

**Organic Chemistry Control Questions 1.**

Variant № 1

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- Write empirical and structural formula of methane, ethane and propane.  
How many 1°, 2°, 3° & 4° carbon atoms has the alkane  $\text{CH}_3\text{CH}_2\text{C}(\text{CH}_3)_2\text{CH}_2\text{CH}(\text{CH}_3)_2$  ?
- Write reaction schemes of cautious oxidation with potassium permanganate in an alkaline or neutral solution (Wagner's reaction) of the following hydrocarbons: a) 4,4-dimethyl-2-pentene; b) 3-methyl-2-butene. What are the products of oxidation?
- Write empirical and structural formulas of the following hydrocarbons: a) 2,2-dimethylhexane; b) 2,3-dimethyl-3-ethylhexane; a) 2,3,4-trimethylpentane; g) 2,5-dimethyl-3,3-diethylhexane; d) 2,2,3,4-tetramethylhexane; e) 2,4,4,5-tetraethylheptane.

**Organic Chemistry Control Questions 1.**

Variant № 2

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- Write empirical and structural formulas: a) propane; b) butane; c) isobutane.  
The IUPAC name for  $(\text{CH}_3)_2\text{CHCH}(\text{CH}_3)\text{CH}_2\text{CH}=\text{CH}_2$  is ...
- Write the empirical formula of heptane. Output all (nine) of the isomeric hydrocarbons with this Mol. formula. Name each isomer according to IUPAC nomenclature.
- Write coupling reaction hydrogen iodide with: a) 2-methyl-3-hexene; b) 2-methyl-2-hexene; c) 3-hexene. What reactions does not follow Markovnikov rule? In what of them, the formation of a mixture of two isomeric halogenated derivatives is possible? Name resulting compounds according to IUPAC nomenclature.

**Organic Chemistry Control Questions 1.**

Variant № 3

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- Write the structural formulas of all the isomers pentane and name each isomer according to IUPAC nomenclature. Underline in formulas primary, secondary, tertiary and quaternary carbon atoms, respectively, with one, two, three and four dashes.
- Write scheme of polymerization: a) propylene; b) 4-methylpent-1-ene. What are the name of resulting polymers? What is differences in the structures of their chains? Specify the polymerization conditions for mentioned hydrocarbons.
- A primary carbon atom is bonded to only 1 other carbon atom. What is a carbon atom bonded to 4 other carbon atoms called?

**Organic Chemistry Control Questions 1.**

Variant № 4

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- Write a reaction scheme of sequential bromination of ethane. Specify the conditions under which such reactions are possible. Name all the bromo derivatives which may be formed at the same time.
- Write and explain the hydration reaction of a) 2-methylprop-1-ene; b) 2-methylpent-2-ene; c) 4-methylpent-2-ene. Specify the conditions under which these reactions occur. What are the resulting compounds?
- Write structural formulas isomeric  $\text{C}_6\text{H}_{14}$  : a) normal structure; b) with two tertiary carbon atoms; c) a quaternary carbon atom; g) two isomers with one tertiary carbon atom. Name each isomer according to IUPAC nomenclature.

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- Write the serial reaction of chlorination of methane, showing a chain free radical mechanism of this reaction.
- Write structural formulas of the isomeric hydrocarbons with Mol. formula  $C_8H_{18}$  and with six carbon atoms in the main chain. Name them according to IUPAC nomenclature.
- For the following ethylene hydrocarbons write Ozone oxidation scheme with the disintegration of the molecules at the double bond location: a) hex-3-ene; b) 2-methylpent-2-ene; c) 3-methylpent-2-ene. Name each compound according to IUPAC nomenclature.

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- What chlorinated derivatives can be obtained by substituting one hydrogen atom by chlorine in compds: a) Propane; b) n-Butane; c) Isobutane; d) 2-Methylbutane? Write reaction schemes of chlorination. Specify the reaction conditions. Name monochloro derivatives formed according to IUPAC nomenclature.
- Name following hydrocarbon according to IUPAC nomenclature.
 
$$\begin{array}{c}
 \text{CH}_3 \\
 | \\
 \text{HC}-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{C}-\text{CH}_3 \\
 | \qquad \qquad \qquad | \\
 \text{CH}_3 \qquad \qquad \qquad \text{HC}-\text{CH}_3 \\
 \qquad \qquad \qquad \qquad | \\
 \qquad \qquad \qquad \qquad \text{CH}_3
 \end{array}$$
- What alkenes can be prepared by dehydrogenation of: a) 2-methylbutane; b) n-butane? Write the reactions and name derived hydrocarbons according to IUPAC nomenclature.

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- Write scheme of reactions occurring under the action of nitric acid (Kononov's reaction) on the saturated hydrocarbons: a) n-butane; b) isobutane; c) n-pentane; d) 2-methylbutane. Specify the conditions and primary products for reactions. Name produced the nitro compound according to IUPAC nomenclature.
- Write reaction schemes of dehydrogenation of the alkanes, producing the following unsaturated hydrocarbons: a) 1-propene; b) 2-methyl-1-propene. Name the initial hydrocarbons.
- Write a reaction schemes of alkenes producing from halogen derivatives: a) 3-chlorohexane; b) 2-chloropentane; c) 3-chloropentane. In which case, we should expect the formation of a mixture of isomeric alkenes and why? Name produced hydrocarbons.

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- Write reaction schemes for oxidation of hydrocarbon  $C_{21}H_{44}$  normal structure: a) with an excess of  $O_2$  (combustion reaction); b) by action of limited amount of oxidant -for synthesis of carboxylic acids (one of the possible reaction). Write a similar reaction for normal hydrocarbon  $C_{25}H_{52}$ .
- Write the reactions under the action of a single molecule of  $Br_2$  on: a) cyclopropane; b) cyclopentene; c) cycloheptane; d) 1,3-cyclohexadiene. Explain feature of the reaction in the case of (d).
- What most simple haloalkyls can be taken to obtain by Wurtz reaction of the hydrocarbons : a) 2,2,4-trimethylpentane; b) 2,4-dimethylhexane? Write in each case the main (target), and side reactions. Name haloalkyls and hydrocarbons resulting from side reactions.

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- Write a dehydrogenation reaction (with subtraction of one molecule of hydrogen) for: a) ethane; b) isobutane; c) butane; d) 2-methylbutane.
- What hydrocarbons produced in the Wurtz synthesis if sodium metal will act on a mixture of alkyl halides of 2-iodopropane, and 2-methyl-2-iodobutane? Write a reaction scheme and name the resulting hydrocarbons according to IUPAC nomenclature.
- Write structural formulas of hydrocarbons: a) 3,4-dimethylhex-3-ene; b) 2-methyl-3-ethylpent-2-ene. Specify hydrocarbons, which can be geometric isomers. Write a formula corresponding geometric isomers and name them according to IUPAC nomenclature.

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- What is the essence of hydrocarbon cracking? Write reaction schemes possible to form the cracking products: a) n-butane; b) n-hexane.
- From which bromo or iodo derivatives the hydrocarbons may be prepared by the Wurtz reaction: a) 4,5-dimethyl octane; b) 2,3,4,5-tetramethyl hexane; c) 3,3,4,4-tetramethyl hexane; g) octane? Write a reaction scheme. Name starting haloalkanes according to IUPAC nomenclature.
- Write structural formulas of hydrocarbons: a) 2,5-dimethyl-2-hexene; b) 2,3-dimethyl-1-pentene. Specify hydrocarbons, which can be geometric isomers. Explain why for some of the above compounds, geometric isomerism is not possible.

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- Write a reaction scheme sequential bromination of methane. Specify the conditions under which such reactions are possible. Name all the bromo derivatives which may be formed at the same time.
- What is the structure of the hydrocarbon  $C_8H_{18}$  if:
  - it may be obtained by the Wurtz method from primary haloalkyl as the sole product of the reaction;
  - the nitration of this hydrocarbon in Kononov reaction the tertiary nitro derivative was formed?
- Write reaction schemes and select conditions for the hydrogenation following hydrocarbons: a) 2-methylpent-2-ene; b) 2,4-dimethylpent-2-ene; c) 2,4-dimethylhex-3-ene. Name formed hydrocarbons.

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- Using a simplified structural formulas, draw all isomeric hydrocarbons for: a)  $C_5H_{12}$  (five isomers); b)  $C_4H_8$  (three isomers). Indicate which isomers differ in the structure of the carbon skeleton, and what the position of the double bond.
- Write empirical formulas: a) pentene; b) octene. Write all relevant isomers.
 

What are the isomers of: a) ethanol; b) propanol; c) butanol; d) aspirin? Name compounds according to IUPAC nomenclature.
- Write the formulae and provide names of all alkanes in the hydrogenation of which 2,2,4-trimethyl pentane (isooctane) can be obtained. Write the equations of the corresponding reactions.

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

1. Create schemes for following transformation:  
**Methane** → **Acetylene** → **Acetaldehyde**
2. Write the empirical formula of the alkene with the six carbon atoms. Output all isomeric hydrocarbons of this Mol. formula (thirteen) and name each according to IUPAC nomenclature.  
Why alkenes are more reactive than alkanes?
3. Write reaction schemes of stepwise hydrocarbon hydrogenation for:  
a) 3-methylbut-1-yne; b) 2,5-dimethylhex-1-yne. Name formed hydrocarbons according to IUPAC nomenclature.  
What are the isomers of: a) ethylacetate; b) pentanol; c) ethylbenzene; d)  $C_7H_{12}$  ?

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

1. What is the primary and side products of the following reaction:



Name resulting compounds according to IUPAC nomenclature.

2. Write structural formulae of hydrocarbons: a) 4,4-dimethylpent-2-ene; b) 3-methylpent-1-yne; c) 2,6-dimethylhept-3-yne; g) 2,2,5,5-tetramethylhex-3-yne.
- Write structural formulae of 2-Methylpent-3-en-1-ol and its isomers.
3. Write the reactions of addition: a) hydrogen bromide to propene; b) hydrogen chloride to 2,4,4-trimethylpent-2-ene. Name resulting compounds and explain each reaction.

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

1. Write all isomeric alkynes with Mol. formula: a)  $C_5H_8$  ; b)  $C_4H_6$  . Name them. Explain electronic structure of the triple bond.
- Write structural formula the geometric isomers of 1-methyl-2-ethylcyclobutane. Name isomers according to IUPAC nomenclature.
2. Write formulae of the following hydrocarbons and give each the name according to IUPAC nomenclature: a) 5-methyl-3-heptene; b) 4,4-dimethyl-2-pentene; c) 2,3,3-trimethyl-1-butene; g) 2,5-dimethyl-3-heptene; d) 2,4-dimethyl-1-pentene.
3. Write the reaction for the action: a) bromine on 3-methylbut-1-ene; b) chlorine on 2,3-dimethylbut-2-ene. Name resulting compounds. Which of these reactions is used as a testing reaction for the presence of unsaturation and why?

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

1. a) There are four constitutional isomers having Mol. formula  $C_4H_9Cl$  . Write formulae with correct IUPAC names for of these isomers.  
b) A primary carbon atom is bonded to only 1 other carbon atom. What is a carbon atom bonded to 4 distinct groups called?
2. Determine structure of alkene if ozonide of which during the hydrolysis forms of acetone ( $CH_3)_2C=O$  and propionaldehyde  $CH_3CH_2CH=O$ . Create a ozonolysis reaction equation and name alkene.
3. A  $C_6H_{12}$  compound reacts with ozone to yield a single  $C_3H_6O$  product. Gas phase free radical bromination of the hydrocarbon gives a single  $C_6H_{11}Br$  product. A likely identification of this compound is ..

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- Write structural formulas of two closest homologues of heptane having in the molecule: a) two tertiary carbon atoms; b) one quaternary carbon atom.
- Write a formula 2,2,5,5-tetramethylhexane. Write a formula its isomer having as substituents on the main chain only ethyl radicals. Create a equation for the reaction obtaining from the corresponding halogenated derivatives: a) methylcyclopropane; b) 1,2-dimethylcyclobutane.
- Two  $C_4H_6$  isomers give the same  $C_4H_8O$  product from  $HgSO_4$  catalyzed hydration in aqueous acid. However, these isomers give different  $C_4H_6Br_4$  products with excess bromine. What are these isomeric hydrocarbons?

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- Two  $C_5H_8$  isomers undergo catalytic (Pt) hydrogenation to form the same  $C_5H_{10}$  product. On ozonolysis followed by oxidative workup with  $H_2O_2$ , one isomer gave a  $C_5H_8O_4$  diacid, while the other isomer gave a  $C_5H_8O_3$  ketoacid. Which of the following isomeric pairs correspond to this evidence?
- Homologues are not: a) cyclopentane and cyclohexane; b) butene and pentene; c) propane and cyclopropane; g) ethane and hexane. Write structural formulas of these substances.
- Write the reactions and name the product obtained by fusion with alkali the following acids:  
a)  $CH_3CH_2COOH$ ; b)  $(CH_3)_2CHCOOH$

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- What is the formula of the carboxylic acid from the sodium salt of which isobutane can be obtained? Create a the reaction equation. There are several constitutional isomers having Mol. formula  $C_4H_{10}O$ . Write formulae with correct IUPAC names for of these isomers.
- Gas produced by the complete combustion of 0.1 mol saturated hydrocarbon was passed through an excess of lime water, and 60 g of sediment was dropped. Determine the molecular formula and structure of the paraffinic hydrocarbon, if it is known that it contains one quaternary carbon atom.
- Write the equations of reactions that can be used to carry out the transformation: 1–Bromopropane  $\rightarrow$  2–Bromopropane

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- Write the reactions of alkene synthesis from the following compounds:  
a) 2-bromo-2-methylbutane; b) 3-chloro-2,3-dimethylhexane; c) 1,2-dibromopentane; g) isobutyl alcohol. Name obtained alkenes.
- Write the equations of reactions that can be used to carry out the transformation:  

$$CH_2=CH-CH-CH_3 \longrightarrow CH_3-CH=C-CH_3$$

|  
CH<sub>3</sub>

|  
CH<sub>3</sub>
- Write the structural formula of acetylene and diene hydrocarbons with Mol. formula  $C_5H_8$  (7 isomers) and name them according to IUPAC nomenclature.

## Organic Chemistry Control Questions 1. Variant № 21

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- Determine the structure of the alkene, which in the oxidation with a chromate mixture forms two ketones:  
 $\text{CH}_3-(\text{CH}_3)\text{C}=\text{O}$  and  $\text{CH}_3\text{CH}_2-(\text{CH}_3)\text{C}=\text{O}$  Create the reaction equation. Name all of the compounds.
- Reaction of 3,3,6,6-tetramethyl-1,4-cyclohexadiene, first with excess aq. mercuric acetate, then followed by  $\text{NaBH}_4$  reduction, produces a mixture of isomeric  $\text{C}_{10}\text{H}_{20}\text{O}_2$  alcohols. Excluding enantiomers, how many isomeric products may be formed in this reaction?
- Write structural formulas of hydrocarbons: isobutyl acetylene; diisopropylacetylene; methyl-sec-butylacetylene; ethyl tert-butylacetylene; 2,5-dimethylhex-3-yne; 2-methylhexa-1,4-diene; 2-methyl-3-ethylpenta-1,3-diene.

## Organic Chemistry Control Questions 1. Variant № 22

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- Perform the transformation and name all the intermediate products of the reactions:  
1-bromo-3-methylbutane  $\rightarrow$  2-methylbut-2-ene.
- What can be reactions to distinguish pentane, pent-1-ene and pent-1-yne? Write the reaction equations.
- Write the reactions of interaction 2-methyl-1,3-butadiene and 3-methyl-1,2-pentadiene: a) with two molecules of  $\text{Br}_2$  ; b) with two molecules of  $\text{HBr}$ ; a) with two molecules of  $\text{H}_2$  .  
Write the equations in stages: addition of one molecule of the reagent, and then the addition of the other reactant molecules. Name all the intermediate and final reaction products.

## Organic Chemistry Control Questions 1. Variant № 23

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- $\text{C}_6\text{H}_{10}$  hydrocarbon forms an insoluble silver salt when treated with silver nitrate in ethanolic ammonia. Acid catalyzed hydration with a  $\text{HgSO}_4$  catalyst generates a single  $\text{C}_6\text{H}_{12}\text{O}$  ketone, and permanganate oxidation yields a  $\text{C}_5\text{H}_{10}\text{O}_2$  carboxylic acid. This compound is most likely which of the following?
- Which of the following compounds react with ammonia solution of silver oxide: a) ethylacetylene; b) 2-butyne; c) 4-methylpent-2-yne; g) methyl-isopropylacetylene; d) 3,3-dimethylpent-1-yne? Write the reactions and name the reaction products.
- Write structural formula the geometric isomers of 1-methyl-2-ethylcyclobutane. Name isomers according to IUPAC nomenclature.

## Organic Chemistry Control Questions 1. Variant № 24

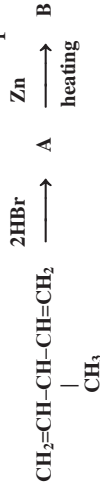
Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- $\text{C}_8\text{H}_{14}$  hydrocarbon (X) is reduced by sodium in liquid ammonia to a single  $\text{C}_8\text{H}_{16}$  product (Y). Both of these compounds undergo hydrogenation (Pt catalyst) to give 2,5-dimethylhexane. Ozonolysis of Y with an oxidative workup produces a single  $\text{C}_4\text{H}_8\text{O}_2$  carboxylic acid. Reaction of Y with perbenzoic acid ( $\text{C}_6\text{H}_5\text{CO}_3\text{H}$ ) gives a chiral  $\text{C}_8\text{H}_{14}\text{O}$  product, but reaction with bromine gives an achiral  $\text{C}_8\text{H}_{14}\text{Br}_2$  product. What are X and Y?
- Write the reaction equations that can be used to carry out the transformation: 1-Bromobutane  $\rightarrow$  2-Bromobutane
- Create a equation for the reaction obtaining from the corresponding halogenated derivatives: a) methylcyclopropane; b) 1,2-dimethylcyclobutane.

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- Write the reactions of obtaining of cycloparaffins from the following compounds: a) 1,4-dibromo-2,3-dimethylbutane; b) 1,3-dichloropentane; c) calcium salt of suberic acid  $\text{HOOC}-(\text{CH}_2)_6-\text{COOH}$ . Name derived hydrocarbons according to IUPAC nomenclature.
- What hydrocarbons produced by the action of sodium metal on halogenated derivatives in conditions of Wurtz synthesis: a) 2-methyl-2-iodopropane; b) 2-bromobutane? Write a reaction scheme and name the resulting hydrocarbons.

- Write the equations of reactions of the following hydrocarbons conversion and name obtained compounds:



- The mixture of two alkenes was subjected to successive oxidation with aq. potassium permanganate, then was reacted with HBr, then an alcoholic solution of KOH, then was subjected exhaustive hydrogenation and then heating with aluminum chloride. What alkenes were taken, if only isobutane was obtained?
- Create structural formulas and name according to IUPAC nomenclature the isomers of cycloalkanes with Mol. formula  $\text{C}_6\text{H}_{12}$  which contain three-membered ring (6 isomers).

- Write the equations of reactions that can be used to carry out the transformation:



Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- The IUPAC name for  $(\text{CH}_3)_2\text{CHCH}(\text{CH}_3)\text{CH}_2\text{CH}=\text{CH}_2$  is ...  
Perform the transformation and name all the intermediate products of the reactions: 1-bromo-3-methylbutane  $\rightarrow$  2-methylbut-2-ene.
- Which of the following compounds contains one secondary and one tertiary carbon atom? Name the hydrocarbons according to IUPAC nomenclature:  
a)  $(\text{CH}_3)_3\text{C}-\text{CH}_2-\text{CH}_3$ ; b)  $(\text{CH}_3)_2\text{CH}-\text{CH}_2-\text{CH}_3$ ; c)  $(\text{CH}_3)_2\text{CH}-\text{C}(\text{CH}_3)_3$
- Write the equations of reactions of isopropyl acetylene with: a) bromine water; b) HCl; c) HCN; g) with water in the presence of mercury salts; d) with copper monochloride. Name the reaction products according to IUPAC nomenclature.

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- The mixture of two alkenes was subjected to successive oxidation with aq. potassium permanganate, then was reacted with HBr, then an alcoholic solution of KOH, then was subjected exhaustive hydrogenation and then heating with aluminum chloride. What alkenes were taken, if only isobutane was obtained?

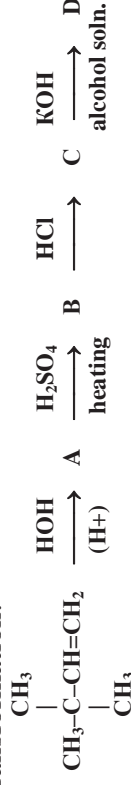
- Create structural formulas and name according to IUPAC nomenclature the isomers of cycloalkanes with Mol. formula  $\text{C}_6\text{H}_{12}$  which contain three-membered ring (6 isomers).

- Write the equations of reactions that can be used to carry out the transformation:



Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

- A mixture of ethane and one from butynes was passed through an ammonia soln of silver oxide, followed by  $\text{Br}_2/\text{H}_2\text{O}$  soln. What butyne was in the mixture if : a)  $\text{Br}_2/\text{H}_2\text{O}$  was not discolored; b)  $\text{Br}_2/\text{H}_2\text{O}$  was discolored? Answers confirm with equations of reactions.
- Create structural formulas of the compounds: a) 1,3-dimethyl-2-ethylcyclopentane; b) 1-methyl-4-isopropylcyclohexane (menthane); c) 1,2-dimethylcyclohex-1-ene; g) 1-methylcyclopenta-1,3-diene.
- Write the equations of reactions that can be used to carry out the transformation:



**Organic Chemistry Control Questions 1. Variant № 29**

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

1. What are the isomers of: a) ethanol; b) propanol; c) butanol; d) aspirin?  
Ethanol (ethyl alcohol), ester, and acetic acid contain both carbon and hydrogen atoms, but are they hydrocarbons?
2. When ethene (ethylene) undergoes a chemical reaction with water in the presence of sulfuric acid, it produces a compound (A). What exactly is the compound (A)?  
What is the formula of the carboxylic acid from the sodium salt of which isobutane can be obtained? Create a the reaction equation.
3. A primary carbon atom is bonded to only 1 other carbon atom. What is a carbon atom bonded to 4 distinct groups called?

**Organic Chemistry Control Questions 1. Variant № 30**

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

1. What are the isomers of: a) acetone; b) 2-methyl-propanol; c) butanone; d)  $C_5H_{10}$ ?  
A primary carbon atom is bonded to only 1 other carbon atom. What is a carbon atom bonded to 4 other carbon atoms called?
2. When ethanol (ethyl alcohol) undergoes a reaction with acetic acid, it produces an ester and a compound (B). What is the name of the compound (B)?
3. Write and explain the addition reaction in presence of concentrated sulfuric acid for hydrocarbons: a) ethene; b) 2-methyl-2-butene. What are the products of the reaction? Name each compound according to IUPAC nomenclature.

**Organic Chemistry Control Questions 1. Variant № 31**

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

1. Which of the following compounds will exhibit geometrical isomerism: a) 1-Phenyl-2-butene; b) 3-Phenyl-1-butene; c) 2-Phenyl-1-butene; d) 1,1-Diphenylprop-1-ene? Write the structural formulae.
2. Write structural formulas of two closest homologues of heptane having in the molecule: a) two tertiary carbon atoms; b) one quaternary carbon atom.  
When an alcohol is exposed to an strong acid, what is the first thing that always happens?
3. Subject secondary butyl alcohol to dehydration. Write the reactions of product interaction with: a) bromine water; b) ozone. Name all the compounds obtained.

**Organic Chemistry Control Questions 1. Variant № 32**

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

1. Write the reactions of obtaining the corresponding dibromo alkanes from the following compounds: a) ethylacetylene; c) ethyl isopropyl acetylene; b) 2,3-dimethylbuta-1,3-diene; g) penta-2,4-diene.
2. Write the reactions of interaction 2-methyl-1,3-butadiene and 3-methyl-1,2-pentadiene: a) with two molecules of  $Br_2$ ; b) with two molecules of  $HBr$ ; a) with two molecules of  $H_2$ . Write the equations in stages: addition of one molecule of the reagent, and then the addition of the other reactant molecules. Name all the intermediate and final reaction products.
3. Create the structural formulae and name the isomers with different positions of the double bond of the compounds: a) methylcyclobutyl; b) methylcyclopentene; c) methylcyclohexene.



**Organic Chemistry Control Questions 1. Variant № 33**

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

1. Write the reaction equations obtaining of the relevant dihalogen derivatives: a) methylcyclopropane; b) 1,2-dimethylcyclobutane. Write structural formulas of 2-Methyl-2-phenylbutane and its isomers.
2. Write empirical and structural formulas of the following hydrocarbons: a) 2,2-dimethylhexane; b) 2,3-dimethyl-3-ethylhexane; c) 2,3,4-trimethylpentane; g) 2,5-dimethyl-3,3-diethylhexane; d) 2,2,3,4-tetramethylhexane; e) 2,4,4,5-tetraethylheptane.
3. Write the reactions of interaction of alpha-pinene: a) with one molecule of chlorine; b) with hydrogen bromide.  
What is the mechanism of electrophilic addition reaction of alkenes?

**Organic Chemistry Control Questions 1. Variant № 34**

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

1. Obtain cyclohexene from cyclohexane and write the equation reactions of cyclohexene: a) with one molecule of chlorine; b) with a solution of potassium permanganate.
2. How many carbon atoms must be present in an alkane for the molecule to show structural isomerism?
- Which of the following compounds will exhibit geometrical isomerism: a) 1-Phenylbut-2-ene; b) 3-Phenylbut-1-ene; c) 2-Phenylbut-1-ene; (d) 1,1-Diphenylprop-1-ene?
3. What is the general term used to describe an alkane in a ring structure? Write formulae six first members of this group.

**Organic Chemistry Control Questions 1. Variant № 35**

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

1. What are endothermic and exothermic reactions?  
When ethene (ethylene) undergoes a chemical reaction with water in the presence of sulfuric acid, it produces a compound (A). What exactly is the compound (A)?
2. As cycloalkanes are a homologous series, what is the general formula for a cyclic alkane?  
Write structural formulae of geometrical isomers of 2-methyl-1-ethylcyclobutane and 4-methyl-1-ethylcyclohexane. Name the isomers.
3. Write the reaction equations obtaining of the relevant dihalogen derivatives: a) methylcyclopropane; b) 1,2-dimethylcyclobutane.

**Organic Chemistry Control Questions 1. Variant № 36**

Alkanes, c-Alkanes, Alkadienes, Alkenes, Alkynes.

1. Obtain cyclohexene from cyclohexane and write the equation reactions of cyclohexene: a) with one molecule of chlorine; b) with a solution of potassium permanganate; c) with hydrogen bromide, d) with water in presence of acid.
2. Write scheme of polymerization: a) propylene; b) 4-methylpent-1-ene. What are the name of resulting polymers? What is differences in the structures of their chains? Specify the polymerization conditions for mentioned hydrocarbons.
3. Write the reactions of interaction of alpha pinene: a) with one molecule of chlorine; b) with hydrogen bromide; c) with hydrogen bromide, d) with water in presence of acid.