

11th grade answers

1)

a)

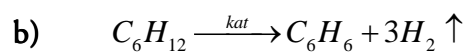
$$n(C) \Leftrightarrow n(CO_2) \rightarrow n(C) = \frac{66g}{44g/mol} = 1,5mol$$

$$n(H) \Leftrightarrow 2n(H_2) \rightarrow n(H) = \frac{27g * 2}{18g/mol} = 3mol$$

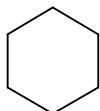
$$C : H \Leftrightarrow C : H$$

$$1,5 : 3 \Leftrightarrow 6 : 12$$

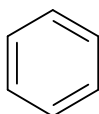
C_6H_{12} because the main chain of the isomer has 5 atoms.



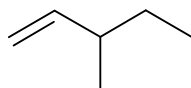
c) X = cyclohexane



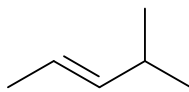
Y = benzene



Z.



Isomer nr.1 3-methylpent-1-ene



Isomer nr.2 4-methylpent-2-ene

2)

a) i)

$$V_{teor.}(CO_2) = \frac{100}{85} * 16,66L = 19,6L$$

$$m_{teor.}(H_2O) = \frac{100}{80} * 12,6g = 15,75g$$

$$n(C) \Leftrightarrow n(CO_2) \rightarrow n(C) = \frac{19,6L}{22,4L/mol} = 0,875mol$$

$$n(H) \Leftrightarrow 2n(H_2O) \rightarrow n(H) = \frac{15,75g * 2}{16g/mol} = 1,75mol$$

Checking if there are any oxygen atoms in the compound.

$$m(C) + m(H) = 0,875 * 12 + 1,75 * 1 = 12,25g \rightarrow 12,25g < 14,25g$$

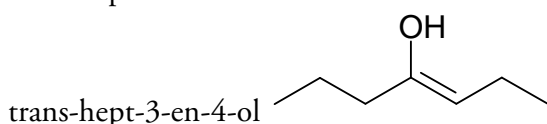
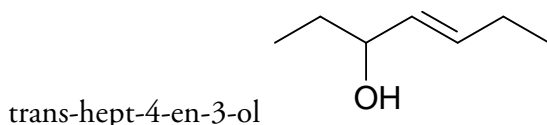
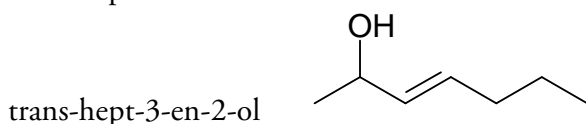
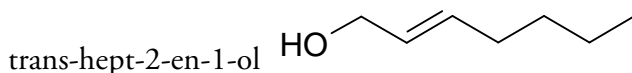
$$m(O) = m(A) - [m(C) + m(H)] \rightarrow m(O) = 14,25 - 12,25 = 2g$$

$$n(O) = \frac{2g}{16g/mol} = 0,125mol$$

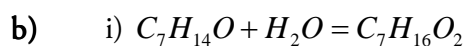
$$C:H:O \Leftrightarrow 0,875:1,75:0,125 \rightarrow C:H:O \Leftrightarrow 7:14:1$$

Formula $C_7H_{14}O$.

ii)

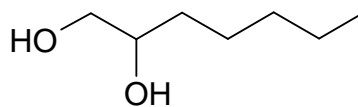


NB! Points were given maximum up to 4 formulas and up to 2 names.

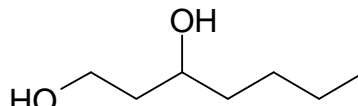


ii)

Isomer nr.1 heptane-1,2-diol



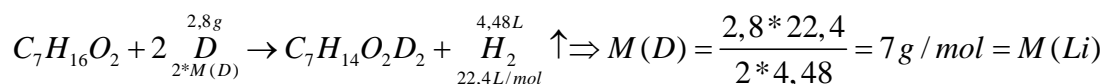
Isomer nr.2 heptane-1,3-diol



NB! Points were given maximum up to 4 formulas and up to 2 names.

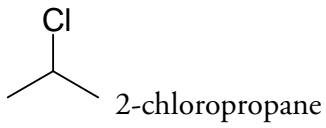
iii)

$$V_{teor}(H_2) = 4,256L * \frac{100}{95} = 4,48L$$

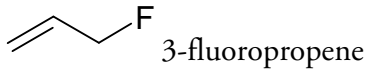


3)

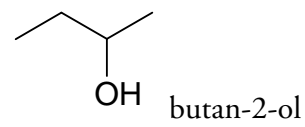
a)



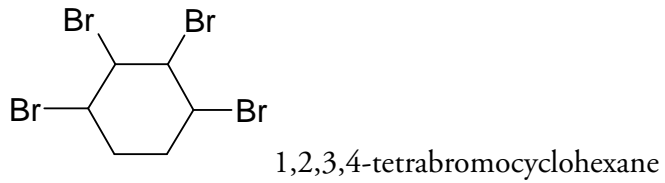
b)



c)

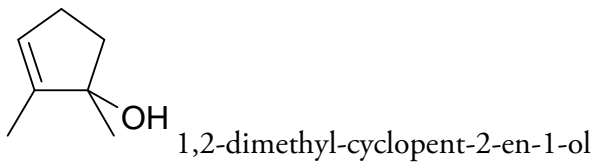


d)



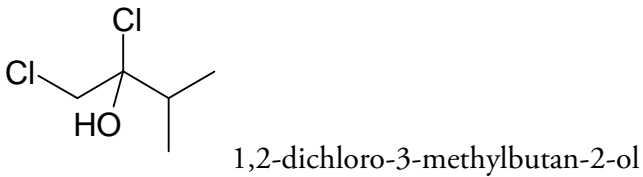
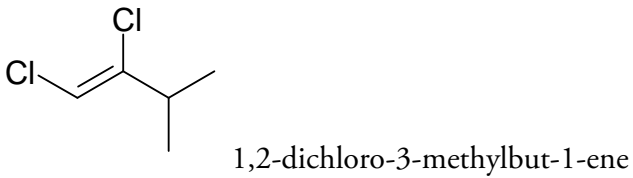
e) - no reaction

f)



g) - no reaction

h)



4)

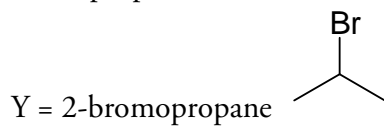
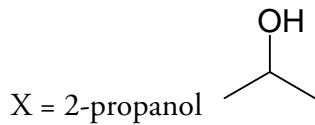
a)

$$m(C) = 81,82g \rightarrow n(C) = \frac{81,82g}{12g/mol} = 6,82mol$$

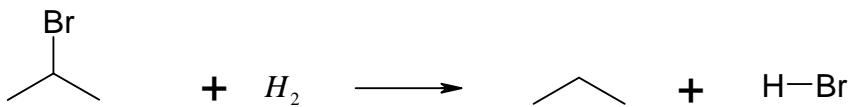
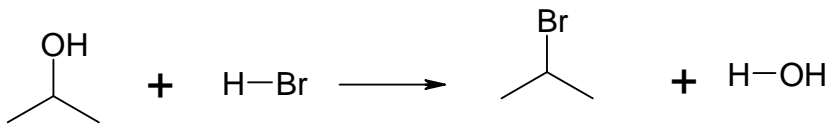
$$m(H) = 18,18g \rightarrow n(H) = \frac{18,18g}{1g/mol} = 18,18mol$$

$$n(C):n(H) = 6,82:18,18 = 1:2,67 = 3:8, C_3H_8 - \text{propane}$$

b)



c)

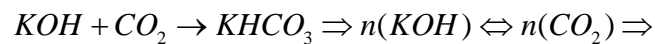


d) 4 parts \leftrightarrow 5 L; 1 part \leftrightarrow 1,25 L

$$\overset{1,25L}{C_3H_8} + 5O_2 \rightarrow \overset{V_1}{3CO_2} + 4H_2O \Rightarrow V_1 = \frac{1,25 * 3 * 22,4}{22,4} = 3,75L$$

$$\overset{3,75L}{CH_4} + 2O_2 \rightarrow \overset{V_2}{CO_2} + 2H_2O \Rightarrow V_2 = \frac{3,75 * 22,4}{22,4} = 3,75L$$

$$V(CO_2) = V_1 + V_2 \Rightarrow V(CO_2) = 7,5L \Rightarrow n(CO_2) = \frac{75}{224} mol$$



$$1L \Leftrightarrow 0,1mol$$

$$xL \Leftrightarrow \frac{75}{224} mol$$

$$V(KOH \text{ solution}) = 3,35L$$