}  $	2	$  \begin{array}{c}  \text{H}_2\text{C} - \text{CH}_2 \\  / \quad \backslash \\  \text{H}_2\text{C} \quad \text{CHBr} \\  \backslash \quad / \\  \text{H}_2\text{C} - \text{CH}_2  \end{array}  $
IUPAC Name		IUPAC Name	
3		4	$  \begin{array}{c}  \text{Cl} \quad \text{CH}_3 \\  \backslash \quad / \\  \text{C} = \text{C} \\  / \quad \backslash \\  \text{H}_3\text{C} \quad \text{CH}_3  \end{array}  $
IUPAC Name		IUPAC Name	
5		6	
IUPAC Name		IUPAC Name	
7		8	$  \begin{array}{c}  \text{Cl} \\    \\  \text{CH}_3\text{CH}_2\text{CHCH}_2\text{CH}_3  \end{array}  $
IUPAC Name		IUPAC Name	
9	$  \begin{array}{c}  \text{CH}_3 \quad \text{Cl} \\    \quad   \\  \text{CH}_3\text{CH} - \text{CHCH}_3  \end{array}  $	10	$  \begin{array}{c}  \text{CH}_3 \\    \\  \text{CH}_3\text{CH}_2\text{CCH}_2\text{CH}_2\text{Br} \\    \\  \text{CH}_2 \\    \\  \text{CH}_3  \end{array}  $
IUPAC Name		IUPAC Name	
11	$  \begin{array}{c}  \text{CH}_3 \\    \\  \text{CH}_3\text{C} - \text{CHCH}_2\text{Br} \\    \quad   \\  \text{CH}_3 \quad \text{CH}_3  \end{array}  $	12	$  \begin{array}{c}  \text{CH}_2 - \text{CH}_3 \\    \\  \text{H}_3\text{C} - \text{C} - \text{CH}_2 - \text{CH} - \text{CH}_2 - \text{CH}_3 \\    \quad   \\  \text{Br} \quad \text{CH}_2 \\  \quad   \\  \quad \text{CH}_3  \end{array}  $
IUPAC Name		IUPAC Name	
13		14	$  \begin{array}{c}  \text{Cl} \quad \text{Cl} \\  \backslash \quad / \\  \text{C} = \text{C} \\  / \quad \backslash \\  \text{H}_3\text{C} \quad \text{CH}_2\text{CH}_3  \end{array}  $
IUPAC Name		IUPAC Name	
15	$  \begin{array}{c}  \text{CH}_3\text{CH}_2\text{CHCH}_2\text{Cl} \\    \\  \text{CH}_3  \end{array}  $	16	$  \begin{array}{c}  \text{CH}_3\text{CH}_2\text{C} = \text{CHCH}_3 \\    \\  \text{Br}  \end{array}  $
IUPAC Name		IUPAC Name	

## Set 3: Draw structures for the following compounds

1	2
2-bromopropane	2-methyl-1-pentene
3	4
2-chloro-5-ethyloctane	3-bromocyclohexene
5	6
<i>cis</i> -2-butene	1,3-diethylcyclohexane
7	8
5,6-dimethyl-1-octyne	4-methyl-2-heptene
9	10
5-bromo-5-chloro-4-ethyl-3-hexene	2,2,5,5-tetrachloro-3-hexyne
11	12
3-iodo- <i>trans</i> -2-pentene	1,5-dibromo-2-chloro-3-ethyl-3-methylhexane

**Question 3.**

Explain why the following molecules have an incorrect name. What is the correct name?

- (a) 1,3-dimethylbutane                      (b) 4-methylpentane  
(c) 2,2-diethylbutane                      (d) 2-ethyl-3-methylpentane

**Question 4.**

Draw structures corresponding to the following names. Which name is incorrect and what is its correct name.

- (a) 2-methyl-3-ethylhexane                      (b) trans-1-chloro-1-pentene  
(c) 3,3-dipropyl-1-butyne                      (d) hexachloro-1,3-butadiene  
(e) 1-iodo-3-methylcycloheptene                      (f) 1,2-dicyclopentylethene  
(g) 2,3-dibromo-4-(methylethyl)nonane                      (h) 3-(2-bromoethyl)-1-hexene

**Question 5.**

Indicate which of the following compounds show geometric isomerism, draw the structures and specify them as *cis* or *trans*

- (a) 1-butene                      (b) 2-butene  
(c) 1,1-dichloroethene                      (d) 1,2-dichloroethene  
(e) 2-methyl-2-butene                      (f) 1-pentene  
(g) 1-chloropropene                      (h) 1-chloro-2-methyl-2-butene

**Question 6.**

How many isomers exist for each of the following? Assign each isomer an IUPAC name.

- (a) butene                      (b) pentane  
(c) dichloroethene                      (d) trifluoropropane  
(e) chlorobutane                      (f) pentene  
(g) hexane                      (h) bromopentene

**Question 7.**

Vapour of a certain saturated hydrocarbon was burnt in excess oxygen to produce 6 times its own volume of carbon dioxide, all measurements being made at the same temperature and pressure.

- (a) Determine the molecular formula for this hydrocarbon.  
(b) Write a balanced chemical equation for its complete combustion in oxygen.  
(c) Write the structural formulae and systematic (IUPAC) names for the isomers of this compound.

**Question 8.**

In excess oxygen and under constant conditions, a hydrocarbon was combusted to produce equal volumes of carbon dioxide and water vapour. Its relative molecular mass as found to be 42.

- (a) Determine its molecular formula.  
(b) Write the structural formulae and systematic (IUPAC) names for the isomers of this compound.

## Answers

### Question 1.

#### Set 1:

- |     |                        |     |                        |
|-----|------------------------|-----|------------------------|
| 1.  | 3,4-dimethylhexane     | 2.  | 2,3,4-trimethylhexane  |
| 3.  | 2,2,3-trimethylpentane | 4.  | 3,4-dimethylheptane    |
| 5.  | 2,2-dimethylbutane     | 6.  | 3,4,5-trimethylheptane |
| 7.  | 3,3-diethylhexane      | 8.  | 2,3,4-trimethylhexane  |
| 9.  | 2-methylpentane        | 10. | 3-ethylpentane         |
| 11. | 2-methylbutane         | 12. | 2,4-dimethylpentane    |
| 13. | 2,3-dimethylpentane    | 14. | 2,3-dimethylpentane    |

#### Set 2:

- |     |                             |     |                                   |
|-----|-----------------------------|-----|-----------------------------------|
| 1.  | 2-methylpropane             | 2.  | 2-methylbutane                    |
| 3.  | 3-ethyl-4-methylheptane     | 4.  | 4-ethyl-6-methylnonane            |
| 5.  | 4-ethyl-3-methyloctane      | 6.  | 4-ethyl-2,3-dimethylheptane       |
| 7.  | 5-ethyl-5-methyldecane      | 8.  | 3-methylhexane                    |
| 9.  | 3,5-diethyl-2-methylheptane | 10. | ethyl cycloheptane                |
| 11. | 3,3-diethyl-2-methylhexane  | 12. | 4-ethyl-3-methyloctane            |
| 13. | 4-ethyl-3,5-dimethyloctane  | 14. | 5-ethyl-3,3,4,6-tetramethyloctane |

#### Set 3:

1 $\begin{array}{ccccccc} \text{H}_3\text{C} & -\text{CH}_2 & -\text{CH} & -\text{CH} & -\text{CH}_2 & -\text{CH}_3 \\ & &   &   & & \\ & & \text{CH}_2 & \text{CH}_3 & & \\ & &   & & & \\ & & \text{CH}_3 & & & \end{array}$	2 $\begin{array}{ccccccc} \text{H}_3\text{C} & -\text{CH}_2 & -\text{CH} & -\text{CH} & -\text{CH} & -\text{CH}_3 \\ & &   &   &   & \\ & & \text{CH}_3 & \text{CH}_3 & \text{CH}_3 & \end{array}$	3 $\begin{array}{ccccccc} & & & \text{CH}_3 & & & \\ & & &   & & & \\ & & & \text{CH}_2 & & & \\ \text{H}_3\text{C} & -\text{CH}_2 & - & \text{C} & -\text{CH}_2 & -\text{CH}_2 & -\text{CH}_2 & -\text{CH}_3 \\ & & &   & & & & \\ & & & \text{CH}_3 & & & & \\ & & &   & & & & \\ & & & \text{CH}_3 & & & & \end{array}$
3-ethyl-4-methylhexane	2,3,4-trimethylhexane	3,3-diethylheptane
4 $\begin{array}{ccccccc} & & & \text{CH}_3 & & & \\ & & &   & & & \\ \text{H}_3\text{C} & -\text{CH}_2 & - & \text{C} & -\text{CH}_2 & -\text{CH}_3 \\ & & &   & & \\ & & & \text{CH}_2 & & \\ & & &   & & \\ & & & \text{CH}_3 & & \end{array}$	5 $\begin{array}{ccccccc} & & & \text{CH}_3 & & \text{CH}_3 & \\ & & &   & &   & \\ \text{H}_3\text{C} & -\text{CH}_2 & - & \text{C} & -\text{CH}_2 & - & \text{C} & -\text{CH}_2 & -\text{CH}_2 & -\text{CH}_3 \\ & & &   & & &   & & \\ & & & \text{CH}_2 & & & \text{CH}_3 & & \\ & & &   & & & & & \\ & & & \text{CH}_3 & & & & & \end{array}$	6 $\begin{array}{ccccccc} & & & \text{CH}_3 & & \text{CH}_3 & \\ & & &   & &   & \\ \text{CH}_3 & \text{CH} & \text{CH}_2 & \text{CH} & \text{CH}_3 & & \end{array}$
3-ethyl-3-methylpentane	3-ethyl-3,5,5-trimethyloctane	3,4-dimethylpentane
7 $\begin{array}{ccccccc} & & & \text{CH}_3 & & \text{CH}_3 & \\ & & &   & &   & \\ \text{H}_3\text{C} & - & \text{C} & -\text{CH} & - & \text{C} & -\text{CH}_3 \\ & &   & & &   & \\ & & \text{CH}_3 & \text{CH}_3 & & \text{CH}_3 & \end{array}$	8 $\begin{array}{ccccccc} & & & & & \text{CH}_3 & \\ & & & & &   & \\ & & & & & \text{CH}_2 & \\ \text{H}_3\text{C} & -\text{CH}_2 & -\text{CH} & -\text{CH}_2 & -\text{CH} & -\text{CH}_2 & -\text{CH}_3 \\ & & & & &   & \\ & & & & & \text{CH}_2 & \\ & & & & &   & \\ & & & & & \text{CH}_3 & \end{array}$	9 $\begin{array}{ccccccc} & & & \text{CH}_3 & & \text{CH}_3 & \\ & & &   & &   & \\ \text{H}_3\text{C} & - & \text{C} & -\text{CH} & -\text{CH} & -\text{CH}_3 \\ & &   & & &   & \\ & & \text{CH}_3 & \text{CH}_2 & & \text{CH}_3 & \end{array}$
2,2,3,4,4-pentamethylpentane	3,5-diethylheptane	3-ethyl-2,2,4-trimethylpentane
10 $\begin{array}{ccccccc} & & & \text{CH}_3 & & & \\ & & &   & & & \\ \text{H}_3\text{C} & & \text{CH}_2 & & & & \\ &   &   & & & & \\ \text{H}_3\text{C} & - & \text{C} & - & \text{C} & -\text{CH}_2 & -\text{CH}_2 & -\text{CH}_3 \\ &   &   & & & & & \\ & \text{H}_3\text{C} & \text{CH}_2 & & & & & \\ & &   & & & & & \\ & & \text{CH}_3 & & & & & \end{array}$	11 $\begin{array}{ccccccc} & & & \text{CH}_3 & & & \\ & & &   & & & \\ & & \text{CH}_3 & \text{CH}_2 & & & \\ \text{H}_3\text{C} & - & \text{CH} & - & \text{CH} & -\text{CH} & -\text{CH}_2 & -\text{CH}_2 & -\text{CH}_2 & -\text{CH}_3 \\ & & & & & &   & & \\ & & & & & & \text{CH}_2 & & \\ & & & & & &   & & \\ & & & & & & \text{CH}_2 & & \\ & & & & & &   & & \\ & & & & & & \text{CH}_3 & & \end{array}$	12 $\begin{array}{ccccccc} & & & \text{CH}_3 & & & \\ & & &   & & & \\ & & \text{CH}_3 & \text{CH}_2 & \text{CH}_3 & \text{CH}_3 & \\ \text{H}_3\text{C} & - & \text{CH} & - & \text{CH} & - & \text{CH} & - & \text{C} & -\text{CH}_2 & -\text{CH}_2 & -\text{CH}_3 \\ & & & & & & & &   & & \\ & & & & & & & & \text{CH}_2 & & \\ & & & & & & & &   & & \\ & & & & & & & & \text{CH}_2 & & \\ & & & & & & & &   & & \\ & & & & & & & & \text{CH}_3 & & \end{array}$
3,3-diethyl-2,2-dimethylhexane	3-ethyl-2-methyl-3-propyloctane	3-ethyl-2,4,5-trimethyl-5-propyloctane

### Question 2.

#### Set 1:

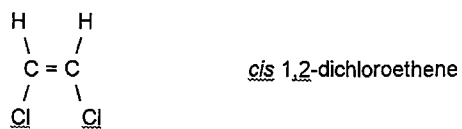
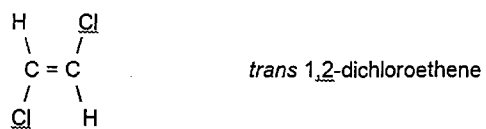
- |     |                           |     |                           |
|-----|---------------------------|-----|---------------------------|
| 1.  | 2-hexene                  | 2.  | 4-nonene                  |
| 3.  | 2,2-dimethyl-3-hexene     | 4.  | <i>trans</i> -2-butene    |
| 5.  | 3-ethyl-4-methyl-2-hexene | 6.  | <i>cis</i> -3-heptene     |
| 7.  | 3-ethyl-2-pentene         | 8.  | 5-ethyl-4-methyl-3-octene |
| 9.  | cyclohexene               | 10. | <i>trans</i> -2-pentene   |
| 11. | 3-ethyl-2-pentene         | 12. | 2,3-dimethyl-2-hexene     |
| 13. | 1-propyl cyclohexene      | 14. | propyne                   |
| 15. | 4-methyl-2-hexyne         | 16. | 3-hexyne                  |

#### Set 2:

- |     |                               |     |                                    |
|-----|-------------------------------|-----|------------------------------------|
| 1.  | 1,2-dibromocyclohexene        | 2.  | bromocyclohexane                   |
| 3.  | 4-bromo-3-iodocyclopentene    | 4.  | 2-chloro-3-methyl-2-butene         |
| 5.  | 1,3,5-trichlorobenzene        | 6.  | 2-ethyl-1-methyl-3-propylbenzene   |
| 7.  | 1,2-dimethylbenzene           | 8.  | 3-chloropentane                    |
| 9.  | 2-chloro-3-methylbutane       | 10. | 1-bromo-3-ethyl-3-methylpentane    |
| 11. | 1-bromo-2,3,3-trimethylbutane | 12. | 3-bromo-5-ethyl-3-methylheptane    |
| 13. | bromocyclopropane             | 14. | <i>cis</i> -2,3-dichloro-2-pentene |
| 15. | 1-chloro-2-methylbutane       | 16. | 3-bromo-2-pentene                  |

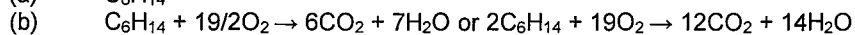
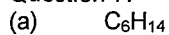




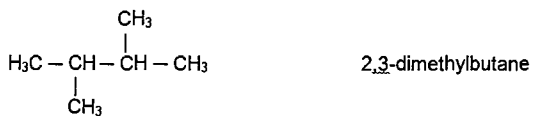
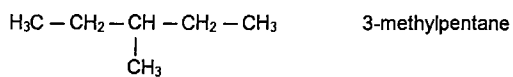
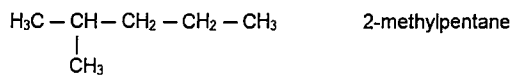
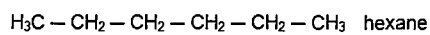


(d)

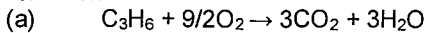
Question 7.



(c)



Question 8.



(b)

