

11th grade assignments

1) After the complete combustion of saturated hydrocarbon **X** 27 grams of water and 66g of CO_2 was collected. Organic substance **Y**, which is characterised by replacement reactions and is resistant to bromine water and hydrobromic acid, was formed after the dehydrogenation of substance **X**.

The isomers of **X** belong to a different substance class than **X** and **Y**. The isomers' **Z** properties are following: i) electrophilic addition, ii) main-chain has 5 atoms, iii) the radical position number is by two units larger than the number of the functional group that determines the substance class.

- Identify the molecular formula of substance **X** with calculations.
- Write and balance the dehydrogenation equation of substance **Y**.
- Draw graphical formula for **X, Y, Z** and name them.

2)

a) After the complete combustion of 14,25g of organic substance **A** 16,66 l of CO_2 and 12,6g of water was gathered, which was accordingly 15% and 20% less than theoretically. The chain of substance **A** has seven links and the distance between functional groups is one unit.

- Using calculations find the molecular formula of substance **A**.
- Create simplified structural formulas for trans-compounds and name two of them.

b) Substance **A**'s isomer **B**, in which the functional group is in the first position gives compound **C** when it reacts with water. 4,256 L of H_2 (yield 95%) was gathered after the reaction between 2,8g of alkali metal **D** and equivalent amount of compound **C**.

- Finish and balance equation $\text{B} + \text{H}_2\text{O} = ?$.
- Draw simplified structural formulas for isomer **C** and name two of them.
- Identify substance **D** with calculations.

3) Draw the graphical formulas of products and name them. *NB! Equations have been balanced and the conditions have been determined.*

a)



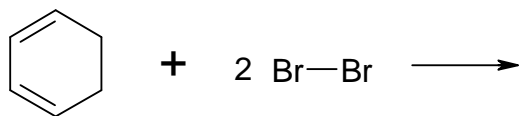
b)



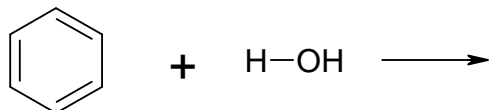
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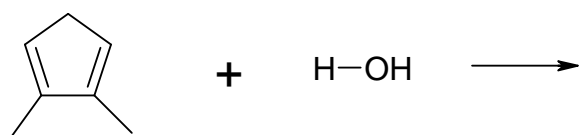
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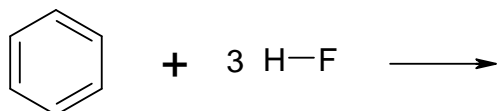
e)



f)



g)



h)



4) When sec-alcohol $\begin{matrix} R \\ | \\ R-CH-OH \end{matrix}$ **X** reacts with HBr, water and compound **Y** are formed. After reducing **Y** with hydrogen, gaseous hydrocarbon **Z** and HBr are formed. Substance **Z** consists 81,82% of carbon and in formula there are 5 carbon atoms less than hydrogen atoms.

a) Using calculations find the formula for substance **Z** and name it.

b) Write the graphical formulas for **X** and **Y** and name them.

c) Write and balance equations referred in the assignment.

d) How many litres of 0,1M KOH solution is required to absorb CO_2 (get KHCO_3), which was acquired by completely combusting 5 l gas mixture?

$$V(\text{Z}): V(\text{CH}_4) = 1:3$$