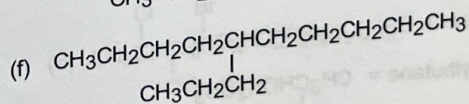
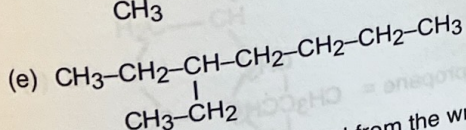
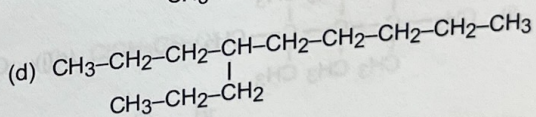
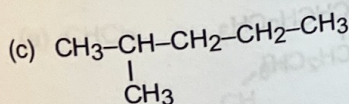
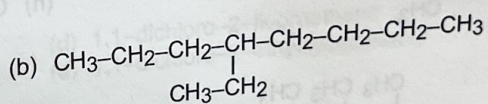
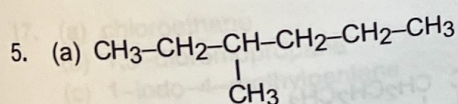
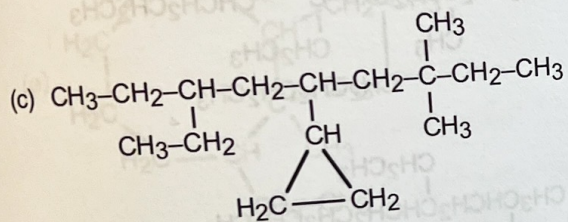
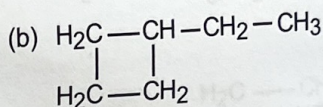
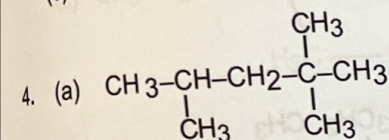


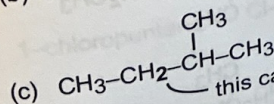
ANSWERS TO UNIT X : ORGANIC CHEMISTRY

1. C_nH_{2n+2}

2. (a) 7 carbons; heptane
 (b) 7 carbons; heptane
 (c) 8 carbons; octane
 (d) 10 carbons; decane
3. (a) 3-methylhexane
 (b) 4-ethylheptane
 (c) 3-ethyloctane
 (d) 2-methylhexane
 (e) 4-methylnonane
 (f) 3-methylheptane



6. (a) the molecule is numbered from the wrong end; it should be 2-methylheptane
 (b) 1-ethylbutane is
$$\begin{array}{ccccccc} & & & & & & \\ & & & & & & \\ \text{CH}_2 & - & \text{CH}_2 & - & \text{CH}_2 & - & \text{CH}_3 \\ & & | & & & & \\ & & \text{CH}_2 & - & \text{CH}_3 & & \end{array}$$
 which is just hexane

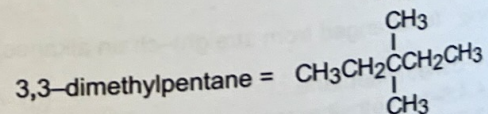
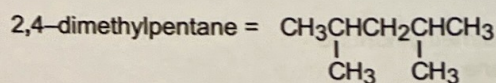
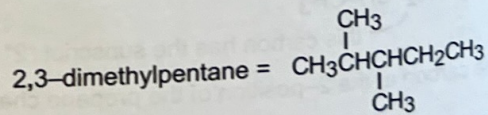
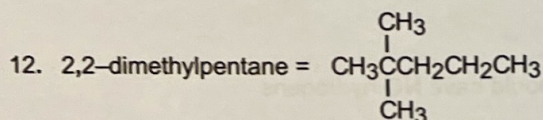
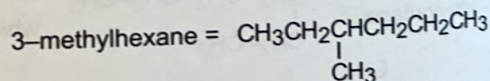
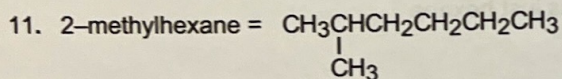
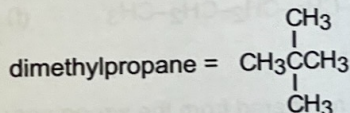
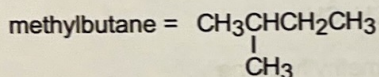
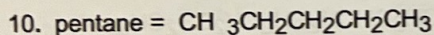
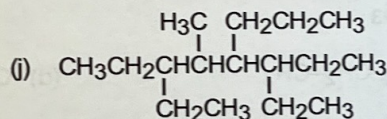
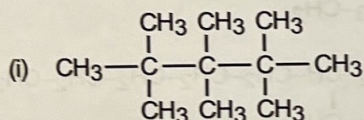
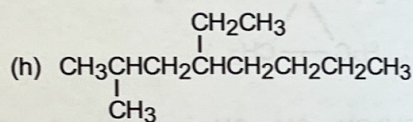
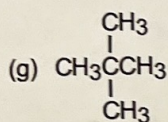
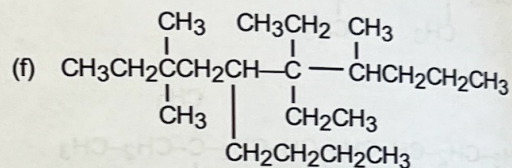
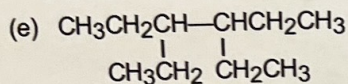
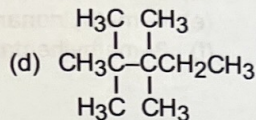
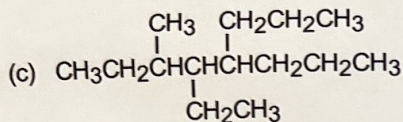
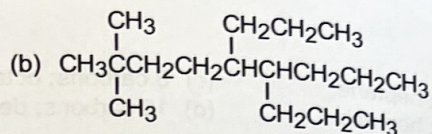
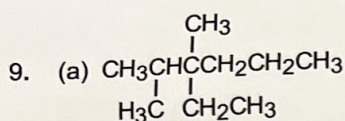


- (d) the carbon at the 2-position of the propane chain should have NO hydrogens
 this carbon has the subscript "2"

7. C_nH_{2n+2} (unchanged from straight-chain alkanes)

8. (a) 3,4-dimethylheptane
 (b) 3,4,4,5-tetraethylheptane
 (c) 2,2,7,7-tetramethyloctane
 (d) 5-ethyl-3,4-dimethylheptane
 or 3-ethyl-4,5-dimethyloctane
 (e) 4-methyl-4-ethyloctane
 (f) 2,2,5-trimethyloctane

- (g) 4,6-dimethylnonane
 (h) decane
 (i) 4,5-diethyl-3,7-dimethylnonane
 (j) 3,3,4,5-tetramethyloctane
 (k) 4-ethyl-3-methyl-5-propyloctane
 (l) 3,6-diethyl-5,8-dimethyldecane
 or 5,8-diethyl-3,6-dimethyldecane

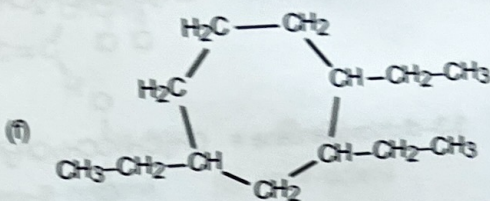
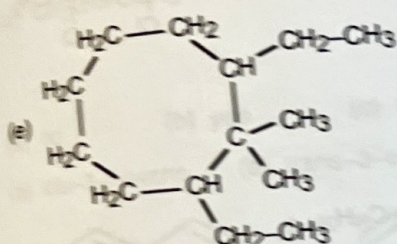
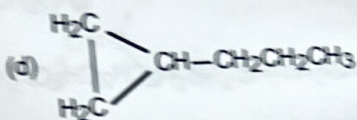
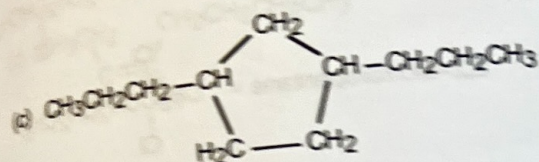
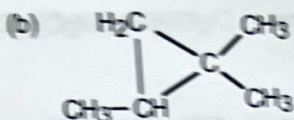
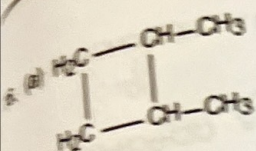


13. 3 - having methyl groups at the 2, 3 or 4 position

14. C_4H_{10}

15. (a) ethylcyclohexane
(b) 1,3-dimethylcyclobutane
(c) methylcyclopropane

- (d) 1-ethyl-1,3-dimethylcyclopentane
(e) 2-ethyl-1,3-dimethylcyclooctane

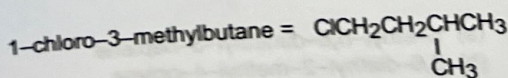
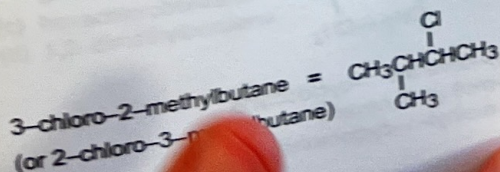
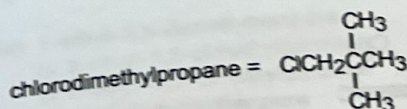
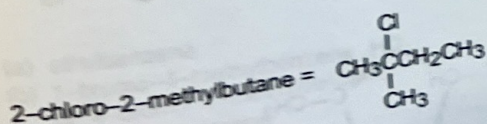
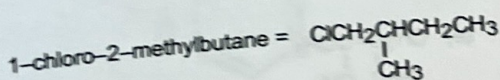
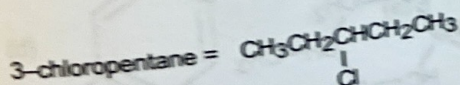
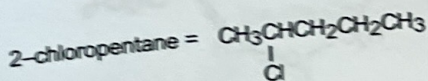
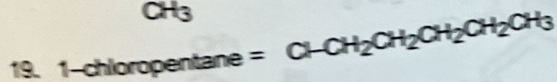
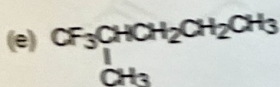
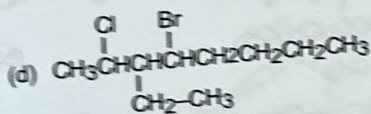
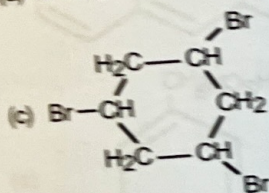


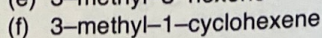
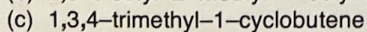
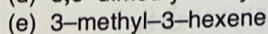
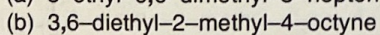
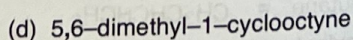
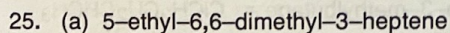
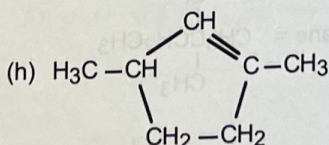
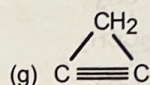
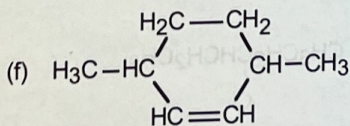
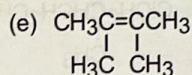
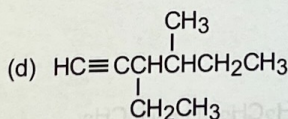
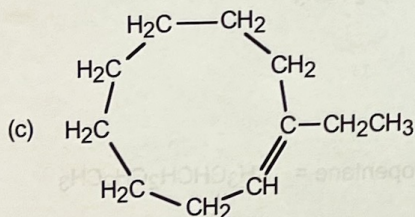
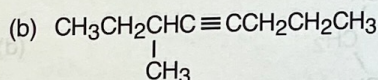
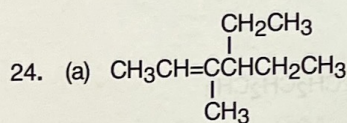
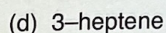
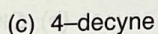
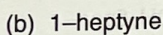
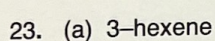
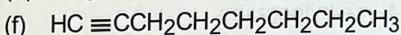
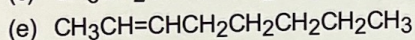
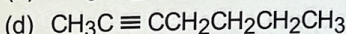
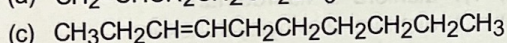
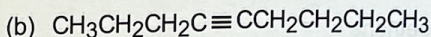
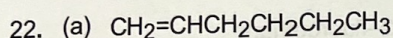
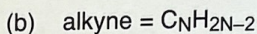
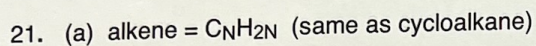
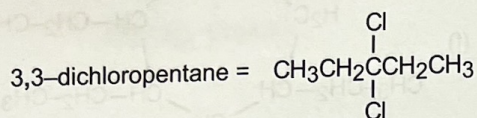
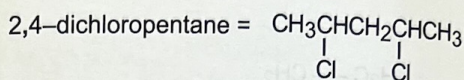
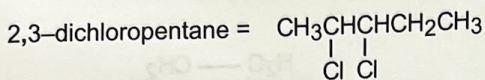
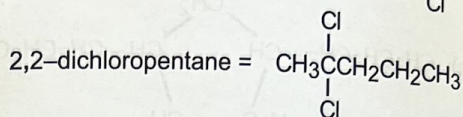
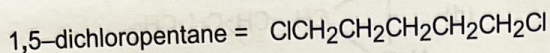
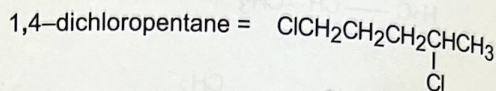
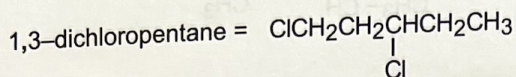
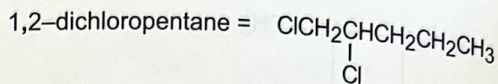
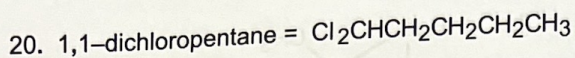
17. (a) chloroethane
(b) 1,3-dibromopropane
(c) 1-iodo-4-methylpentane

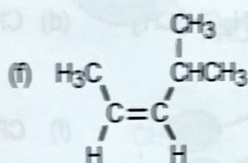
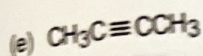
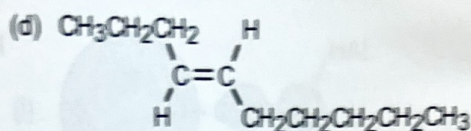
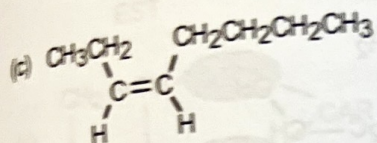
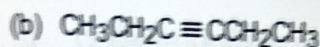
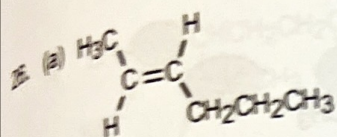
- (d) 1,1-dichloro-2-fluoroethane
(e) 1,1-dichloro-2-ethylcyclohexane

18. (a) CHCl_3

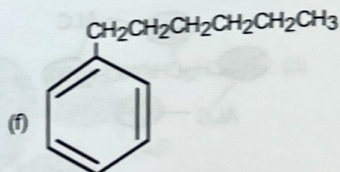
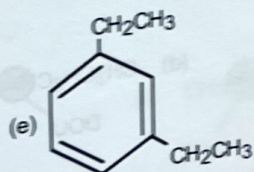
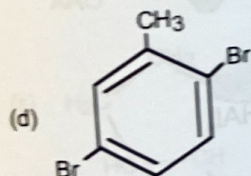
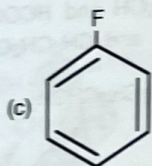
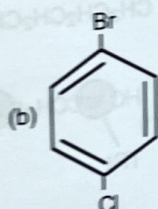
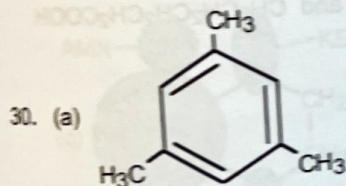
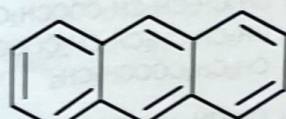
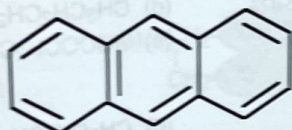
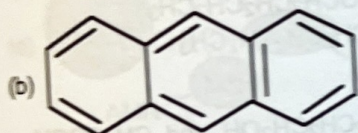
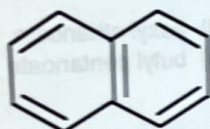
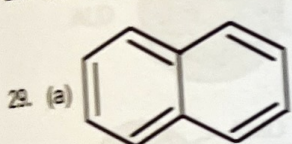
- (b) $\text{ClCH}_2\text{CH}_2\text{Cl}$





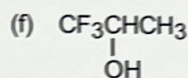
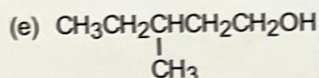
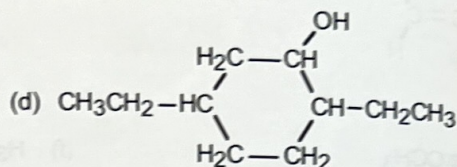
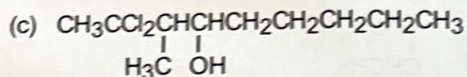
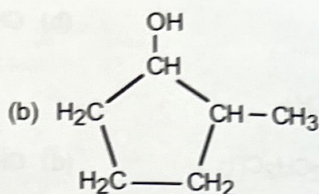
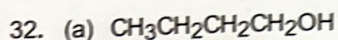


27. (a) no (b) yes (c) no (d) yes (e) no (f) no
28. (a) cis-3-hexene (b) trans-3-octene (c) trans-2-heptene (d) cis-4-octene



31. (a) ethylbenzene
 (b) 1-bromo-4-methylbenzene
 or 4-bromo-1-methylbenzene
 (c) hexachlorobenzene
 (d) 1,2-dimethylbenzene

- (e) 1-ethyl-3,5-dimethylbenzene
 or 3-ethyl-1,5-dimethylbenzene
 or 5-ethyl-1,3-dimethylbenzene
 (f) 1-ethyl-4-methylbenzene
 or 4-ethyl-1-methylbenzene



33. (a) 2-propanol
-
- (b) 4,4,4-trifluoro-2-butanol
-
- (c) 3-methyl-1-butanol

- (d) 2-methyl-2-propanol
-
- (e) 2-chloro-1-cyclobutanol
-
- (f) 2,3-dimethyl-1-cyclopropanol

34. (a) methyl propanoate
-
- (b) propyl methanoate
-
- (c) ethyl butanoate

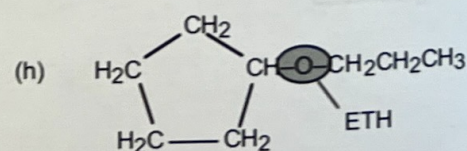
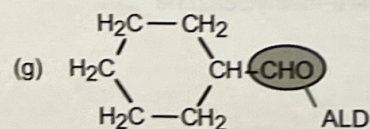
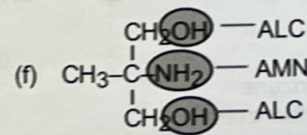
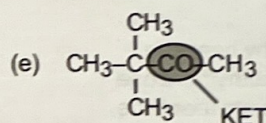
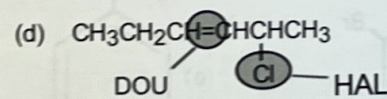
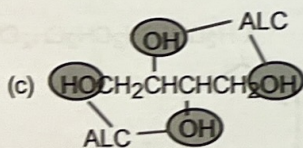
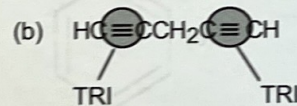
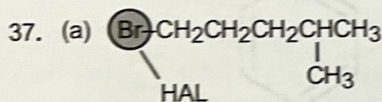
- (d) hexyl ethanoate
-
- (e) butyl pentanoate

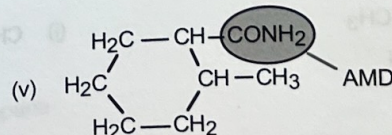
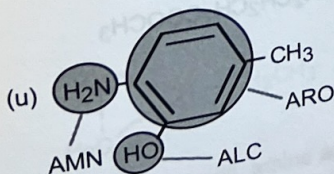
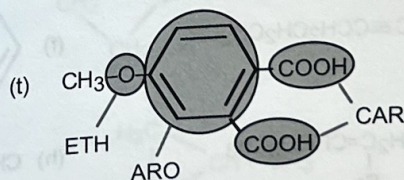
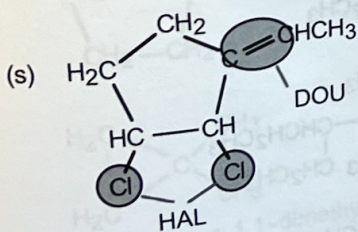
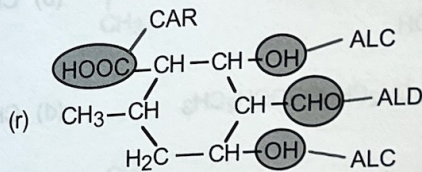
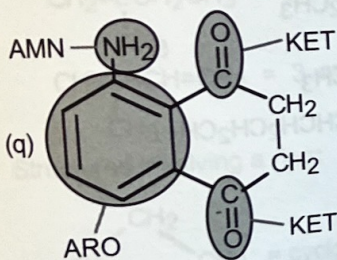
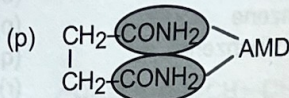
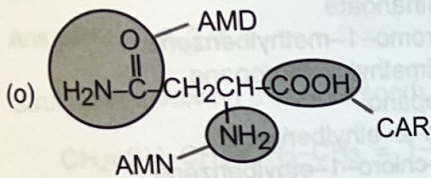
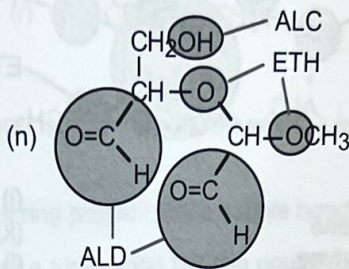
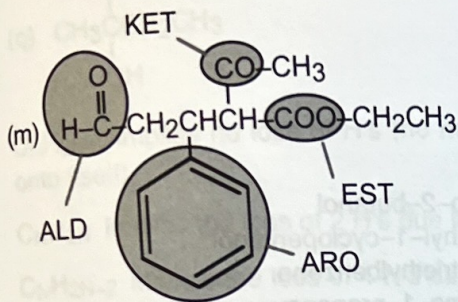
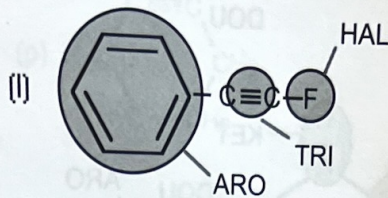
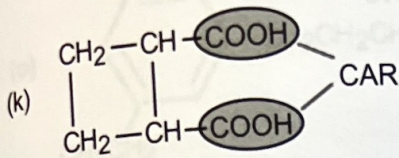
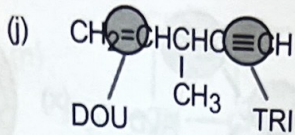
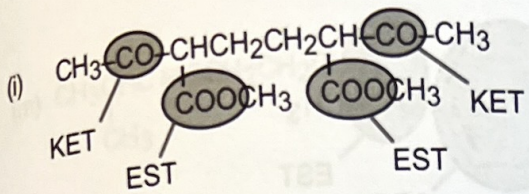
35. (a)
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{COOCH}_2\text{CH}_2\text{CH}_3$
-
- (b)
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{COOCH}_3$
-
- (c)
- $\text{CH}_3\text{CH}_2\text{COOCH}_2\text{CH}_3$

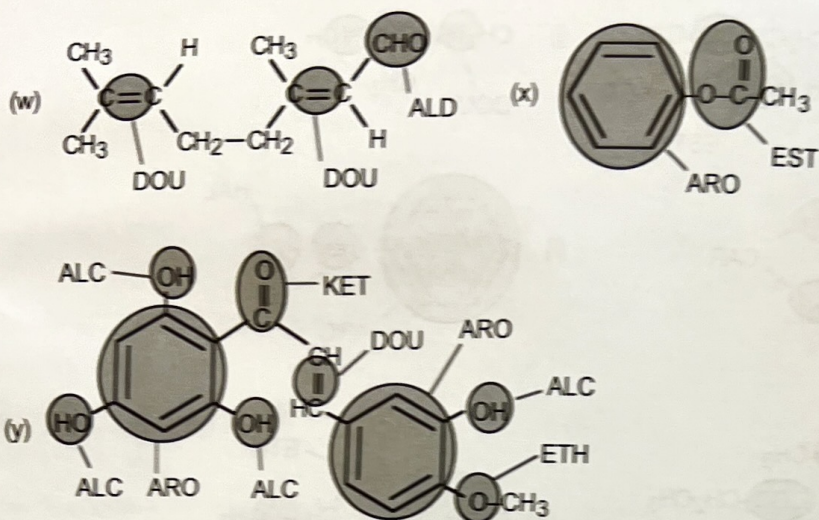
- (d)
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOCH}_2\text{CH}_2\text{CH}_2\text{CH}_3$
-
- (e)
- $\text{HCOOCH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$

36. (a)
- CH_3OH
- and
- $\text{CH}_3\text{CH}_2\text{COOH}$
-
- (b)
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
- and
- HCOOH
-
- (c)
- $\text{CH}_3\text{CH}_2\text{OH}$
- and
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$

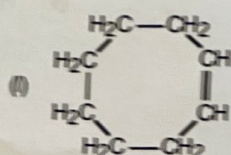
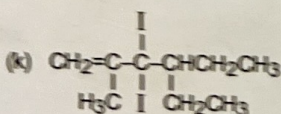
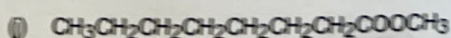
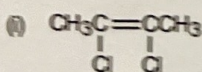
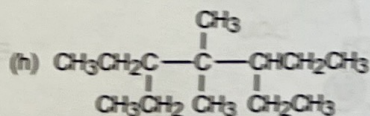
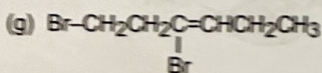
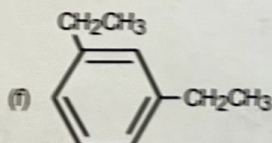
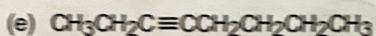
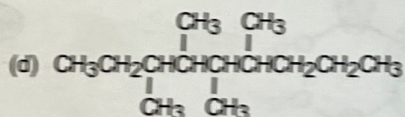
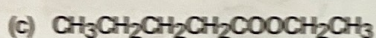
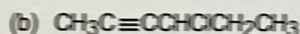
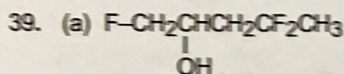
- (d)
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
- and
- CH_3COOH
-
- (e)
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$
- and
- $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$

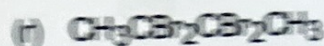
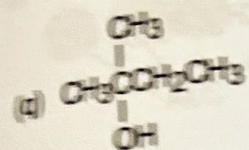
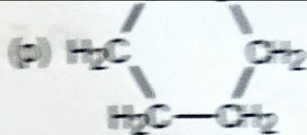
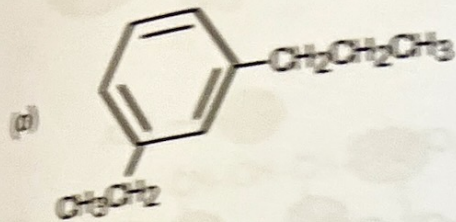






38. (a) 2-fluoropentane
 (b) 3-chloro-3-hexene
 (c) 1,4-diiodo-2-butyne
 (d) pentyl methanoate
 (e) 3-bromo-3,5,5-trimethyloctane
 (f) 1,3-dichlorocyclobutane
 (g) 1-fluoro-4-propylbenzene
 or 4-fluoro-1-propylbenzene
 (h) 2,6-dimethyloctane
 (i) 4-bromo-5-chloro-1-iodo-2-pentyne
 (j) 4-iodo-2-butanol
 (k) 3-methyl-1-cyclopentanol
 (l) 1,3,5-triethylbenzene
 (m) 3-bromo-1-propene
 (n) pentyl ethanoate
 (o) 2,4-dibromo-1-methylbenzene
 (p) 1,2,3-trimethylcyclopropane
 (q) cyclopropanol
 (r) 1-chloro-2-ethylbenzene
 or 2-chloro-1-ethylbenzene





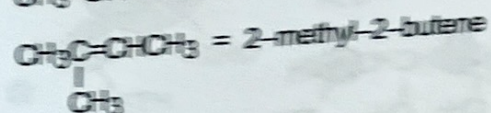
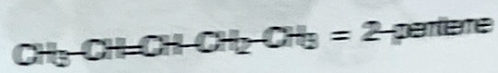
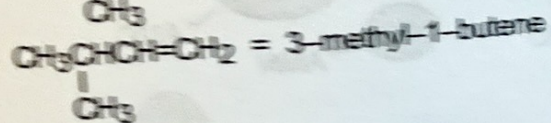
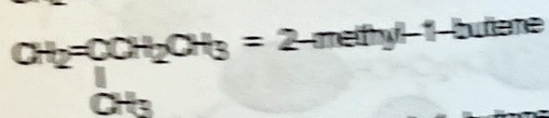
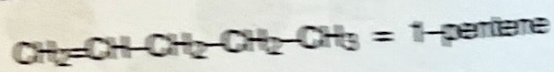
40. $\text{C}_n\text{H}_{2n-2}$ implies no loss of H's (no multiple bonds; no ring present which joins one end of a chain back onto itself).

C_nH_{2n} implies the loss of 2 H's due to either a ring present OR a double bond.

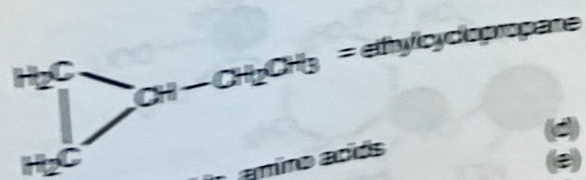
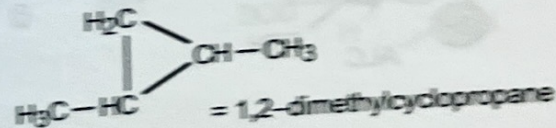
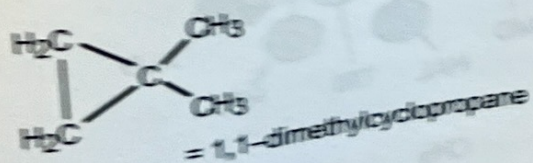
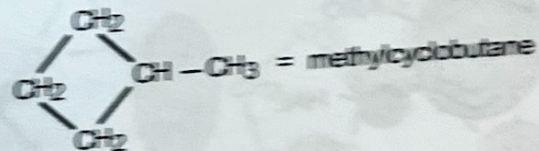
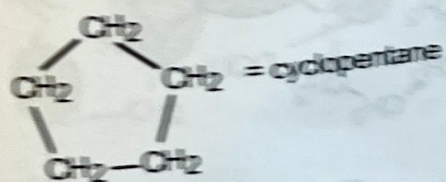
$\text{C}_n\text{H}_{2n-2}$ implies the loss of 4 H's due to either a triple bond OR two double bonds OR two rings present OR a double bond AND a ring present.

Answers: c, e, g, i

41. Structures involving a double bond:

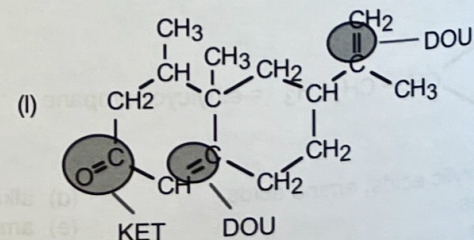
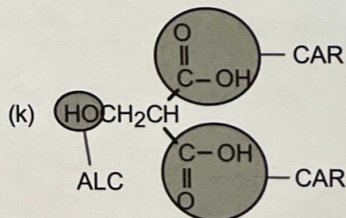
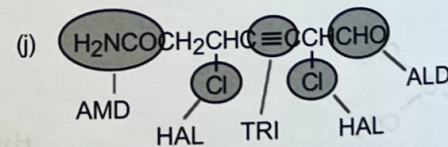
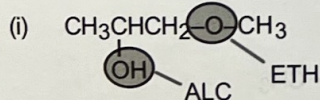
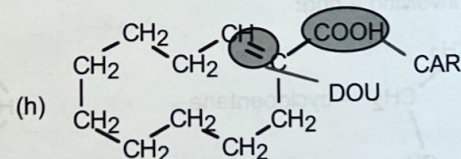
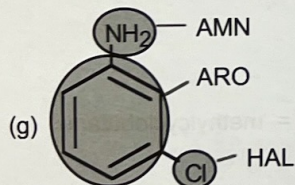
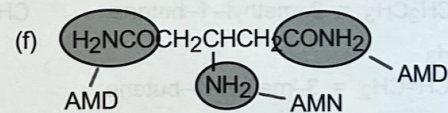
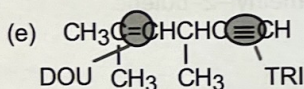
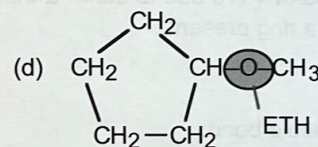
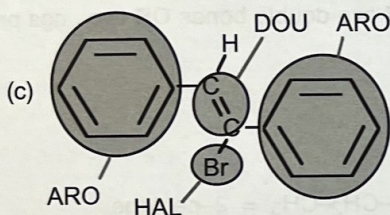
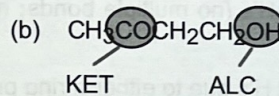
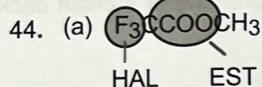
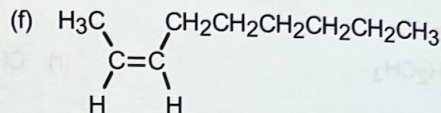
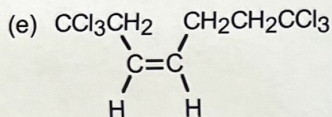
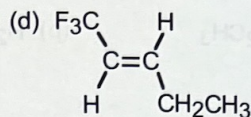
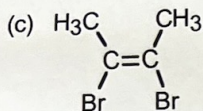
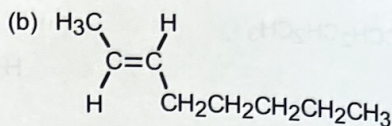
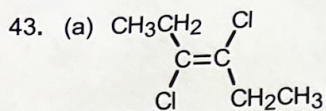


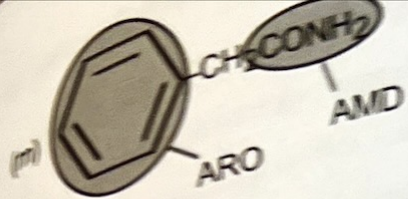
Structures involving a ring:



42. (a) carboxylic acids, amino acids
(b) amines
(c) esters

- (d) alkanes
(e) amino acids
(f) esters





ETH

