

## BUSINESS PLAN INNOVATIVE PROJECT

Development of technology for isotope labeling of nucleosides

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Nizhny Novgorod 2021

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# Introduction

## Project name

Development of technology for isotope labeling of nucleosides.

## Business name

NOTE: Heavy Nucleosides LLC, the working name of the future startup, has not yet been registered.

## Distribution of authorized capital

The authorized capital of Heavy Nucleosides LLC is distributed in a ratio of 51% owned by the founders and 49% - by investors involved at the stage of project acceleration.

## Information about the location, legal address

Depends on the accelerator

## Project site

<https://sites.google.com/view/bio-isotope-cloud>

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# The field of activity of the enterprise, types of products and / or services provided

The main activity of the company is the development of software and hardware for nuclear medicine and biotechnology to order, as well as modification and adaptation of third-party hardware and software, the development of robotic systems and IoT systems. The developed products are used for the production of radioactive isotopes for biotechnology labeled with radioactive isotopes of biological materials.

## SCIENTIFIC COMPONENT OF AN INNOVATIVE PROJECT

In connection with the growth of biotechnological, chemical, pharmacological, materials science (nanotechnology) research, the demand for tools and consumables used in research and production is growing. Isotope labeling is one of the widespread research methods.

Isotope labeling is a technique used to track the passage of an isotope (an atom with detectable variations in the number of neutrons) through a reaction, metabolic pathway, or cell. A reagent is "labeled" by replacing its specific atoms with an isotope. The reagent is then allowed to react. The position of isotopes in foods is measured to determine the sequence in which an isotopic atom follows in a reaction, or the metabolic pathway of a cell. Nuclides used in an isotopic label can be stable or unstable - radionuclides. In the latter case, the marking is called a radioactive label.

In isotopic labeling, there are several ways to detect the presence of labeled isotopes; through their mass, normal vibrations or radioactive decay. Mass spectrometry detects the difference in the mass of the isotope, while infrared spectroscopy detects the difference in the vibrational modes of the isotope. Nuclear magnetic resonance detects atoms with different gyromagnetic ratios. Radioactive decay can be detected using an ionization chamber or gel autoradiography.

An example of the use of isotopic labeling is the study of phenol ( $C_6H_5OH$ ) in water by replacing ordinary hydrogen with deuterium (deuterium labeling). When phenol is added to heavy water (water containing  $D_2O$  in addition to regular  $H_2O$ ), deuterium is substituted for hydrogen in the hydroxyl group of phenol (resulting in  $C_6H_5OD$ ), indicating that phenol easily enters into hydrogen-water exchange reactions. Only the hydroxyl group is affected, indicating that the other 5 hydrogen atoms are not involved in exchange reactions.

### Isotope indicator

Isotopic markers or isotopic labels are used in chemistry and biochemistry to help understand chemical reactions and interactions. In this technique, one or more of the atoms in the molecule of interest is replaced with an atom of the same chemical element but a different isotope (eg, a radioactive isotope used in radioactive tracing). Since a labeled atom has the same number of protons, it will behave in much the same way as its unlabeled counterpart and, with a few exceptions, will not interfere with the reaction under study. However, the difference in the number of neutrons means that it can be detected separately from other atoms of the same element.

Nuclear magnetic resonance (NMR) and mass spectrometry (MS) are used to study the mechanisms of chemical reactions. NMR and MS reveal isotopic differences, which makes it possible to determine information about the position of labeled atoms in the structure of products. Having information about the arrangement of isotopic atoms in products, it is possible to determine the reaction path that the initial

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metabolites use to convert into products. Radioactive isotopes can be checked with a gel autoradiograph in gel electrophoresis. The radiation emitted by compounds containing radioactive isotopes darkens a piece of photographic film, registering the position of the labeled compounds relative to each other in the gel. Isotope tracers are usually used in the form of isotope ratios. By studying the ratio between two isotopes of the same element, we avoid effects related to the total abundance of the element, which usually overlap much smaller variations in isotope abundance. Tracers are some of the most important tools in geology because they can be used to understand the complex mixing processes in earth systems. Further discussion of the application of isotope tracers in geology is contained in the section on isotope geochemistry.

Tracer isotopes generally fall into two categories: stable isotope indicators and radiogenic isotope indicators. Stable isotope indicators include only non-radioactive isotopes and are usually mass-dependent. In theory, any element with two stable isotopes can be used as an isotopic indicator. However, the most commonly used indicators of stable isotopes include relatively light isotopes that are readily fractionated in natural systems (isotope signature). A radioactive isotope tracer includes an isotope resulting from radioactive decay, which is usually in proportion to non-radioactive ones.

## Stable isotope labeling

Stable isotope labeling involves the use of non-radioactive isotopes, which can act as indicators used to model several chemical and biochemical systems. The selected isotope can act as a label on this compound, which can be identified using nuclear magnetic resonance (NMR) and mass spectrometry (MS). Some of the most common stable isotopes are H<sub>2</sub>, C<sub>13</sub> and N<sub>15</sub>, which can be further converted to NMR solvents, amino acids, nucleic acids, lipids, general metabolites, and cell growth media. Compounds obtained using stable isotopes are determined either by the percentage of labeled isotopes (i.e. 30% of homogeneously labeled C<sub>13</sub> glucose contains a mixture 30% labeled with a C<sub>13</sub> carbon isotope and 70% natural C<sub>12</sub> carbon) or by specially marked carbon positions per compound ( i.e. 1-C<sub>13</sub> glucose, which means that the first glucose position is C<sub>13</sub>).

Let us consider the sequence of reactions borrowed from the glycolysis and pentose phosphate pathways, in which the labeled carbon isotope is rearranged to different carbon positions throughout the reaction network.

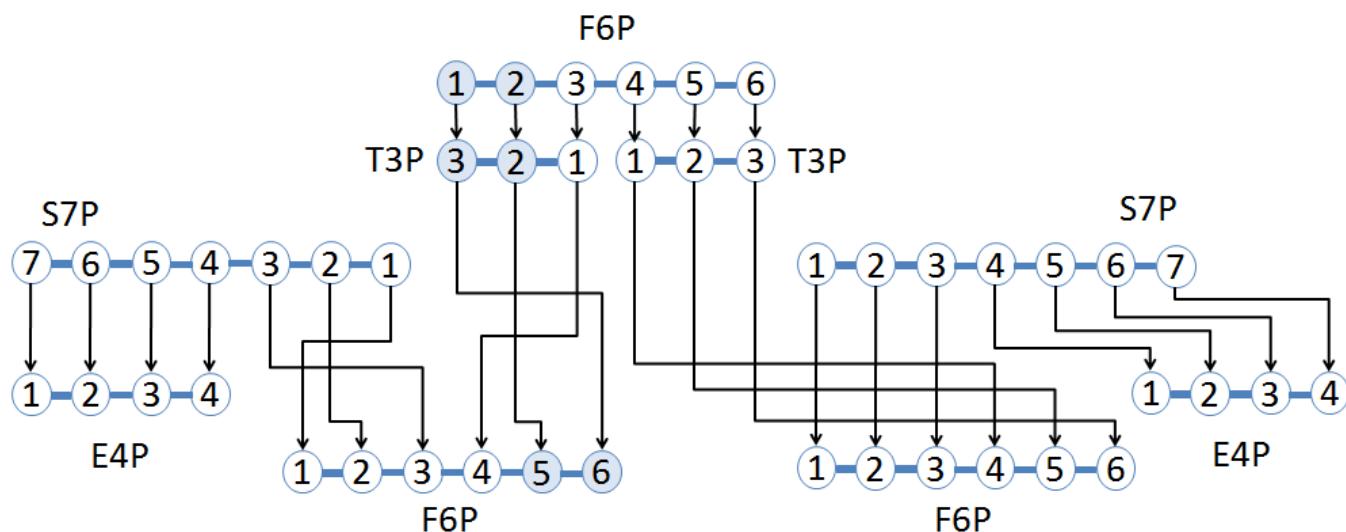


Figure 1 - An example of using a stable isotope tag to detect rearrangement of carbon atoms by reactions using position-specific labeled compounds.

The sequence starts with fructose-6-phosphate (F6P), which has 6 carbon atoms labeled with <sup>13</sup>C at carbon positions 1 and 2. 1,2-C<sub>13</sub> F6P converts to two glyceraldehyde-3-phosphate (G3P), one 2,3 - C<sub>13</sub> T3P and one unmarked T3P. 2,3-C<sub>13</sub> T3P can now be reacted with sedoheptulose 7-phosphate (S7P) to

form unlabeled erythrose 4-phosphate (E4P) and 5,6-C13 F6P. Unlabeled T3P will react with S7P to synthesize unlabeled products.

## Meselson-Stahl experiment

The Meselson-Stahl experiment illustrates not only a variant of the research approach, but also the need for isotopic production when using this biotechnological tool.

Meselson and Stahl conducted their famous DNA replication experiments using *E. coli* bacteria as a model system. They began by growing *E. coli* in a nutrient medium containing the "heavy" nitrogen isotope N15. When grown in this medium, the bacteria absorbed nitrogen and used it to synthesize new biological molecules, including DNA.

After many generations of cultivation in N15 media, the nitrogenous bases of bacterial DNA were labeled with heavy N15. The bacteria were then transferred to a medium containing the N14 isotope and allowed to grow for several generations. The DNA created after the switch must include the N14 isotope, as that would be the only nitrogen available for DNA synthesis.

Meselson and Stahl knew how often *E. coli* cells divide, so they were able to collect small samples in each generation, extract and purify DNA. They then measured the DNA density (and indirectly, the N14 and N15 isotopes) using density gradient centrifugation. This method separates molecules such as DNA into strips by rotating them at high speed in the presence of another molecule, such as cesium chloride, which forms a density gradient from the top to the bottom of the rotating tube. Density gradient centrifugation allows for very small differences - for example, between N14 and N15 labeled DNA, but sufficient for detection.

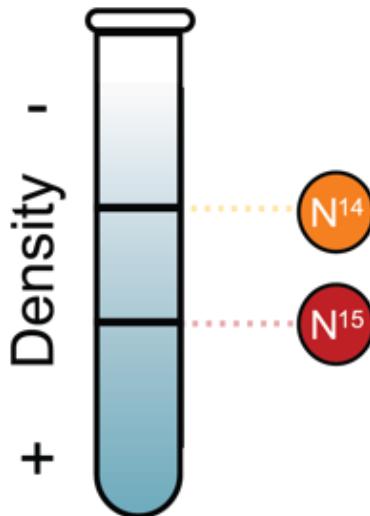


Figure 2 - Principle of determination of isotopes by density

When analyzing the DNA of the first four generations of *E. coli*, a band pattern was obtained, shown in the figure below:

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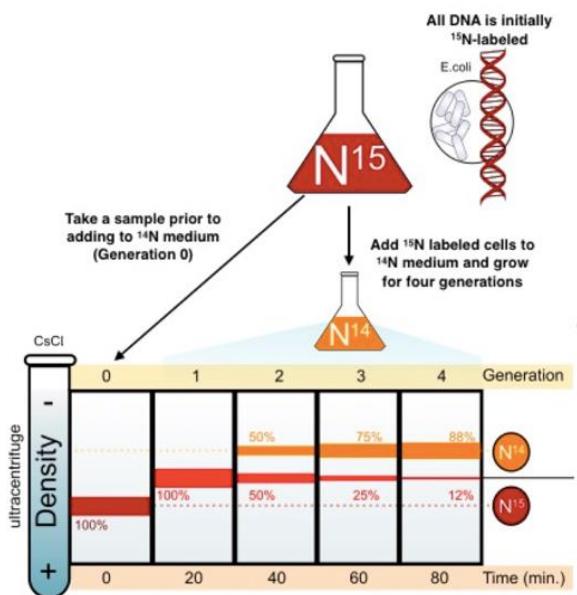


Figure 3 - Analysis of the results of the Meselson-Stahl experiment

Based on this historical experiment, Meselson and Stahl concluded that DNA replicates semi-conservatively. The structure of two separate bands - one at the position of the hybrid molecule and one at the position of the light molecule - is exactly what is expected from semi-conserved replication (as shown in the diagram below).

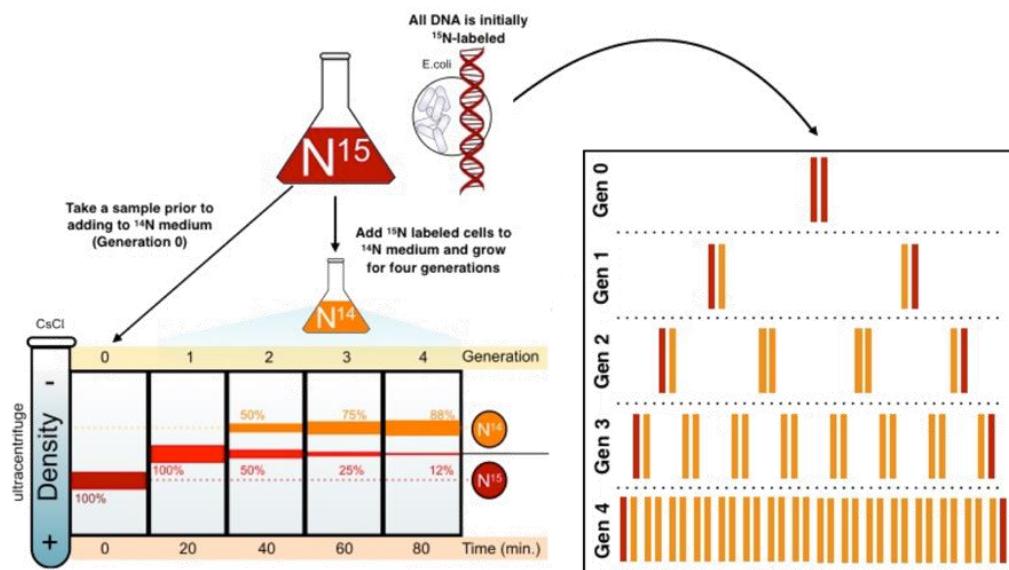


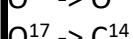
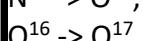
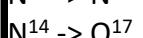
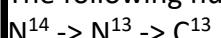
Figure 4 - Analysis of the results of the Meselson-Stahl experiment

## Overall needs assessment

As shown in the examples above, biotechnology researchers need isotopes as labels.

We conducted a market analysis and identified the most commonly performed type of experiment - isotopic DNA labeling. For this method, there is a demand for isotopes O<sup>15</sup>, N<sup>15</sup>, C<sup>13</sup>.

The following nuclear reactions:



can be carried out in laboratory conditions using sources of ionizing radiation.

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There are source restrictions on nuclear reactions. In laboratory installations, sources produced by the State Corporation Rosatom of JSC "Isotope" can be used and, accordingly, only those reactions that are possible with available sources will be possible. If it is impossible to cooperate with Rosatom State Corporation, it is possible to purchase sources on the European or American market, and it is also possible to use sources from household appliances, for example, from fire alarm sensors.



## Theoretical justification

Nucleosides are the structural subunit of nucleic acids such as DNA and RNA. The nucleoside, consisting of a nitrogenous base, is pyrimidine (cytosine, thymine, or uracil) or purine (adenine or guanine), a five-carbon sugar that is ribose or deoxyribose. Nucleosides play an important role in intermediate metabolism, biosynthesis of macromolecules and transmission of cellular signals through interaction with purinergic receptors. In the medical field, several nucleosides are used as antiviral or anti-cancer agents. Several new nucleosides show a high degree of activity and selectivity against herpes viruses. Nucleosides are responsible for encoding, transmitting and expressing genetic information in all living things.

Nucleotides are the building blocks of nucleic acids, DNA and RNA. Nucleotides are composed of a nitrogenous base, five carbon sugar (ribose or deoxyribose), and at least one phosphate group. Thus, a nucleoside plus a phosphate group produces a nucleotide. The components used in the de novo synthesis of nucleotides are derived from biosynthetic precursors of carbohydrate and amino acid metabolism, as well as from ammonia and carbon dioxide. Nucleoside triphosphates (ATP, GTP, CTP and UTP) play a central role in cell metabolism. Defective nucleotides are one of the main causes of all types of cancer known today.

Certain nucleotides and nucleoside analogs inhibit reverse-transcriptase, an enzyme that controls the replication of the genetic material of the human immunodeficiency virus (HIV) and other retroviruses.

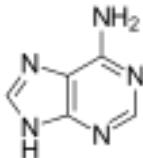
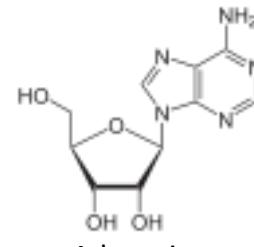
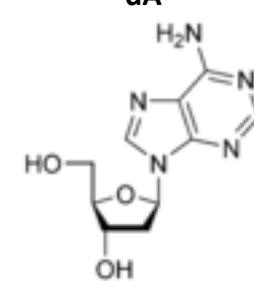
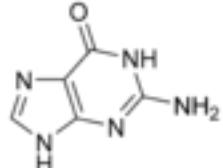
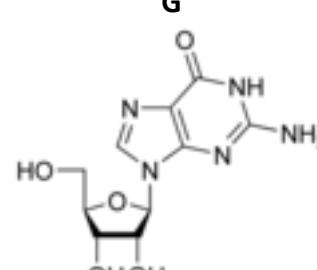
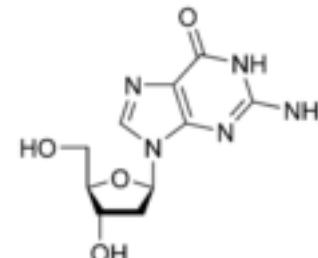
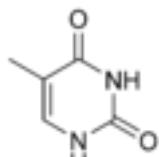
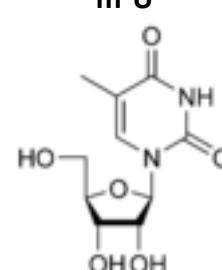
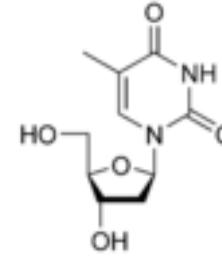
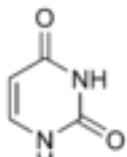
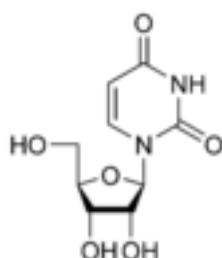
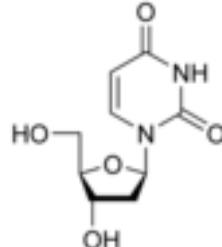
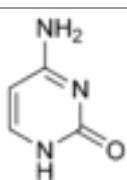
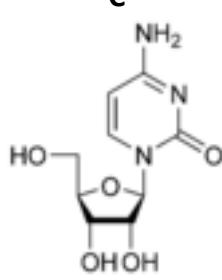
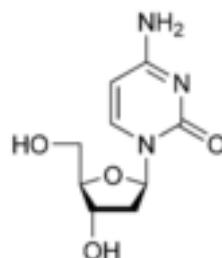
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Nitrogen base	Nucleoside	Deoxynucleoside
 Adenine	<b>A</b>  Adenosine	<b>dA</b>  Deoxyadenazine
 Guanine	<b>G</b>  Guanosine	<b>dG</b>  Deoxyguanosine
 Timin	<b>m<sup>5</sup>U</b>  5-Methyluridine	<b>dT</b>  Deoxythymidine
 Uracil	<b>U</b>  Uridine	<b>dU</b>  Deoxyuridine
 Cytosine	<b>C</b>  Cytidine	<b>dC</b>  Deoxycytidine

Isotope-labeled nucleosides are used in research works [2] "Most of the methods used to detect replication activity are based on the incorporation of modified nucleosides into replicated DNA and their subsequent detection. The first nucleoside markers used radioisotopes to label and detect

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them. Examples of such isotopically labeled nucleosides are N15-thymidine [3] and C14-thymidine [4-6]. This technology has shown that, for example, thymidine is a precursor of DNA, but not RNA [3]."

In 1957, Taylor and colleagues developed a method in which they used H3-thymidine to label replicated DNA in the root of a bean and autoradiography to detect it.

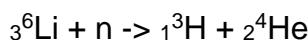
There are alternative methods of labeling, however "... the efficiency of phosphorylation and incorporation into DNA of nucleosides not labeled with isotopes is usually lower than in the case of nucleosides labeled with isotopes." [2]

The expansion of Meselson-Stahl research has led to the study of DNA-based stable isotopes, which allow the study of the relationship between metabolic function and the taxonomic identity of microorganisms in the environment without the need to isolate cultures. Proteins can be labeled by cultivating them in an isotopic environment.

If we look at the composition, we see that for marking we need isotopes of the elements: H, N, O, C.

## Nuclear reactions

### *Isotope of hydrogen – Tritium*



Tritium has a half-life ( $12.32 \pm 0.02$ ) years [7]

### *Nitrogen isotopes*

Символ нуклида	Z(p)	N(n)	Масса изотопа <sup>[1]</sup> (а. е. м.)	Период полураспада <sup>[2]</sup> (T <sub>1/2</sub> )
			Энергия возбуждения	
<sup>10</sup> N	7	3	10,04165	200 ис
<sup>11</sup> N	7	4	11,02609	590 ис
<sup>11m</sup> N			740 кэВ	690 ис
<sup>12</sup> N	7	5	12,0186132	11,000 мс
<sup>13</sup> N	7	6	13,00573861	9,965 мин
<sup>14</sup> N	7	7	14,0030740048	<b>стабилен</b>
<sup>15</sup> N	7	8	15,0001088982	<b>стабилен</b>
<sup>16</sup> N	7	9	16,0061017	7,13 с
<sup>17</sup> N	7	10	17,008450	4,173 с
<sup>18</sup> N	7	11	18,014079	622 мс
<sup>19</sup> N	7	12	19,017029	271 мс
<sup>20</sup> N	7	13	20,02337	130 мс
<sup>21</sup> N	7	14	21,02711	87 мс
<sup>22</sup> N	7	15	22,03439	13,9 мс
<sup>23</sup> N	7	16	23,04122	14,5 мс
<sup>24</sup> N	7	17	24,05104	52 нс
<sup>25</sup> N	7	18	25,06066	260 нс

Data are given in [8-9]

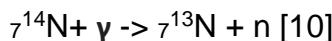
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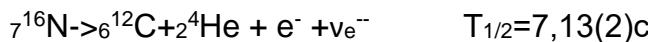
Natural nitrogen  ${}^7\text{N}$  consists of two stable isotopes:

- natural nitrogen  ${}^{14}\text{N}$  – 99,6%;
- nitrogen  ${}^{15}\text{N}$  – rest.

The rest of the isotopes can be obtained using nuclear reactions.



Decay modes [11]

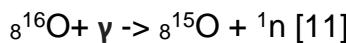


### Oxygen isotopes

Natural oxygen consists of three stable isotopes,  ${}^{16}\text{O}$ ,  ${}^{17}\text{O}$  and  ${}^{18}\text{O}$ , of which the isotope  ${}^{16}\text{O}$  is the most abundant (99.762%) oxygen isotope

Символ	Z(p)	N(n)	Масса изотопа (u)	Период полураспада	Спин	изотопный состав (мольная доля)		Диапазон природных изменений (мольная доля)
						энергия		
${}^{12}\text{O}$	8	4	12.034405(20)	$580(30) \times 10^{-24} \text{ с}$ [0.40(25) MeV]	0+			
${}^{13}\text{O}$	8	5	13.024812(10)	8.58(5) мс	(3/2-)			
${}^{14}\text{O}$	8	6	14.00859625(12)	70.598(18) с	0+			
${}^{15}\text{O}$	8	7	15.0030656(5)	122.24(16) с	1/2-			
${}^{16}\text{O}$	8	8	15.99491461956(16)	<b>стабилен</b>	0+	0.99757(16)	0.99738-0.99776	
${}^{17}\text{O}$	8	9	16.99913170(12)	<b>стабилен</b>	5/2+	0.00038(1)	0.00037-0.00040	
${}^{18}\text{O}$	8	10	17.9991610(7)	<b>стабилен</b>	0+	0.00205(14)	0.00188-0.00222	
${}^{19}\text{O}$	8	11	19.003580(3)	26.464(9) с	5/2+			
${}^{20}\text{O}$	8	12	20.0040767(12)	13.51(5) с	0+			
${}^{21}\text{O}$	8	13	21.008656(13)	3.42(10) с	(1/2,3/2,5/2)+			
${}^{22}\text{O}$	8	14	22.00997(6)	2.25(15) с	0+			
${}^{23}\text{O}$	8	15	23.01569(13)	82(37) мс	1/2#			
${}^{24}\text{O}$	8	16	24.02047(25)	65(5) мс	0+			
${}^{25}\text{O}$	8	17						
${}^{26}\text{O}$	8	18		< 40 нс				
${}^{27}\text{O}$	8	19		< 260 нс				
${}^{28}\text{O}$	8	20		< 100 нс				

Basic reactions:



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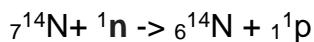
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### *Carbon isotope $^{14}\text{C}$*

Carbon has two stable isotopes,  $^{12}\text{C}$  and  $^{13}\text{C}$ . The content of these isotopes in natural carbon is 98.93% and 1.07%, respectively. There are also known 13 radioactive isotopes of carbon (from  $^{8}\text{C}$  to  $^{22}\text{C}$ ), of which one -  $^{14}\text{C}$  - occurs in nature (its content in atmospheric carbon is about 10-12%).

Символ изотопа	Z (p)	N (n)	Масса, а.е.м.	Период полураспада	Спин и чётность ядра	Содержание изотопа в природном элементе	Вариация содержания изотопа в природном элементе
$^{8}\text{C}$	6	2	8,037675(25)	$2,0(4)\times 10^{-21}$ с (ширина распада 230(50) кэВ)	$0^{+}$		
$^{9}\text{C}$	6	3	9,0310367(23)	126,5(9) мкс	$(3/2)^{-}$		
$^{10}\text{C}$	6	4	10,0168532(4)	19,290(12) с	$0^{+}$		
$^{11}\text{C}$	6	5	11,0114336(10)	20,334(24) мин	$3/2^{-}$		
$^{12}\text{C}$	6	6	12 по определению	<b>Стабилен</b>	$0^{+}$	0,9893(8)	0,98853-0,99037
$^{13}\text{C}$	6	7	13,0033548378(10)	<b>Стабилен</b>	$1/2^{-}$	0,0107(8)	0,00963-0,01147
$^{14}\text{C}$	6	8	14,003241989(4)	$5,70(3)\times 10^3$ лет	$0^{+}$		
$^{15}\text{C}$	6	9	15,0105993(9)	2,449(5) с	$1/2^{+}$		
$^{16}\text{C}$	6	10	16,014701(4)	0,747(8) с	$0^{+}$		
$^{17}\text{C}$	6	11	17,022586(19)	193(5) мкс	$(3/2)^{+}$		
$^{18}\text{C}$	6	12	18,02676(3)	92(2) мкс	$0^{+}$		
$^{19}\text{C}$	6	13	19,03481(11)	46,2(23) мкс	$(1/2)^{+}$		
$^{20}\text{C}$	6	14	20,04032(26)	16(3) мкс [ $14_{-5}^{+6}$ мкс]	$0^{+}$		
$^{21}\text{C}$	6	15	21,04934(54)	<30 нс	$(1/2)^{+}$		
$^{22}\text{C}$	6	16	22,05720(97)	6,2(13) мкс [ $6,1_{-12}^{+14}$ мкс]	$0^{+}$		
$^{23}\text{C}$	6	17					

In addition to stable isotopes of carbon, the radioactive isotope  $^{14}\text{C}$  (radiocarbon) is found in nature. It is formed by irradiation with  $^{14}\text{N}$  neutrons by the following reaction:



In addition to the nitrogen reaction,  $^{14}\text{C}$  can be formed upon neutron irradiation of the oxygen isotope  $^{17}\text{O}$  by the reaction:

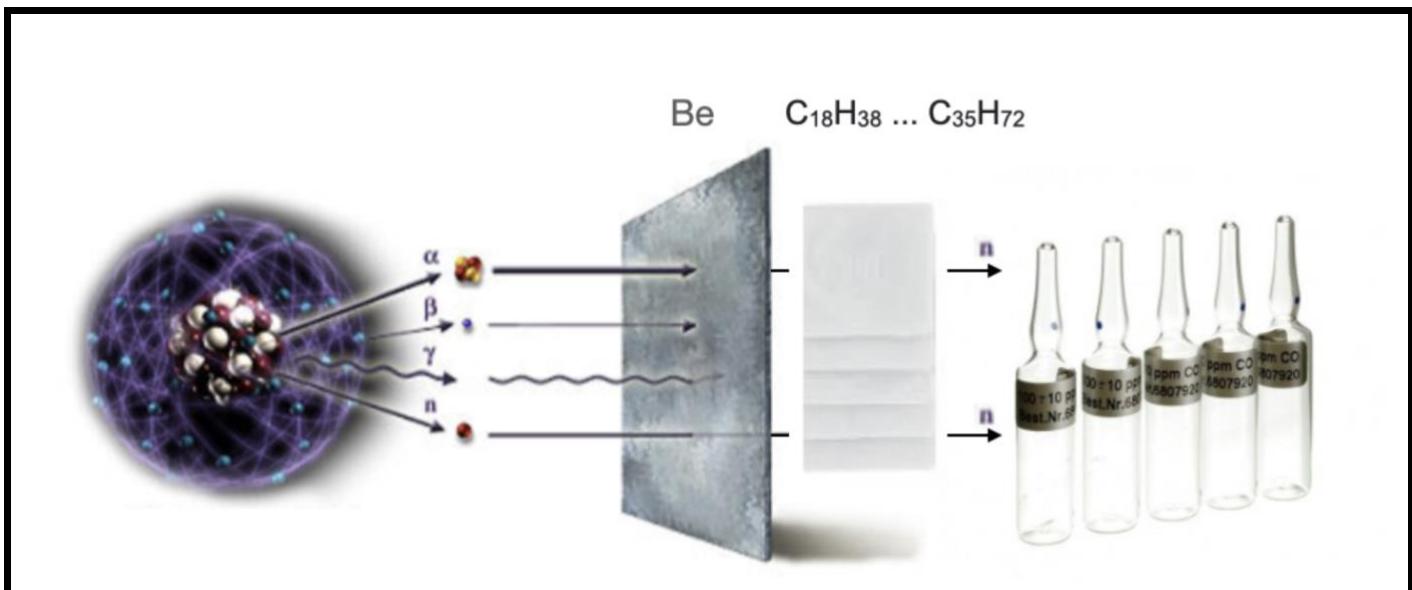
${}^8\text{O} + \text{n} \rightarrow {}_6^{14}\text{C} + \alpha$ , however, the content of  $^{17}\text{O}$  in the atmosphere is extremely low and this path of  $^{14}\text{C}$  formation is taken into account only in nuclear technologies.

## Marking methods

For the production of radioisotope labeling, you can use a laboratory installation with the following schematic diagram:

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Three types of marking are possible:

1. Irradiation of the nucleoside
2. Chemical substitution
3. Cultivation of biological culture in an isotopic environment

The last two methods are more laborious, since, in addition to compliance with radiation safety standards, requirements for chemical and biological protection are added, therefore the first method is promising - irradiation of nucleosides.

## Irradiation of nucleosides

The technological process is quite simple - we place the ampoule with the nucleoside into the neutron flux.

Objective of the study: to clarify the dependence of the release of labeled nucleosides on the flux intensity, type of radiation, radiation time, as well as the type of label H, N, O, C and the probability of release.

Nucleosides are commercially available, below was the cost of the supplier AlfaAesar by Thermo Fisher Scientific [12]

Some drugs are fluorogenic. Their use is valuable in that there are two ways to measure concentration - by isotope and by luminescence intensity, and if you use short-lived isotopes, it is also possible to determine the speed, provided that the fluorescent properties will not be lost during the decay of the label.

The obtained dependences will have commercial value, according to which it is possible to create technological processes for the production of radioisotope-labeled drugs for modern biotechnological research.

The scientific value of this area is the search for opportunities and options for using short-lived isotopes in biotechnological research.

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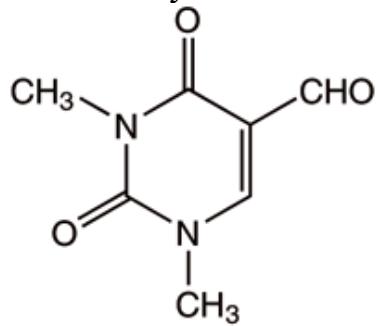
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# H50287 1,3-Dimethyluracil-5-carboxaldehyde



1,3-Dimethyluracil-5-carboxaldehyde [13]

## H50287 1,3-Dimethyluracil-5-carboxaldehyde, 96%

CAS Number 4869-46-9

Synonyms

5-Formyl-1,3-dimethyluracil

◆ SDS

◆ Certificate of Analysis

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H50287.MD	250mg	60.40	<input type="text"/>	
H50287.03	1g	214.00	<input type="text"/>	

◆ Add to Cart

Bulk/Specialty

Print Quote

◆ Product Overview

◆ Health & Safety

◆ Documentation

### Documents

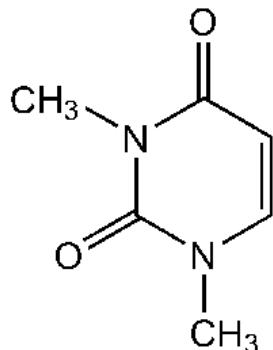
Product SDS

Certificate of Analysis

Инв.№	Подп. и дата
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						TH.YYY.001.БП1-1.М	Лист.
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# L19664 1,3-Dimethyluracil



L19664 1,3-Dimethyluracil [14]

## L19664 1,3-Dimethyluracil, 99%

CAS Number 874-14-6

Synonyms

SDS

Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
L19664.03	1g	38.30	<input type="text"/>	
L19664.06	5g	122.00	<input type="text"/>	

Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### 1,3-Dimethyluracil, 99%

MDL MFCD00038065  
EINECS 212-856-4

### Chemical Properties

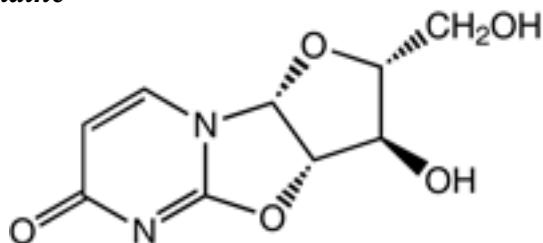
Formula C<sub>6</sub>H<sub>8</sub>N<sub>2</sub>O<sub>2</sub>  
Melting point 119-125°

Formula Weight 140.14  
Storage & Sensitivity Ambient temperatures.

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### H33038 2,2'-O-Cyclouridine



H33038 2,2'-O-Cyclouridine [15]

### H33038 2,2'-O-Cyclouridine, 98%

CAS Number 3736-77-4

Synonyms

2,2'-O-Anhydro-(1-beta-D-arabofuranosyl)uracil

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H33038.03	1g	26.00	<input type="text"/>	
H33038.06	5g	77.00	<input type="text"/>	

Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### 2,2'-O-Cyclouridine, 98%

MDL  
EINECS

MFCD00004945  
223-107-6

### Chemical Properties

Formula

Melting point

C<sub>9</sub>H<sub>10</sub>N<sub>2</sub>O<sub>5</sub>

248-251°

Formula Weight

Storage & Sensitivity

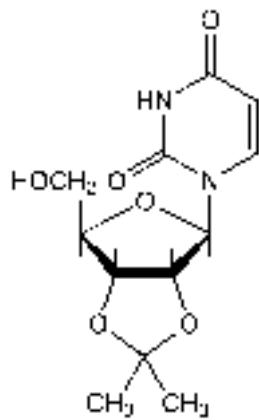
226.19

Store at -20°C.

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# L03686 2',3'-Isopropylideneuridine



L03686 2',3'-Isopropylideneuridine [16]

## L03686 2',3'-Isopropylideneuridine

CAS Number 362-43-6

Synonyms



Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

L03686.03

1g

41.80



L03686.06

5g

90.80



L03686.14

25g

248.00



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### 2',3'-Isopropylideneuridine

MDL

EINECS

MFCD00034509

206-647-7

### Chemical Properties

Formula

Melting point

C<sub>12</sub>H<sub>16</sub>N<sub>2</sub>O<sub>6</sub>

165-166°

Formula Weight

Storage & Sensitivity

284.27

Keep Cold.

Инв. №	Бланк. №	Инв. № дубл.	Подп. и дата

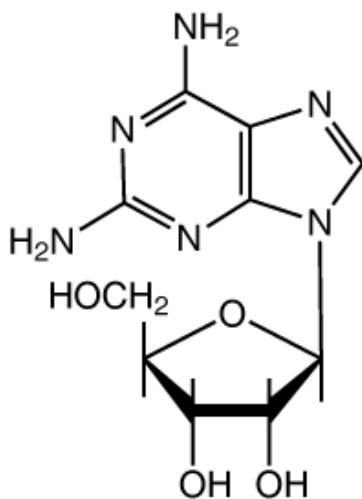
Изм.	Лист	№ докум.	Подп.	Дата

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Лист

19

## 44748 2-Aminoadenosine



44748 2-Aminoadenosine [17]

### 44748 2-Aminoadenosine, 97%

CAS Number 2096-10-8

Synonyms

2,6-Diaminopurine riboside



Certificate of Analysis

Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
44748.03	1g	42.60	<input type="text"/>	
44748.06	5g	165.00	<input type="text"/>	
44748.14	25g	564.00	<input type="text"/>	

Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### 2-Aminoadenosine, 97%

MDL

MFCD00053556

### Chemical Properties

Formula  
Form

C<sub>10</sub>H<sub>14</sub>N<sub>6</sub>O<sub>4</sub>  
Powder

Formula Weight  
Storage & Sensitivity

282.26  
Ambient temperatures.

Инв. № подл.	Годл. и дата	Взам.инв.№	Инв. № дубл.	Подл. и дата

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Лист

20

# A11166 2'-Deoxyadenosine monohydrate



A11166 2'-Deoxyadenosine monohydrate [18]

## A11166 2'-Deoxyadenosine monohydrate, 99%

CAS Number 16373-93-6

Synonyms

Adenine deoxyriboside  
9-(2-Deoxy-beta-D-  
ribofuranosyl)adenine

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
A11166.03	1g	38.30	<input type="text"/>	Q
A11166.06	5g	163.00	<input type="text"/>	Q
A11166.14	25g	752.00	<input type="text"/>	Q

◆ Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### 2'-Deoxyadenosine monohydrate, 99%

MDL MFCD00149364  
EINECS 213-488-7

### Chemical Properties

Formula C<sub>10</sub>H<sub>13</sub>N<sub>5</sub>O<sub>3</sub>•H<sub>2</sub>O  
Melting point 186-189°  
Solubility Soluble in water.

Formula Weight 269.26 (251.24anhy)  
Storage & Sensitivity Keep Cold.

2'-Деоксиаденозин используется некоторыми клетками в качестве источника энергии в условиях энергетического стресса и влияет на уровни ЦАМФ. 2' - Деоксиаденозин используется в сравнительных исследованиях функций аналогов аденоцина на различные биологические процессы.

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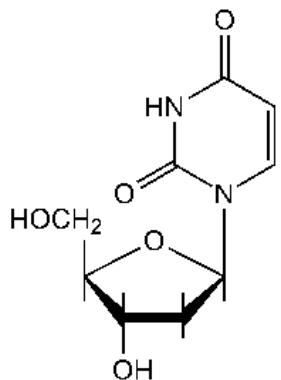
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Лист

21

# A16026 2'-Deoxyuridine



A16026 2'-Deoxyuridine [19]

## A16026 2'-Deoxyuridine, 99%

CAS Number 951-78-0

Synonyms

1-(2-Deoxy-beta-D-ribofuranosyl)uracil  
Uracil deoxyriboside

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
A16026.03	1g	45.00	<input type="text"/>	Q
A16026.06	5g	163.00	<input type="text"/>	Q
A16026.14	25g	550.00	<input type="text"/>	Q

◆ Add to Cart

Bulk/Specialty

Print Quote

Product Overview Health & Safety Documentation

## 2'-Deoxyuridine, 99%

MDL MFCD00006527  
EINECS 213-455-7

### Chemical Properties

Formula C9H12N2O5  
Melting point 164-167°  
Solubility Soluble in water.

Formula Weight 228.21  
Storage & Sensitivity Air Sensitive. Ambient temperatures.

2'-дезоксиуридин часто галогенируют для создания аналогов тимицина, полезных для изучения механизмов синтеза и деградации ДНК. Дериватизированные 2'-дезоксиуридины, используемые в качестве субстратов для мечения, включают хлор-2'-дезоксиуридин (CldU), бромдезоксиуридин (BrdU) и / или йоддезоксиуридин (IdU). Другие полезные аналоги 2'-дезоксиуридина включают 5-этинил-2'-дезоксиуридин (DdU) и 5-гидроксиметил-2'-дезоксиуридин (HmdU). Лабораторное подавление дезоксиуридина используется для диагностики мегалобластных анемий из-за дефицита витамина B12 и фолиевой кислоты. Дезоксиуридин (dU) используется для косвенного определения наличия достаточных уровней фолиевой кислоты и кобаламина в образцах клеток или тканей.

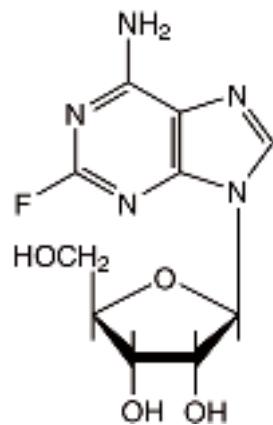
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Лист

22

Изм. Лист № докум. Подп. Дата

## H27412 2-Fluoroadenosine



H27412 2-Fluoroadenosine [20]

### H27412 2-Fluoroadenosine, 97%

CAS Number 146-78-1

Synonyms



Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H27412.MD	250mg	129.00	<input type="text"/>	
H27412.03	1g	417.00	<input type="text"/>	

Add to Cart

Bulk/Specialty

Print Quote

Product Overview Health & Safety Documentation

### 2-Fluoroadenosine, 97%

MDL

MFCD00866394

### Chemical Properties

Formula

C<sub>10</sub>H<sub>12</sub>FN<sub>5</sub>O<sub>4</sub>

Melting point

231° dec.

Formula Weight

285.23

Storage & Sensitivity

Keep Cold.

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Взам.инв.№	
Годп. и дата	

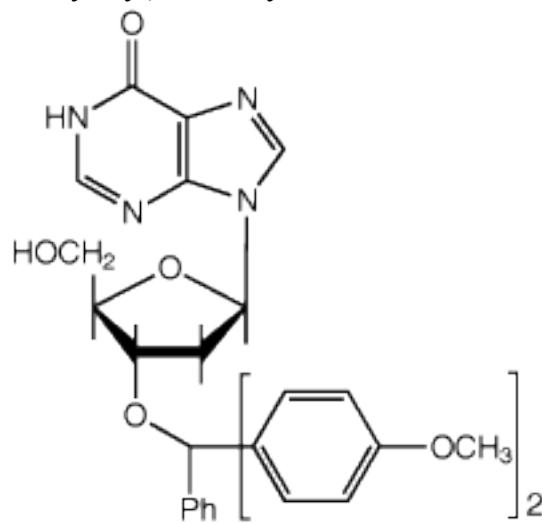
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Лист

23

# H52741 3'-O-(4,4'-Dimethoxytrityl)-2'-deoxyinosine



H52741 3'-O-(4,4'-Dimethoxytrityl)-2'-deoxyinosine [21]

## H52741 3'-O-(4,4'-Dimethoxytrityl)-2'-deoxyinosine, 97%

CAS Number

Synonyms

Once available inventory is depleted, this item will no longer be available.

◆ SDS

◆ Certificate of Analysis

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H52741.MD	250mg	76.10	<input type="text"/>	
H52741.03	1g	229.00	<input type="text"/>	
H52741.06	5g	915.00	<input type="text"/>	

Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

3'-O-(4,4'-Dimethoxytrityl)-2'-deoxyinosine,  
97%

MDL

MFCD04972291

### Chemical Properties

Formula

C<sub>31</sub>H<sub>30</sub>N<sub>4</sub>O<sub>6</sub>

Formula Weight

554.60

Storage & Sensitivity

Ambient temperatures.

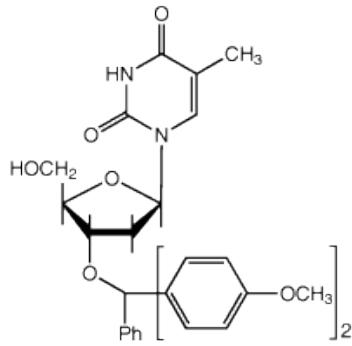
Изм.	Лист	№ докум.	Подп.	Дата

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Лист

24

## H52408 3'-O-(4,4'-Dimethoxytrityl)thymidine



H52408 3'-O-(4,4'-Dimethoxytrityl)thymidine [22]

### H52408 3'-O-(4,4'-Dimethoxytrityl)thymidine, 97%

CAS Number

76054-81-4

Synonyms

Once available inventory is depleted, this item will no longer be available.

◆ SDS

◆ Certificate of Analysis

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H52408.MD	250mg	69.20	<input type="text"/>	Q
H52408.03	1g	208.00	<input type="text"/>	Q
H52408.06	5g	829.00	<input type="text"/>	Q

◆ Add to Cart

Bulk/Specialty

Print Quote

◆ Product Overview

◆ Health & Safety

◆ Documentation

### 3'-O-(4,4'-Dimethoxytrityl)thymidine, 97%

MDL

MFCD04972293

### Chemical Properties

Formula

C<sub>31</sub>H<sub>32</sub>N<sub>2</sub>O<sub>7</sub>

Formula Weight

544.60

Storage & Sensitivity

Ambient temperatures.

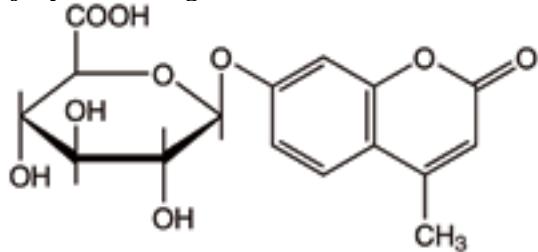
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Лист

25

**B21190 4-Methylumbelliferyl-beta-D-glucuronide**

B21190 4-Methylumbelliferyl-beta-D-glucuronide [23]

**B21190 4-Methylumbelliferyl-beta-D-glucuronide, 98%**

CAS Number

6160-80-1

Synonyms

MUG

SDS

Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

B21190.MF

50mg

44.80



B21190.MD

250mg

172.00



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health &amp; Safety

Documentation

**4-Methylumbelliferyl-beta-D-glucuronide, 98%**MDL  
EINECSMFCD00036772  
228-186-0**Chemical Properties**

Formula

C<sub>16</sub>H<sub>16</sub>O<sub>9</sub>

Formula Weight

352.30

Storage &amp; Sensitivity

Store at -20°C. Light  
Sensitive.

Solubility

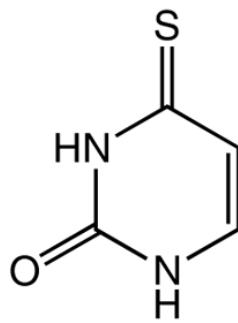
Soluble in hot water.

Это флуорогенный субстрат для измерения активности β-глюкуронидазы для быстрой чувствительной идентификации *Escherichia coli*. MUG является субстратом для глюкуронидазы. Он идеально подходит для молекулярных исследований растений как способ изучения экспрессии генов под различными промоторами. И хотя он хорошо работает для измерения активности лизата растений и дисков листьев, он также может работать в анализах всего растения.

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Годп.и дата	

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# H61919 4-Thiouracil



H61919 4-Thiouracil [24]

## H61919 4-Thiouracil, 97%

CAS Number 591-28-6

Synonyms

2-Hydroxy-4-mercaptopurine

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H61919.MD	250mg	31.10	<input type="text"/>	Q
H61919.03	1g	94.60	<input type="text"/>	Q

[Add to Cart](#) [Bulk/Specialty](#) [Print Quote](#)

Product Overview [Health & Safety](#) [Documentation](#)

### 4-Thiouracil, 97%

MDL MFCD00090842

### Chemical Properties

Formula C<sub>4</sub>H<sub>4</sub>N<sub>2</sub>OS  
Melting point 295°

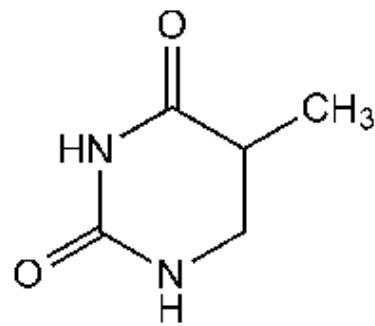
Formula Weight  
Storage & Sensitivity

128.15  
Ambient temperatures.

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Годп. и дата	

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# L01996 5,6-Dihydro-5-methyluracil



L01996 5,6-Dihydro-5-methyluracil [25]

## L01996 5,6-Dihydro-5-methyluracil, 98+%

CAS Number 696-04-8

Synonyms

5-Methyl-5,6-dihydrouracil

◆ SDS

▪ Certificate of Analysis

ⓘ Product Specification

ⓘ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
L01996.06	5g	38.80	<input type="text"/>	
L01996.14	25g	134.00	<input type="text"/>	

>Add to Cart

Bulk/Specialty

Print Quote

Product Overview

ⓘ Health & Safety

ⓘ Documentation

### 5,6-Dihydro-5-methyluracil, 98+%

MDL MFCD00023159  
EINECS 211-787-7

### Chemical Properties

Formula C<sub>5</sub>H<sub>8</sub>N<sub>2</sub>O<sub>2</sub>  
Melting point 263-265°  
Solubility Soluble in dimethyl sulfoxide.

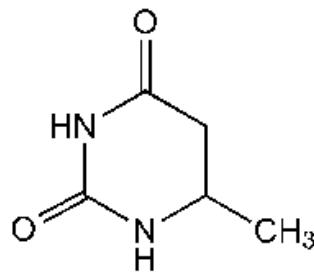
Formula Weight 128.13  
Storage & Sensitivity Ambient temperatures.

5,6-Дигидро-5-метилурацил используется в качестве активного фармацевтического ингредиента. [26-27]

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Взам.инв.№	
Годп. и дата	

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# L02292 5,6-Dihydro-6-methyluracil



L02292 5,6-Dihydro-6-methyluracil [28]

## L02292 5,6-Dihydro-6-methyluracil, 99%

CAS Number 2434-49-3

Synonyms

6-Methyl-5,6-dihydrouracil



Certificate of Analysis

Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
L02292.03	1g	26.80	<input type="text"/>	
L02292.06	5g	70.70	<input type="text"/>	

Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### 5,6-Dihydro-6-methyluracil, 99%

MDL

MFCD00023160

EINECS

219-421-8

### Chemical Properties

Formula

Formula Weight

128.13

Melting point

C<sub>5</sub>H<sub>8</sub>N<sub>2</sub>O<sub>2</sub>

218-220°

Storage & Sensitivity

Ambient temperatures.

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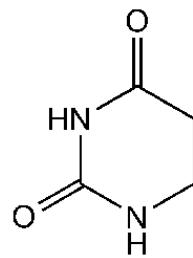
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Лист

29

# L01918 5,6-Dihydrouracil



L01918 5,6-Dihydrouracil [29]

## L01918 5,6-Dihydrouracil, 97%

CAS Number 504-07-4

Synonyms

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
L01918.03	1g	36.10	<input type="text"/>	
L01918.06	5g	145.00	<input type="text"/>	

◆ Add to Cart

Bulk/Specialty

Print Quote

◆ Product Overview

◆ Health & Safety

◆ Documentation

### 5,6-Dihydrouracil, 97%

MDL MFCD00006029  
EINECS 207-982-1

### Chemical Properties

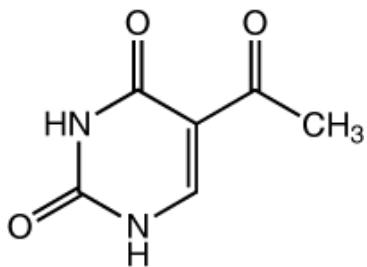
Formula C <sub>4</sub> H <sub>6</sub> N <sub>2</sub> O <sub>2</sub>	Formula Weight 114.10
Melting point 278-280°	Storage & Sensitivity Ambient temperatures.
Solubility Soluble in Sodium Hydroxide.	

5,6-Дигидроурацил действует как промежуточное звено в катаболизме урацила [30-31].

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## 44378 5-Acetyluracil



44378 5-Acetyluracil [32]

### 44378 5-Acetyluracil, 98%

CAS Number 6214-65-9

Synonyms

5-Acetyl-1H-pyrimidine-2,4-dione

◆ SDS

■ Certificate of Analysis

⌚ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
44378.03	1g	77.80	<input type="text"/>	
44378.06	5g	289.00	<input type="text"/>	
44378.14	25g	1368.00	<input type="text"/>	

🛒 Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### 5-Acetyluracil, 98%

MDL

MFCD00151968

### Chemical Properties

Formula  
Form

C<sub>6</sub>H<sub>6</sub>N<sub>2</sub>O<sub>3</sub>  
Powder

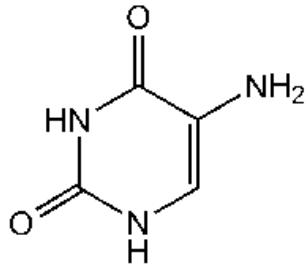
Formula Weight  
Storage & Sensitivity

154.11  
Ambient temperatures.

Инв. № подл.	Годл. и дата	Инв. № дубл.	Взам. инв. №

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## L04452 5-Aminouracil



L04452 5-Aminouracil [33]

### L04452 5-Aminouracil, 97%

CAS Number 932-52-5

Synonyms

5-Amino-2,4-dihydroxypyrimidine

◆ SDS

▪ Certificate of Analysis

ⓘ Product Specification

ⓘ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
L04452.06	5g	27.60	<input type="text"/>	
L04452.14	25g	106.00	<input type="text"/>	

🛒 Add to Cart

Bulk/Specialty

Print Quote

Product Overview Health & Safety Documentation

### 5-Aminouracil, 97%

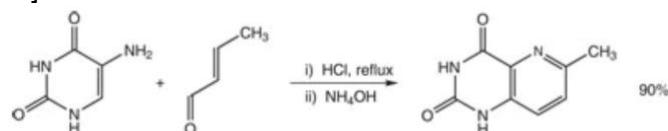
MDL MFCD00006025  
EINECS 213-252-3

#### Chemical Properties

Formula C<sub>4</sub>H<sub>5</sub>N<sub>3</sub>O<sub>2</sub>  
Melting point >300°

Formula Weight 127.10  
Storage & Sensitivity Ambient temperatures.

Конденсация с кротоновым альдегидом дает 2,4-диоксо-6-метилпиримидо [3,2-d] пиримидин [34] и дигидрофолатредуктазы [35].



Обзор использования урацилов в качестве исходных материалов в гетероциклическом синтезе приведен в [36].

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Взам.инв.№	
Инв.№ дубл.	

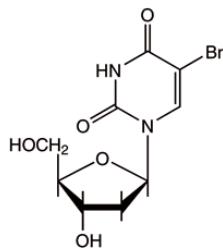
Изм.	Лист	№ докум.	Подл.	Дата

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Лист

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## H27260 5-Bromo-2'-deoxyuridine



H27260 5-Bromo-2'-deoxyuridine [37]

### H27260 5-Bromo-2'-deoxyuridine, 99%

CAS Number 59-14-3

Synonyms

5-Bromo-1-(2-deoxy-beta-D-ribofuranosyl)uracil  
5-BrdU

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H27260.MD	250mg	34.00	<input type="text"/>	
H27260.03	1g	93.40	<input type="text"/>	
H27260.06	5g	321.00	<input type="text"/>	

◆ Add to Cart

Bulk/Specialty

Print Quote

◆ Product Overview

◆ Health & Safety

◆ Documentation

### 5-Bromo-2'-deoxyuridine, 99%

MDL MFCD00006529  
EINECS 200-415-9

### Chemical Properties

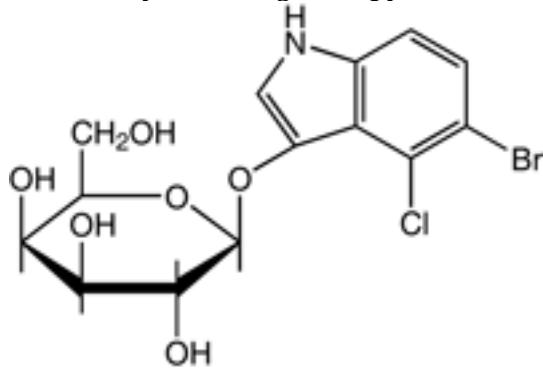
Formula C<sub>9</sub>H<sub>11</sub>BrN<sub>2</sub>O<sub>5</sub>  
Melting point ca 190° dec.  
Solubility Soluble in water.

Formula Weight 307.10  
Storage & Sensitivity Keep Cold.

5-Бром-2'-дезоксиуридин (BrdU) представляет собой аналог тимицина, используемый для мечения ДНК. Он включается во вновь синтезированную ДНК вместо тимицина во время S-фазы клеточного цикла. Затем клетки, которые активно пролиферировали, можно обнаружить, денатурируя ДНК и давая возможность специфическим антителам нацеливаться на включение BrdU. Следовательно, 5-BrdU используется для изучения передачи сигналов клеток и других процессов, которые индуцируют пролиферацию клеток. [38-39] Аналог тимицина, предпочтительно включенный в клеточную ДНК вместо тимицина, вызывает повышенную радиочувствительность клетки [40]. Мутаген, используемый в генетических исследованиях [41]. Отзывы об использовании в диагностике и исследованиях [42].

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**B21034 5-Bromo-4-chloro-3-indolyl-beta-D-galactopyranoside**

B21034 5-Bromo-4-chloro-3-indolyl-beta-D-galactopyranoside [43]

**B21034 5-Bromo-4-chloro-3-indolyl-beta-D-galactopyranoside, 98+%**

CAS Number 7240-90-6

Synonyms X-gal

SDS

Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
B21034.MA	10mg	19.50	<input type="text"/>	
B21034.MF	50mg	45.30	<input type="text"/>	
B21034.MD	250mg	150.00	<input type="text"/>	

Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health &amp; Safety

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**5-Bromo-4-chloro-3-indolyl-beta-D-galactopyranoside, 98+%**MDL MFCD00005666  
EINECS 230-640-8**Chemical Properties**

Formula C <sub>14</sub> H <sub>15</sub> BrClNO <sub>6</sub>	Melting point ca 236° dec.	Formula Weight 408.64	Storage & Sensitivity Store under Nitrogen. Keep Cold. Moisture Sensitive. Light Sensitive.
Solubility	Soluble in 100 mM in DMSO.		

Это субстрат для бета-галактозидазы, которая расщепляет гликозидную связь с образованием 5-бром-4-хлор-3-гидрокси-1Н-индола, который немедленно димеризуется с образованием продукта ярко-синего цвета. Он также используется для определения активности этого фермента в гистохимии и бактериологии. Он используется в качестве бесцветных, эндогенных или экзогенных предшественников пигментов, которые могут быть преобразованы с помощью биологических механизмов в окрашенные соединения. Они используются в биохимических анализах и в

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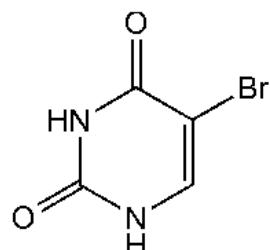
34

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диагностике в качестве индикаторов, особенно в форме ферментных субстратов. X-Gal является предпочтительным субстратом для сине-белой селекции рекомбинантных бактериальных колоний с генотипом lac +.

Применялся при окрашивание X-gal эмбрионов электропорированными морскими брызгами (Ciona) [44] и при подавлении скоплений видов Vibrio [45].

### A14799 5-Bromouracil



A14799 5-Bromouracil [46]

### A14799 5-Bromouracil, 98+%

CAS Number 51-20-7

Synonyms

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
A14799.06	5g	21.10	<input type="text"/>	Q
A14799.14	25g	76.70	<input type="text"/>	Q
A14799.22	100g	253.00	<input type="text"/>	Q

◆ Add to Cart

Bulk/Specialty

Print Quote

◆ Product Overview

◆ Health & Safety

◆ Documentation

### 5-Bromouracil, 98+%

MDL  
EINECS

MFCD00006017  
200-084-0

### Chemical Properties

Formula  
Melting point

C<sub>4</sub>H<sub>3</sub>BrN<sub>2</sub>O<sub>2</sub>  
ca 310° dec.

Formula Weight  
Storage & Sensitivity

190.99  
Ambient temperatures.

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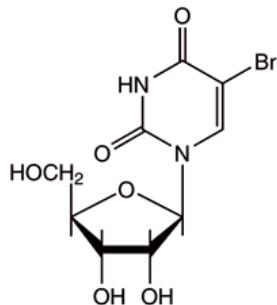
Изм.	Лист	№ докум.	Подп.	Дата
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Лист

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# A18507 5-Bromouridine



A18507 5-Bromouridine [47]

## A18507 5-Bromouridine, 98%

CAS Number 957-75-5

Synonyms



Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

A18507.01

0.25g

24.30



A18507.03

1g

59.20



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### 5-Bromouridine, 98%

MDL

MFCD00006528

EINECS

213-486-6

### Chemical Properties

Formula

C<sub>9</sub>H<sub>11</sub>BrN<sub>2</sub>O<sub>6</sub>

Melting point

191-193°

Solubility

Insoluble in water.

Formula Weight

323.10

Storage & Sensitivity

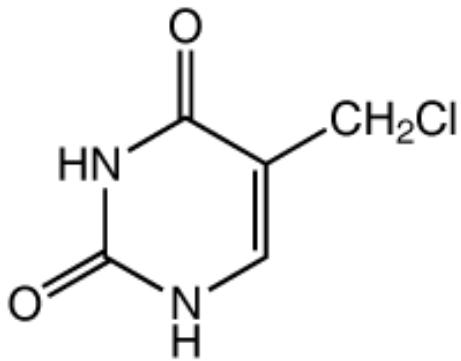
Ambient temperatures.

5-Бромуридин часто включается в РНК для иммуноцитохимического обнаружения и анализа с помощью цитометрии. Он обладает противовирусной активностью и подавляет активность вирусов, таких как вирус иммунодефицита человека. [48-49]

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Взам.инв.№	
Инв. № подп.	

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## 44639 5-(Chloromethyl)uracil



44639 5-(Chloromethyl)uracil [50]

### 44639 5-(Chloromethyl)uracil, 97%

CAS Number 3590-48-5

Synonyms

◆ SDS

◆ Certificate of Analysis

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
44639.01	0.25g	44.70	<input type="text"/>	Q
44639.03	1g	141.00	<input type="text"/>	Q
44639.06	5g	560.00	<input type="text"/>	Q

◆ Add to Cart

Bulk/Specialty

Print Quote

Product Overview Health & Safety Documentation

### 5-(Chloromethyl)uracil, 97%

MDL

MFCD00218445

### Chemical Properties

Formula  
Form

C<sub>5</sub>H<sub>5</sub>ClN<sub>2</sub>O<sub>2</sub>  
Powder

Formula Weight  
Storage & Sensitivity

160.56  
Ambient temperatures.

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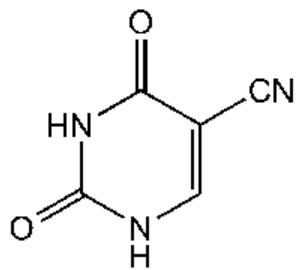
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Лист

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# L08490 5-Cyanouracil



L08490 5-Cyanouracil [51]

## L08490 5-Cyanouracil, 97%

CAS Number 5428-41-1

Synonyms

Uracil-5-carbonitrile



[Certificate of Analysis](#)

[Product Specification](#)

[Technical Inquiry](#)

Stock No.

Size

Price (€)

Quantity

Availability

L08490.03

1g

105.00



L08490.06

5g

437.00



[Add to Cart](#)

[Bulk/Specialty](#)

[Print Quote](#)

[Product Overview](#)

[Health & Safety](#)

[Documentation](#)

### 5-Cyanouracil, 97%

MDL

MFCD00051958

### Chemical Properties

Formula

C<sub>5</sub>H<sub>3</sub>N<sub>3</sub>O<sub>2</sub>

Melting point

>300° dec.

Formula Weight

137.10

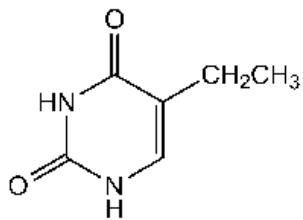
Storage & Sensitivity

Ambient temperatures.

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Изм.	Лист	№ докум.	Подп.	Дата	TH. YYY.001.БП1-1.М	Лист.
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# L10861 5-Ethyluracil



L10861 5-Ethyluracil [52]

## L10861 5-Ethyluracil, 98+%

CAS Number

4212-49-1

Synonyms

2,4-Dihydroxy-5-ethylpyrimidine



Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

L10861.MD

250mg

46.20



L10861.03

1g

156.00



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

## 5-Ethyluracil, 98+%

MDL

MFCD00079187

EINECS

000-000-0

## Chemical Properties

Formula

C<sub>6</sub>H<sub>8</sub>N<sub>2</sub>O<sub>2</sub>

Melting point

308-310°

Formula Weight

140.14

Storage & Sensitivity

Ambient temperatures.

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Изм.	Лист	№ докум.	Подп.

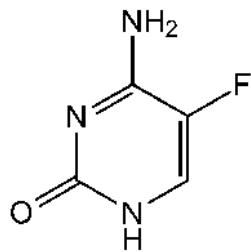
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Лист

39

## L16496 5-Fluorocytosine



L16496 5-Fluorocytosine [53]

### L16496 5-Fluorocytosine, 98+%

CAS Number

2022-85-7

Synonyms

Flucytosine

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

L16496.MD

250mg

30.80



L16496.03

1g

87.40



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### 5-Fluorocytosine, 98+%

MDL  
EINECS

MFCD00006035  
217-968-7

### Chemical Properties

Formula  
Melting point

C<sub>4</sub>H<sub>4</sub>FN<sub>3</sub>O  
ca 297° dec.

Formula Weight  
Storage & Sensitivity

129.09  
Light Sensitive. Ambient  
temperatures.

Solubility

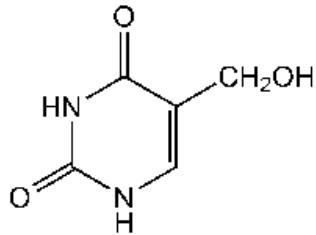
Soluble in water and  
hydrochloric acid.

5-фторцитозин действует как противодиабетическое, противогрибковое и противомикробное средство. Он полезен для лечения серьезных инфекций, возникающих из-за чувствительных штаммов *Candida* или *Cryptococcus neoformans* и хромомикоза. Кроме того, он используется в исследованиях биосинтеза ТМП. [54-55]

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## L01682 5-(Hydroxymethyl)uracil



L01682 5-(Hydroxymethyl)uracil [56]

### L01682 5-(Hydroxymethyl)uracil, 98%

CAS Number 4433-40-3

Synonyms

5-(Hydroxymethyl)pyrimidine-2,4-dione  
Uracil-5-methanol

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
L01682.03	1g	47.70	<input type="text"/>	Q
L01682.06	5g	166.00	<input type="text"/>	Q

◆ Add to Cart

Bulk/Specialty

Print Quote

◆ Product Overview

◆ Health & Safety

◆ Documentation

### 5-(Hydroxymethyl)uracil, 98%

MDL MFCD00006070  
EINECS 224-636-5

#### Chemical Properties

Formula C<sub>5</sub>H<sub>6</sub>N<sub>2</sub>O<sub>3</sub>  
Melting point >300°  
Solubility Soluble in water. (50 g/L )  
at 20°C, DMSO, dimethyl formamide or 100% ethanol.

Formula Weight  
Storage & Sensitivity

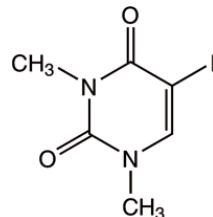
142.12  
Ambient temperatures.

5- (Гидроксиметил) урацил служит стабильной основной окислительной модификацией тимина, образующейся под действием ионизирующего излучения. [57-58]

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Подп. и дата	

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# B25173 5-Iodo-1,3-dimethyluracil



B25173 5-Iodo-1,3-dimethyluracil [59]

## B25173 5-Iodo-1,3-dimethyluracil, 99%

CAS Number

40738-83-8

Synonyms



Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
B25173.03	1g	56.00	<input type="text"/>	
B25173.06	5g	184.00	<input type="text"/>	
B25173.14	25g	758.00	<input type="text"/>	

Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### 5-Iodo-1,3-dimethyluracil, 99%

MDL

MFCD00192228

### Chemical Properties

Formula

C<sub>6</sub>H<sub>7</sub>IN<sub>2</sub>O<sub>2</sub>

Melting point

225° dec.

Formula Weight

Storage & Sensitivity

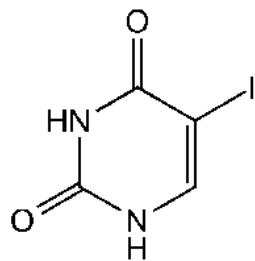
266.04

Light Sensitive. Ambient temperatures.

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# A18994 5-Iodouracil



A18994 5-Iodouracil [60]

## A18994 5-Iodouracil, 97%

CAS Number 696-07-1

Synonyms



Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
A18994.09	10g	51.20	<input type="text"/>	
A18994.18	50g	199.00	<input type="text"/>	
A18994.30	250g	764.00	<input type="text"/>	

Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### 5-Iodouracil, 97%

MDL MFCD00006020  
EINECS 211-788-2

### Chemical Properties

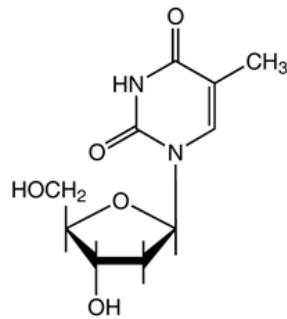
Formula	C <sub>4</sub> H <sub>3</sub> IN <sub>2</sub> O <sub>2</sub>	Formula Weight	237.99
Melting point	274-276°	Storage & Sensitivity	Light Sensitive. Ambient temperatures.
Solubility	Very faint turbidity in NH <sub>3</sub> aq. Soluble in 1M NaOH.		

Он используется как промежуточное звено. Обладает противоопухолевым действием. [61-63]

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## H64259 5-Methyluridine



H64259 5-Methyluridine [64]

### H64259 5-Methyluridine, 99%

CAS Number

1463-10-1

Synonyms

Ribothymidine

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

H64259.14

25g

65.10



H64259.22

100g

199.00



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### 5-Methyluridine, 99%

MDL  
EINECS

MFCD00006535  
215-973-9

### Chemical Properties

Formula  
Melting point

C<sub>10</sub>H<sub>14</sub>N<sub>2</sub>O<sub>6</sub>  
183-184°

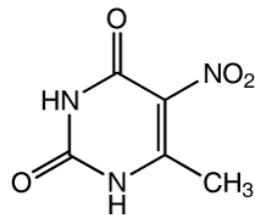
Formula Weight  
Storage & Sensitivity

258.23  
Keep Cold.

Инв. № подл.	Годл. и дата	Бзэм.инв.№	Инв. № дубл.

Изм.	Лист	№ докум.	Подп.	Дата	TH. YYY.001.БП1-1.М	Лист.
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## H55913 5-Nitro-6-methyluracil



H55913 5-Nitro-6-methyluracil [65]

### H55913 5-Nitro-6-methyluracil, 99%

CAS Number 16632-21-6

Synonyms

2,4-Dihydroxy-6-methyl-5-nitropyrimidine

◆ SDS

Bookmark Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H55913.MD	250mg	16.40	<input type="text"/>	Q
H55913.03	1g	45.40	<input type="text"/>	Q
H55913.06	5g	170.00	<input type="text"/>	Q

Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### 5-Nitro-6-methyluracil, 99%

MDL MFCD00047362  
EINECS 240-688-1

#### Chemical Properties

Formula C<sub>5</sub>H<sub>5</sub>N<sub>3</sub>O<sub>4</sub>  
Storage & Sensitivity Ambient temperatures.

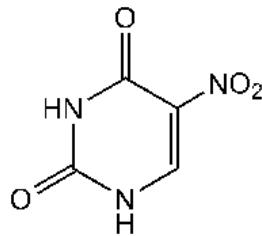
Formula Weight 171.11  
Solubility Soluble in DMF, DMSO, hot methanol and hot water.

5-Нитро-6-метилурацил используется в качестве важного сырья и промежуточного продукта, используемого в органическом синтезе, фармацевтических препаратах, агрохимикатах и красителях. [66-67]

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Годп. и дата	

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						45

# A12448 5-Nitouracil



A12448 5-Nitouracil [68]

## A12448 5-Nitouracil, 98+%

CAS Number

611-08-5

Synonyms



SDS



Certificate of Analysis



Product Specification



Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

A12448.14

25g

43.10



A12448.22

100g

124.00



A12448.36

500g

516.00



Add to Cart



Bulk/Specialty



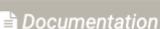
Print Quote



Product Overview



Health & Safety



Documentation

### 5-Nitouracil, 98+%

MDL

EINECS

MFCD00006021

210-250-4

### Chemical Properties

Formula

Melting point

C<sub>4</sub>H<sub>3</sub>N<sub>3</sub>O<sub>4</sub>

ca 300°

Formula Weight

Storage & Sensitivity

157.09

Ambient temperatures.

Инв. № подл.	Годл. и дата	Взам.инв.№	Инв. № дубл.

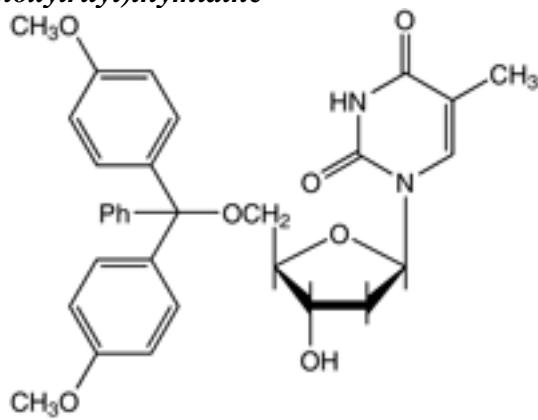
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Лист

46

## 44815 5'-O-(4,4'-Dimethoxytrityl)thymidine



44815 5'-O-(4,4'-Dimethoxytrityl)thymidine [69]

### 44815 5'-O-(4,4'-Dimethoxytrityl)thymidine, 98+%

CAS Number 40615-39-2

Synonyms

◆ SDS

◆ Certificate of Analysis

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
44815.77	0.1g	57.40	<input type="text"/>	Q
44815.02	0.5g	156.00	<input type="text"/>	Q
44815.04	2g	472.00	<input type="text"/>	Q
44815.09	10g	1578.00	<input type="text"/>	Q

◆ Add to Cart

Bulk/Specialty

Print Quote

Product Overview Health & Safety Documentation

### 5'-O-(4,4'-Dimethoxytrityl)thymidine, 98+%

MDL MFCD00010113  
EINECS 255-003-1

#### Chemical Properties

Formula C<sub>31</sub>H<sub>32</sub>N<sub>2</sub>O<sub>7</sub>  
Form Powder      Formula Weight 544.60  
Storage & Sensitivity Ambient temperatures.

5'-O-(4,4'-Диметокситритил) тимидин используется в твердофазном синтезе полинуклеотидов и политимилиловых кислот методом блочного связывания фосфотриэфира. Кроме того, он используется в стереоселективном синтезе 3'-дезокси-3'-трегидроксиметилнуклеозида. В дополнение к этому, он используется в качестве исследовательского инструмента для противовирусных и противораковых исследований. [70-71]

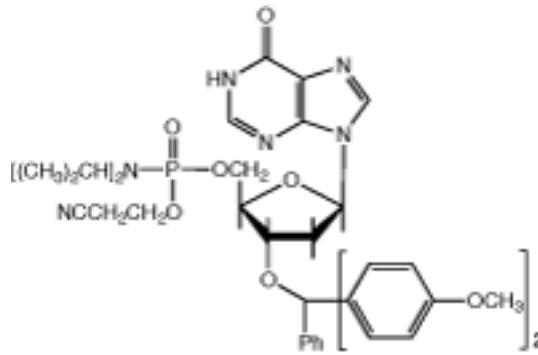
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Лист

47

*H52780 5'-O-[(Diisopropylamino)-(2-cyanoethoxy)phosphinyl]-3'-O-(4,4'-dimethoxytrityl)-2'-deoxyinosine*



H52780 5'-O-[(Diisopropylamino)-(2-cyanoethoxy)phosphinyl]-3'-O-(4,4'-dimethoxytrityl)-2'-deoxyinosine [72]

**H52780 5'-O-[(Diisopropylamino)-(2-cyanoethoxy)phosphinyl]-3'-O-(4,4'-dimethoxytrityl)-2'-deoxyinosine, 97%**

CAS Number

Synonyms

Once available inventory is depleted, this item will no longer be available.

❖ SDS

▪ Certificate of Analysis

⌚ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H52780.MD	250mg	89.80	<input type="text"/>	Q
H52780.03	1g	270.00	<input type="text"/>	Q

🛒 Add to Cart

Bulk/Specialty

Print Quote

Product Overview

🔒 Health & Safety

📄 Documentation

**5'-O-[(Diisopropylamino)-(2-cyanoethoxy)phosphinyl]-3'-O-(4,4'-dimethoxytrityl)-2'-deoxyinosine, 97%**

MDL

MFCD08706370

**Chemical Properties**

Formula

C<sub>40</sub>H<sub>47</sub>N<sub>6</sub>O<sub>8</sub>P

Storage & Sensitivity

Ambient temperatures.

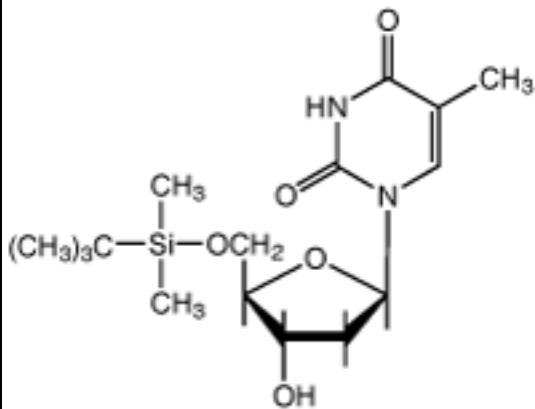
Formula Weight

770.82

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# H52301 5'-O-(tert-Butyldimethylsilyl)thymidine



H52301 5'-O-(tert-Butyldimethylsilyl)thymidine [73]

## H52301 5'-O-(tert-Butyldimethylsilyl)thymidine, 97+%

CAS Number

40733-28-6

Synonyms



[Certificate of Analysis](#)

[Technical Inquiry](#)

Stock No.

Size

Price (€)

Quantity

Availability

H52301.MD

250mg

29.00



H52301.03

1g

111.00



[Add to Cart](#)

[Bulk/Specialty](#)

[Print Quote](#)

[Product Overview](#)

[Health & Safety](#)

[Documentation](#)

## 5'-O-(tert-Butyldimethylsilyl)thymidine, 97+%

MDL

MFCD01631041

### Chemical Properties

Formula

C<sub>16</sub>H<sub>28</sub>N<sub>2</sub>O<sub>5</sub>Si

Formula Weight

356.49

Storage & Sensitivity

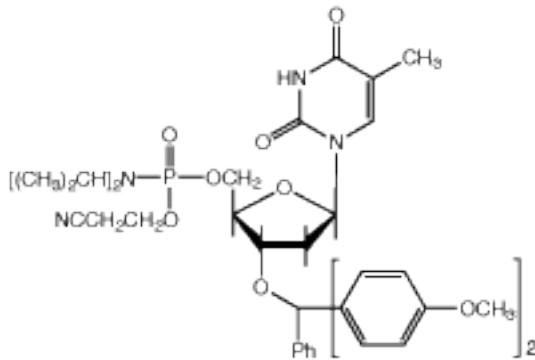
Ambient temperatures.

5'-O- (трет-Бутилдиметилсил) тимидин используется в качестве промежуточного фармацевтического продукта [74-75].

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**H52782 5'-O-[(Diisopropylamino)-(2-cyanoethoxy)phosphinyl]-3'-O-(4,4'-dimethoxytrityl)thymidine**



H52782 5'-O-[(Diisopropylamino)-(2-cyanoethoxy)phosphinyl]-3'-O-(4,4'-dimethoxytrityl)thymidine [76]

**H52782 5'-O-[(Diisopropylamino)-(2-cyanoethoxy)phosphinyl]-3'-O-(4,4'-dimethoxytrityl)thymidine, 97%**

CAS Number

134031-86-0

Synonyms

Once available inventory is depleted, this item will no longer be available.

◆ SDS

◆ Certificate of Analysis

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H52782.MD	250mg	69.20	<input type="text"/>	
H52782.03	1g	208.00	<input type="text"/>	
H52782.06	5g	829.00	<input type="text"/>	

Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

**5'-O-[(Diisopropylamino)-(2-cyanoethoxy)phosphinyl]-3'-O-(4,4'-dimethoxytrityl)thymidine, 97%**

MDL

MFCD08706371

**Chemical Properties**

Formula  
Storage & Sensitivity

C<sub>40</sub>H<sub>49</sub>N<sub>4</sub>O<sub>9</sub>P  
Ambient temperatures.

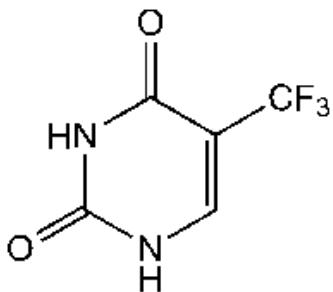
Formula Weight

760.82

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						50

# L16196 5-(Trifluoromethyl)uracil



L16196 5-(Trifluoromethyl)uracil [77]

## L16196 5-(Trifluoromethyl)uracil, 97%

CAS Number

54-20-6

Synonyms



Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

L16196.MD

250mg

50.00



L16196.03

1g

129.00



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### 5-(Trifluoromethyl)uracil, 97%

MDL

EINECS

MFCD00006024

200-197-5

### Chemical Properties

Formula

Melting point

C<sub>5</sub>H<sub>3</sub>F<sub>3</sub>N<sub>2</sub>O<sub>2</sub>

251-254

Formula Weight

Storage & Sensitivity

180.08

Ambient temperatures.

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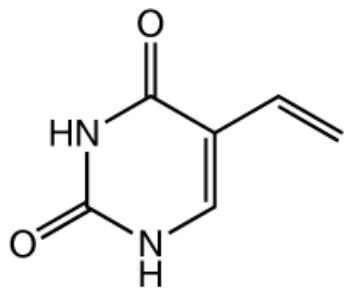
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Лист

51

## 44379 5-Vinyluracil



44379 5-Vinyluracil [78]

### 44379 5-Vinyluracil, 97%

CAS Number

37107-81-6

Synonyms



Certificate of Analysis

Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

44379.01

0.25g

108.00



44379.03

1g

359.00



44379.06

5g

1384.00



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### 5-Vinyluracil, 97%

MDL

MFCD00913267

### Chemical Properties

Formula  
Form

C<sub>6</sub>H<sub>6</sub>N<sub>2</sub>O<sub>2</sub>  
Powder

Formula Weight  
Storage & Sensitivity

138.12  
Ambient temperatures.

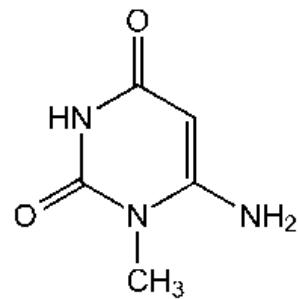
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Лист

52

**B25448 6-Amino-1-methyluracil**

B25448 6-Amino-1-methyluracil [79]

**B25448 6-Amino-1-methyluracil, 97%****CAS Number**

2434-53-9

**Synonyms**

6-Amino-1-methyl-2,4(1H,3H)-pyrimidinedione

Once available inventory is depleted, this item will no longer be available.

SDS

Certificate of Analysis

Product Specification

Technical Inquiry

**Stock No.****Size****Price (€)****Quantity****Availability**

B25448.22

100g

109.00



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health &amp; Safety

Documentation

**6-Amino-1-methyluracil, 97%****MDL**

MFCD00075366

**EINECS**

219-422-3

**Chemical Properties****Formula**C<sub>5</sub>H<sub>7</sub>N<sub>3</sub>O<sub>2</sub>**Melting point**

&gt;300°

**Solubility**

Soluble in diluted sodium hydroxide solution.

**Formula Weight**

141.13

**Storage & Sensitivity**

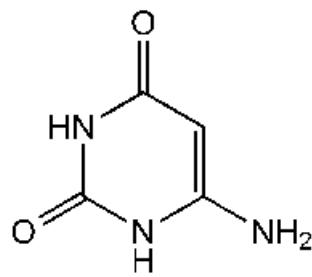
Ambient temperatures.

6-Амино-1-метилурацил может быть использован при получении 1,1? -Диметил-1Н-спиро [пиримидо [4,5-*b*] хинолин-5,5? -Пирроло [2,3-*d*] пиримидина. ] -2,2?, 4,4?, 6? (1? Н, 3Н, 3? Н, 7? Н, 1? Н) -пентаон, посредством реакции с изатином в присутствии каталитической п-толуолсульфоновой кислоты [80-81].

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## L03332 6-Aminouracil



L03332 6-Aminouracil [82]

### L03332 6-Aminouracil, 98%

CAS Number 873-83-6

Synonyms

4-Amino-2,6-dihydroxypyrimidine  
4-Aminouracil



Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

L03332.22

100g

37.60



L03332.36

500g

143.00



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### 6-Aminouracil, 98%

MDL

EINECS

MFCD00006071

212-854-3

### Chemical Properties

Formula

C<sub>4</sub>H<sub>5</sub>N<sub>3</sub>O<sub>2</sub>

Melting point

360°

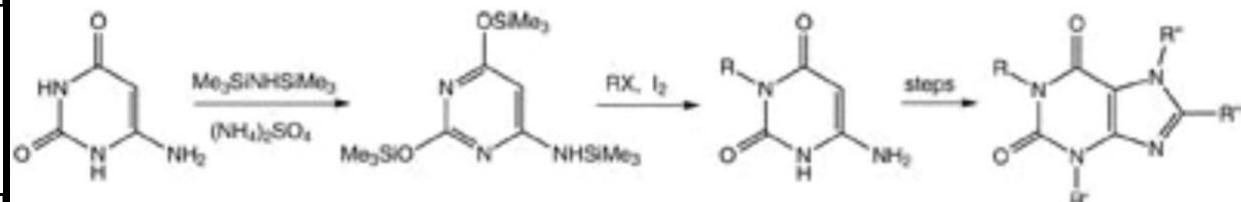
Formula Weight

127.10

Storage & Sensitivity

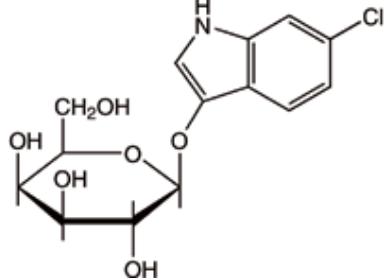
Ambient temperatures.

Силилирование способствует региоселективному алкилированию по 3-азоту [83]. Эти продукты являются промежуточными продуктами в универсальном синтезе ксантинов [84].



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**B21131 6-Chloro-3-indolyl-beta-D-galactopyranoside**

B21131 6-Chloro-3-indolyl-beta-D-galactopyranoside [85]

**B21131 6-Chloro-3-indolyl-beta-D-galactopyranoside, 98%**

CAS Number

138182-21-5

Synonyms

Rose-gal  
Salmon-gal

SDS

Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

B21131.77

0.1g

94.90



B21131.02

0.5g

212.00



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health &amp; Safety

Documentation

**6-Chloro-3-indolyl-beta-D-galactopyranoside,  
98%**

MDL

MFCD00467206

**Chemical Properties**

Formula

C<sub>14</sub>H<sub>16</sub>ClNO<sub>6</sub>

Melting point

188-190°

Formula Weight

329.74

Storage &amp; Sensitivity

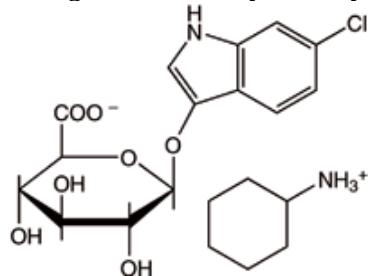
Keep Cold. Moisture  
Sensitive.

Solubility

Insoluble in water. Soluble  
in DMSO and DMFO,  
methanol.

Используется в качестве промежуточного фармацевтического продукта для снижения токсичности и в качестве ферментного субстрата в диагностических реагентах. Salmon-gal используется в сочетании с IPTG для обнаружения активности β-галактозидазы в бактериальных колониях в колометрическом анализе для обнаружения рекомбинантов (белые) из нерекомбинированных (SALMON). В сочетании с X-glu, лосось полезен для одновременного обнаружения активности GUS и Lac на одной и той же пластине [86-87].

<i>Изм.</i>	<i>Лист</i>	<i>№ докум.</i>	<i>Подп.</i>	<i>Дата</i>	<i>TH. YYY.001.БП1-1.М</i>		<i>Лист.</i>
							55

**B21068 6-Chloro-3-indolyl-beta-D-glucuronide cyclohexylammonium salt**

B21068 6-Chloro-3-indolyl-beta-D-glucuronide cyclohexylammonium salt [88]

**B21068 6-Chloro-3-indolyl-beta-D-glucuronide cyclohexylammonium salt, 98%**

CAS Number

138182-20-4

Synonyms

Salmon-glcA

SDS

Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

B21068.MA

10mg

29.90



B21068.MF

50mg

116.00



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health &amp; Safety

Documentation

**6-Chloro-3-indolyl-beta-D-glucuronide cyclohexylammonium salt, 98%**

MDL MFCD00153940

**Chemical Properties**

Formula

C<sub>20</sub>H<sub>27</sub>ClN<sub>2</sub>O<sub>7</sub>

Formula Weight

442.90

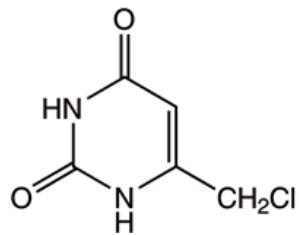
Storage &amp; Sensitivity

Keep Cold. Moisture  
Sensitive. Light Sensitive.

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Годп. и дата	

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## B21985 6-(Chloromethyl)uracil



B21985 6-(Chloromethyl)uracil [89]

### B21985 6-(Chloromethyl)uracil, 98%

CAS Number 18592-13-7

Synonyms

◆ SDS

◆ Certificate of Analysis

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
B21985.03	1g	43.80	<input type="text"/>	Q
B21985.06	5g	140.00	<input type="text"/>	Q
B21985.14	25g	530.00	<input type="text"/>	Q

◆ Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### 6-(Chloromethyl)uracil, 98%

MDL MFCD00010095  
EINECS 242-431-9

### Chemical Properties

Formula C<sub>5</sub>H<sub>5</sub>ClN<sub>2</sub>O<sub>2</sub>  
Melting point 256-258° dec.  
Formula Weight 160.56  
Storage & Sensitivity Ambient temperatures.

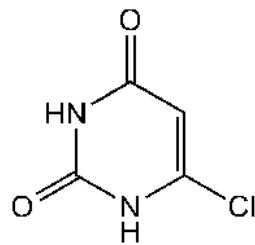
Инв. № подл.	Годл. и дата	Инв. № дубл.	Взам. инв. №	Бзам. инв. №
Изм.	Лист	№ докум.	Подл.	Дата

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57

# L01875 6-Chlorouracil



L01875 6-Chlorouracil [90]

## L01875 6-Chlorouracil, 98+%

CAS Number 4270-27-3

Synonyms

6-Chloro-2,4-dihydroxypyrimidine  
4-Chlorouracil

Once available inventory is depleted, this item will no longer be available.

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

L01875.03

1g

49.70



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

## 6-Chlorouracil, 98+%

MDL

MFCD00014595

EINECS

224-258-0

## Chemical Properties

Formula

C<sub>4</sub>H<sub>3</sub>ClN<sub>2</sub>O<sub>2</sub>

Melting point

ca 295° dec.

Solubility

Soluble in Ammonium Hydroxide

Formula Weight

146.53

Storage & Sensitivity

Ambient temperatures.

Хлорацил (4-хлороурацил; 6-хлороурацил) представляет собой галогенированный урацил, который полезен при исследованиях влияния галогенирования на стабильность пары оснований нуклеиновых кислот и сродство к ионам щелочных металлов. Взаимодействие 6-хлороурацила с 4-(диметиламино) пиридином, 4-метилпиридином и пиридин-4-илморфолином давало замещенные пиридинием урацилы в виде хлоридов, которые превращались в урацилаты пиридиния депротонированием. Эти гетероциклические мезомерные бетаины являются перекрестно-конъюгированными и, таким образом, содержат отдельные катионные (пиридиний) и анионные (урацилатные) части. Расчеты и рентгеновский анализ монокристаллов можно использовать для характеристики этих систем и сравнения солей с бетаинами. [91-92]

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Лист

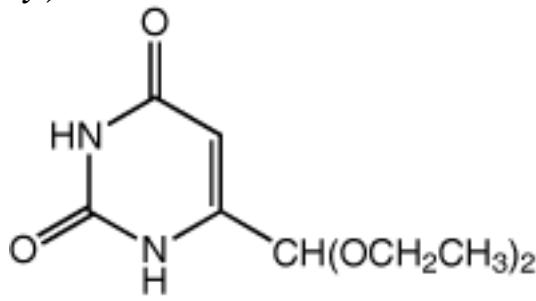
58

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Копировал

Формат А4

# H51694 6-(Diethoxymethyl)uracil



H51694 6-(Diethoxymethyl)uracil [93]

## H51694 6-(Diethoxymethyl)uracil, 98%

CAS Number 16953-48-3

Synonyms

6-(Diethoxymethyl)pyrimidine-  
2,4(1H,3H)-dione  
Uracil-6-carboxaldehyde diethyl acetal

Once available inventory is depleted, this item will no longer be available.

◆ SDS

◆ Certificate of Analysis

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H51694.MD	250mg	96.20	<input type="text"/>	Q
H51694.03	1g	314.00	<input type="text"/>	Q

◆ Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

## 6-(Diethoxymethyl)uracil, 98%

MDL

MFCD12755731

## Chemical Properties

Formula

C9H14N2O4

Formula Weight

214.22

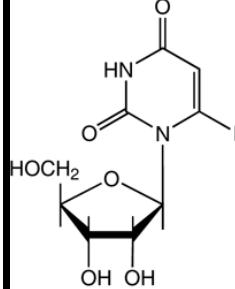
Storage & Sensitivity

Ambient temperatures.

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### H66634 6-Iodouridine



H66634 6-Iodouridine [94]

### H66634 6-Iodouridine, 96%

CAS Number 105967-11-1

Synonyms

◆ SDS

◆ Certificate of Analysis

◆ Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

H66634.MD

250mg

393.00



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### 6-Iodouridine, 96%

MDL

MFCD21607789

### Chemical Properties

Formula  
Density

C<sub>9</sub>H<sub>11</sub>IN<sub>2</sub>O<sub>6</sub>  
2.27

Formula Weight  
Storage & Sensitivity

370.10  
Light Sensitive. Ambient  
temperatures.

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Взам. инв. №			

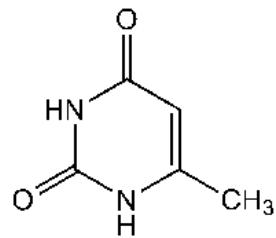
Изм.	Лист	№ докум.	Подл.	Дата
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Лист

60

## B24191 6-Methyluracil



B24191 6-Methyluracil [95]

### B24191 6-Methyluracil, 97%

CAS Number 626-48-2

Synonyms

2,4-Dihydroxy-6-methylpyrimidine



Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
B24191.22	100g	19.60	<input type="text"/>	
B24191.36	500g	65.70	<input type="text"/>	
B24191.0E	2500g	305.00	<input type="text"/>	

Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### 6-Methyluracil, 97%

MDL

MFCD00006028

EINECS

210-949-4

### Chemical Properties

Formula

C<sub>5</sub>H<sub>6</sub>N<sub>2</sub>O<sub>2</sub>

Melting point

317-320°

Formula Weight

126.12

Storage & Sensitivity

Ambient temperatures.

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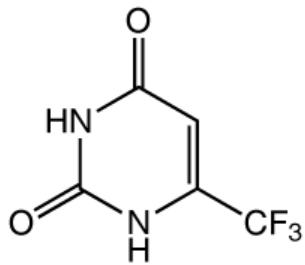
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Лист

61

# 44467 6-(Trifluoromethyl)uracil



44467 6-(Trifluoromethyl)uracil [96]

## 44467 6-(Trifluoromethyl)uracil, 97%

CAS Number

672-45-7

Synonyms

◆ SDS

◆ Certificate of Analysis

◆ Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

44467.03

1g

67.90



44467.06

5g

234.00



◆ Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

## 6-(Trifluoromethyl)uracil, 97%

MDL

MFCD01011762

### Chemical Properties

Formula  
Form

C<sub>5</sub>H<sub>3</sub>F<sub>3</sub>N<sub>2</sub>O<sub>2</sub>  
Powder

Formula Weight  
Storage & Sensitivity

180.08  
Ambient temperatures.

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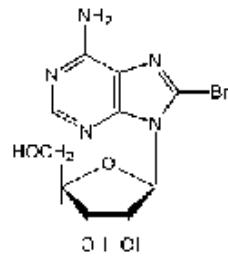
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Лист

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## L03544 8-Bromoadenosine



L03544 8-Bromoadenosine [97]

### L03544 8-Bromoadenosine, 98%

CAS Number

2946-39-6

Synonyms



Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

L03544.MD

250mg

52.70



L03544.03

1g

132.00



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### 8-Bromoadenosine, 98%

MDL

MFCD00005733

EINECS

220-959-0

### Chemical Properties

Formula

C<sub>10</sub>H<sub>12</sub>BrN<sub>5</sub>O<sub>4</sub>

Melting point

ca 211° dec.

Formula Weight

346.15

Storage & Sensitivity

Keep Cold. Air Sensitive.

Solubility

Soluble in DMSO, and DMF.  
Insoluble in water.

Store under Nitrogen.

8-Бромаденозин является ингибитором связывания аденоцина. [98-99]

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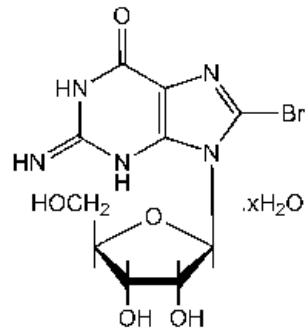
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Лист

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## L02992 8-Bromoguanosine hydrate



L02992 8-Bromoguanosine hydrate [100]

L02992 8-Bromoguanosine hydrate, 97%

CAS Number

332359-99-6

Synonyms



Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

L02992.03

1g

20.50



L02992.06

5g

70.00



L02992.14

25g

245.00



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

8-Bromoguanosine hydrate, 97%

MDL

EINECS

MFCD00150531

223-677-6

### Chemical Properties

Formula

Melting point

C<sub>10</sub>H<sub>12</sub>BrN<sub>5</sub>O<sub>5</sub>·xH<sub>2</sub>O

>300°

Formula Weight

Storage & Sensitivity

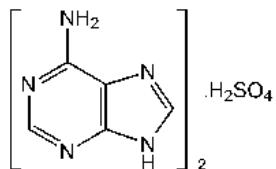
362.14(anhy)

Keep Cold.

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## A16964 Adenine sulfate



A16964 Adenine sulfate [101]

### A16964 Adenine sulfate, 98+%

CAS Number

321-30-2

Synonyms

Adenine hemisulfate  
6-Aminopurine sulfate

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

A16964.09

10g

33.40



A16964.18

50g

116.00



◆ Add to Cart

Bulk/Specialty

Print Quote

◆ Product Overview

◆ Health & Safety

◆ Documentation

### Adenine sulfate, 98+%

MDL

EINECS

MFCD00213655

206-286-5

### Chemical Properties

Formula

C<sub>10</sub>H<sub>10</sub>N<sub>10</sub>·H<sub>2</sub>SO<sub>4</sub>

Melting point

ca 210° dec.

Formula Weight

Storage & Sensitivity

368.34

Hygroscopic. Ambient temperatures.

Solubility

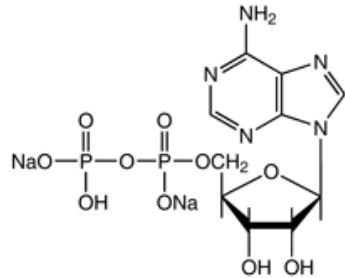
Soluble in water (4 mg/ml), ethanol (<1 mg/ml at 25°C), DMSO (<1 mg/ml at 25°C), and HCl (10 mg/ml).

Он выполняет широкий спектр химических и биохимических ролей *in vivo* и *in vitro*, используя его в качестве регуляторной молекулы. Он действует как предшественник, субстрат или кофактор в различных биохимических путях. [102-103]

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# L14029 Adenosine-5'-diphosphate disodium salt



L14029 Adenosine-5'-diphosphate disodium salt [104]

L14029 Adenosine-5'-diphosphate disodium salt, 96% (dry wt.), water 15% max.

CAS Number 16178-48-6

Synonyms

5'-ADP-Na2

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
L14029.MD	250mg	18.60	<input type="text"/>	
L14029.03	1g	45.60	<input type="text"/>	

Add to Cart Bulk/Specialty Print Quote

Product Overview Health & Safety Documentation

Adenosine-5'-diphosphate disodium salt, 96% (dry wt.), water 15% max.

MDL MFCD00066635  
EINECS 240-314-7

## Chemical Properties

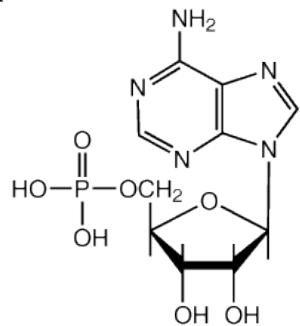
Formula C <sub>10</sub> H <sub>13</sub> N <sub>5</sub> Na <sub>2</sub> O <sub>10</sub> P <sub>2</sub>	Formula Weight 471.17
Storage & Sensitivity Store at -20°C. Hygroscopic.	Solubility Soluble in water.

Динатриевая соль аденоzin-5'-дифосфата является важным сырьем и промежуточным продуктом, используемым в органическом синтезе, фармацевтике и агрохимии. [105]

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# L14051 Adenosine-5'-monophosphoric acid



L14051 Adenosine-5'-monophosphoric acid [106]

## L14051 Adenosine-5'-monophosphoric acid, 99% (dry wt.), water <6%

CAS Number 61-19-8

Synonyms

Adenylic acid  
5'-AMP

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
L14051.03	1g	16.40	<input type="text"/>	
L14051.06	5g	54.80	<input type="text"/>	

◆ Add to Cart

Bulk/Specialty

Print Quote

◆ Product Overview

◆ Health & Safety

◆ Documentation

### Adenosine-5'-monophosphoric acid, 99% (dry wt.), water <6%

MDL MFCD00149360  
EINECS 200-500-0

### Chemical Properties

Formula C<sub>10</sub>H<sub>14</sub>N<sub>5</sub>O<sub>7</sub>P  
Melting point ca 190° dec.  
Solubility Soluble in water.

Formula Weight 347.22  
Storage & Sensitivity Keep Cold.

полезная детерминанта лиганда, которая облегчает связывание ингибиторов APS-редуктазы и активирует агонисты аденоzinового рецептора. 5α-AMP является активатором класса протеинкиназ, известных как АМФ-активированная протеинкиназа, активатором фосфорилазы b в реакции полимеризации для синтеза разветвленных полисахаридов, реагентом при синтезе аденоzin-5β-фосфоимидазолида, ингибитор активности эндогенной аденилтрансферазы NMN (NMNAT), которая превращает NMN в NAD + [107-108].

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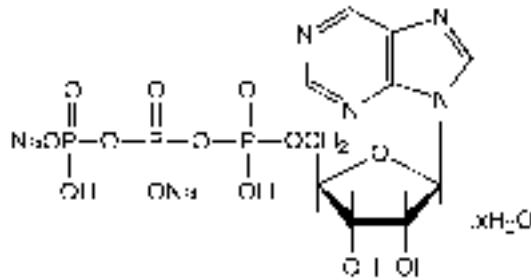
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Формат А4

# L14522 Adenosine-5'-triphosphate disodium salt hydrate

NH<sub>2</sub>



L14522 Adenosine-5'-triphosphate disodium salt hydrate [109]

## L14522 Adenosine-5'-triphosphate disodium salt hydrate, 99%, water <10%

CAS Number

34369-07-8

Synonyms

5'-ATP-Na2

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

L14522.03

1g

35.80



L14522.06

5g

153.00



Add to Cart

Bulk/Specialty

Print Quote

◆ Product Overview

◆ Health & Safety

◆ Documentation

### Adenosine-5'-triphosphate disodium salt hydrate, 99%, water <10%

MDL

MFCD00150755

EINECS

213-579-1

### Chemical Properties

Formula

C<sub>10</sub>H<sub>14</sub>N<sub>5</sub>Na<sub>2</sub>O<sub>13</sub>P<sub>3</sub>·xH<sub>2</sub>O

Storage & Sensitivity

Store at -20°C.

Hygroscopic. Light  
Sensitive.

Formula Weight

551.15(anhy)

Solubility

Soluble in water.

Гидрат динатриевой соли аденоzin-5'-трифосфата используется как форма клеточной энергии. Он используется во многих клеточных процессах, дыхании, биосинтетических реакциях, подвижности и делении клеток. АТФ является субстратом многих киназ, участвующих в передаче сигналов клеток, и аденилаткиназы (ов), которые продуцируют второй мессенджер цАМФ. АТФ обеспечивает метаболическую энергию для работы метаболических насосов. АТФ служит коферментом в широком спектре ферментативных реакций [110-111].

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# A10781 Adenosine



A10781 Adenosine [112]

## A10781 Adenosine, 99%

CAS Number 58-61-7

Synonyms



Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
A10781.09	10g	30.10	<input type="text"/>	
A10781.18	50g	116.00	<input type="text"/>	
A10781.30	250g	466.00	<input type="text"/>	

Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### Adenosine, 99%

MDL  
EINECS

MFCD00005752  
200-389-9

### Chemical Properties

Formula

C<sub>10</sub>H<sub>13</sub>N<sub>5</sub>O<sub>4</sub>

Formula Weight

267.25

Melting point

234-237°

Storage & Sensitivity

Keep Cold.

Solubility

Soluble in water,  
ammonium hydroxide and  
dimethyl sulfoxide.  
Insoluble in ethanol.

Аденозин служит нуклеотидом. Он также играет важную роль в регуляции кровотока к различным органам за счет расширения сосудов. Он активно участвует в биохимических процессах, таких как передача энергии в виде аденоинтрифосфата и аденоиндинифосфата. Кроме того, он используется в лекарствах, в частности, в качестве антиаритмического средства для лечения ряда наджелудочных тахикардий. Он используется для утолщения волос у людей с истонченными волосами [113-114].

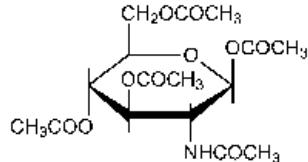
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## L09020 beta-D-Glucosamine pentaacetate



L09020 beta-D-Glucosamine pentaacetate [115]

### L09020 beta-D-Glucosamine pentaacetate, 96%

CAS Number

7772-79-4

Synonyms

2-Acetamido-2-deoxy-1,3,4,6-tetra-O-acetyl-beta-D-glucopyranose



Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

L09020.03

1g

43.10



L09020.06

5g

151.00



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### beta-D-Glucosamine pentaacetate, 96%

MDL

MFCD00006595

EINECS

231-865-4

### Chemical Properties

Formula

C<sub>16</sub>H<sub>23</sub>NO<sub>10</sub>

Melting point

184-189°

Formula Weight

389.37

Storage & Sensitivity

Ambient temperatures.

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# H26557 Casein Peptone

## H26557 Casein Peptone

CAS Number

91079-40-2

Synonyms

Peptones, casein

SDS

Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

H26557.22

100g

41.40



H26557.36

500g

134.00



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health &amp; Safety

Documentation

### Casein Peptone

MDL

MFCD00131829

EINECS

293-428-4

### Chemical Properties

Storage &amp; Sensitivity

Hygroscopic. Ambient temperatures.

Solubility

Soluble in water. Insoluble in alcohol and ether.

### H26557 Casein Peptone [116]

Казеиновый пептон используется в питательных средах для роста бактерий и грибов. Он используется в производстве антибиотиков и ферментов. Это также важно для аналитической микробиологии и промышленного процесса ферментации. Он также используется в бактериальной диагностике и в агропродовольственной, косметической и фармацевтической ферментации для производства биомассы [117-118].

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Взам. инв. №		Инв. № дубл.

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# A13707 Casein

## A13707 Casein, tech.

CAS Number

9000-71-9

Synonyms

[SDS](#)[Certificate of Analysis](#)[Product Specification](#)[Technical Inquiry](#)

Stock No.	Size	Price (€)	Quantity	Availability
A13707.36	500g	44.40	<input type="text"/>	
A13707.0E	2500g	148.00	<input type="text"/>	
A13707.0C	10000g	500.00	<input type="text"/>	

[Add to Cart](#)[Bulk/Specialty](#)[Print Quote](#)[Product Overview](#)[Health & Safety](#)[Documentation](#)

### Casein, tech.

MDL  
EINECSMFCD00081481  
232-555-1

### Chemical Properties

Melting point

ca 280° dec.

Storage &amp; Sensitivity

Hygroscopic. Ambient temperatures.

Solubility

Insoluble in water.

### A13707 Casein, tech. [119]

Натуральный источник белка, обычно выделяемый из коровьего молока. Казеин широко используется в качестве пищевой добавки. Он используется в продуктах для реминерализации зубов для стабилизации аморфного фосфата кальция. Он также используется в качестве органического клея и связующего вещества для безопасных спичек. Он содержит аминокислоты, углеводы и два неорганических элемента, таких как кальций и фосфор. Кроме того, он также используется в производстве трансформаторного щита из-за его маслопроницаемости [120-121].

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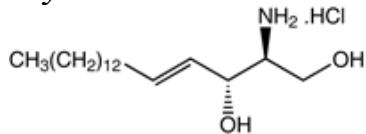
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72

## H52427 D-erythro-Sphingosine hydrochloride



H52427 D-erythro-Sphingosine hydrochloride [122]

### H52427 D-erythro-Sphingosine hydrochloride, 97%

CAS Number 2673-72-5

Synonyms

trans-D-erythro-2-Amino-4-octadecene-1,3-diol hydrochloride

◆ SDS

◆ Certificate of Analysis

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H52427.MC	100mg	315.00	<input type="text"/>	Q
H52427.ME	500mg	1176.00	<input type="text"/>	Q

◆ Add to Cart

Bulk/Specialty

Print Quote

◆ Product Overview

◆ Health & Safety

◆ Documentation

### D-erythro-Sphingosine hydrochloride, 97%

MDL

MFCD08436977

### Chemical Properties

Formula

C<sub>18</sub>H<sub>37</sub>NO<sub>2</sub>·HCl

Formula Weight

335.96

Storage & Sensitivity

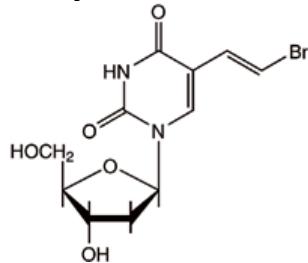
Ambient temperatures.

Ингибитор протеинкиназы С и кальмодулинзависимых ферментов, но может стимулировать тучные клетки путем активации протеинкиназы С.

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						73

## H27853 (E)-5-(2-Bromovinyl)-2'-deoxyuridine



H27853 (E)-5-(2-Bromovinyl)-2'-deoxyuridine [123]

### H27853 (E)-5-(2-Bromovinyl)-2'-deoxyuridine, 98%

CAS Number

69304-47-8

Synonyms

BVdU

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H27853.MF	50mg	52.90	<input type="text"/>	
H27853.MD	250mg	163.00	<input type="text"/>	
H27853.03	1g	453.00	<input type="text"/>	

Add to Cart

Bulk/Specialty

Print Quote

Product Overview

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### (E)-5-(2-Bromovinyl)-2'-deoxyuridine, 98%

MDL

MFCD00058585

### Chemical Properties

Formula

C<sub>11</sub>H<sub>13</sub>BrN<sub>2</sub>O<sub>5</sub>

Formula Weight

333.14

Melting point

ca 165° dec.

Storage & Sensitivity

Keep Cold.

Solubility

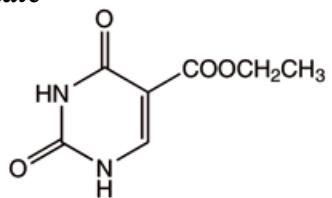
Soluble in water and methanol.

Он используется в качестве промежуточного фармацевтического продукта [124].

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## H26507 Ethyl uracil-5-carboxylate



H26507 Ethyl uracil-5-carboxylate [125]

### H26507 Ethyl uracil-5-carboxylate, 98%

CAS Number

28485-17-8

Synonyms

Isoorotic acid ethyl ester  
Uracil-5-carboxylic acid ethyl ester

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H26507.03	1g	46.80	<input type="text"/>	Q
H26507.06	5g	148.00	<input type="text"/>	Q

◆ Add to Cart

Bulk/Specialty

Print Quote

Product Overview

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### Ethyl uracil-5-carboxylate, 98%

MDL

MFCD00057337

EINECS

249-053-3

### Chemical Properties

Formula

C<sub>7</sub>H<sub>8</sub>N<sub>2</sub>O<sub>4</sub>

Storage & Sensitivity

Ambient temperatures.

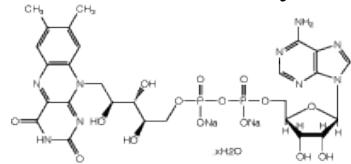
Formula Weight

184.15

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# A14495 Flavin adenine dinucleotide disodium salt hydrate



A14495 Flavin adenine dinucleotide disodium salt hydrate [126]

## A14495 Flavin adenine dinucleotide disodium salt hydrate, 94% (dry wt.), water <10%

CAS Number

1891059-93-0

Synonyms

FAD-Na2

Riboflavin 5'-adenosine diphosphate disodium salt

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

A14495.MC

100mg

42.60



A14495.ME

500mg

148.00



◆ Add to Cart

Bulk/Specialty

Print Quote

◆ Product Overview

◆ Health & Safety

◆ Documentation

### Flavin adenine dinucleotide disodium salt hydrate, 94% (dry wt.), water <10%

MDL

MFCD00151217

EINECS

282-733-8

### Chemical Properties

Formula

C<sub>27</sub>H<sub>31</sub>N<sub>9</sub>Na<sub>2</sub>O<sub>15</sub>P<sub>2</sub>•xH<sub>2</sub>O

Storage & Sensitivity

Keep Cold.

Formula Weight

829.52

Solubility

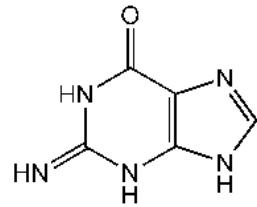
Soluble in water (50 mg/ml).

Флавинадениндинуклеотид (FAD) используется в качестве окислительно-восстановительного кофактора (переносчика электронов) флавопротеинами, включая сукцинатдегидрогеназу (комплекс),  $\alpha$ -кетоглутаратдегидрогеназу, фактор, вызывающий апоптоз 2 (AIF-M2, AMID), фолат / FAD-зависимые тРНК метилтрансферазы и N-гидроксилирующие флавопротеинмонооксигеназы. ФАД является компонентом комплекса пируватдегидрогеназы [127-128].

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## A12024 Guanine



A12024 Guanine [129]

### A12024 Guanine, 98%

CAS Number

73-40-5

Synonyms

2-Amino-6-hydroxypurine

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
A12024.14	25g	41.70	<input type="text"/>	
A12024.22	100g	111.00	<input type="text"/>	
A12024.36	500g	372.00	<input type="text"/>	

◆ Add to Cart

Bulk/Specialty

Print Quote

◆ Product Overview

◆ Health & Safety

◆ Documentation

### Guanine, 98%

MDL  
EINECS

MFCD00071533  
200-799-8

### Chemical Properties

Formula  
Melting point  
Solubility

C<sub>5</sub>H<sub>5</sub>N<sub>5</sub>O  
>300°  
Insoluble in water. Soluble  
in ammonia-water, KOH  
solutions, dilute acids, and  
1 N NaOH (0.1M).

Formula Weight  
Storage & Sensitivity

151.13  
Keep Cold.

Используется в качестве азотистого основания, включенного в биологические нуклеиновые кислоты. Гуанин - подходящий реагент, используемый для исследования механизма электрохимического окисления гуанина и аденина с использованием стеклоуглеродного микроэлектрода и циклической и дифференциальной импульсной вольтамперометрии. Его можно использовать при получении мономеров пептидной нуклеиновой кислоты (ПНК) со смешанной последовательностью [130-132].

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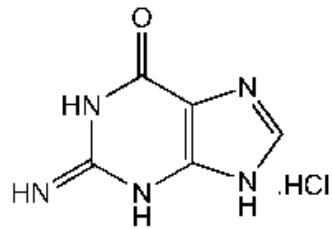
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## A11532 Guanine hydrochloride



A11532 Guanine hydrochloride [133]

### A11532 Guanine hydrochloride, 98%

CAS Number

635-39-2

Synonyms

2-Amino-6-hydroxypurine hydrochloride



Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
A11532.09	10g	29.50	<input type="text"/>	
A11532.18	50g	116.00	<input type="text"/>	
A11532.30	250g	434.00	<input type="text"/>	

Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### Guanine hydrochloride, 98%

MDL  
EINECS

MFCD00213670  
211-235-5

### Chemical Properties

Formula  
Melting point  
Solubility

C<sub>5</sub>H<sub>5</sub>N<sub>5</sub>O·HCl  
>300°  
Slightly soluble in water

Formula Weight  
Storage & Sensitivity

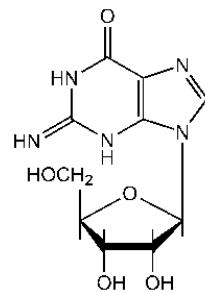
187.59  
Keep Cold.

Гидрохлорид гуанина - один из сильнейших денатурирующих агентов. Он в основном используется при очистке белков и исследованиях сворачивания белков. Это азотистое основание, используемое в биохимических исследованиях [134-135].

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## A11328 Guanosine



A11328 Guanosine [136]

### A11328 Guanosine, 98+%

CAS Number 118-00-3

Synonyms

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
A11328.14	25g	50.40	<input type="text"/>	Q
A11328.18	50g	85.90	<input type="text"/>	Q
A11328.22	100g	145.00	<input type="text"/>	Q
A11328.30	250g	341.00	<input type="text"/>	Q

◆ Add to Cart

Bulk/Specialty

Print Quote

Product Overview

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Documentation

### Guanosine, 98+%

MDL MFCD00010182  
EINECS 204-227-8

### Chemical Properties

Formula C<sub>10</sub>H<sub>13</sub>N<sub>5</sub>O<sub>5</sub>  
Melting point ca 250° dec.  
Solubility Soluble in Formic Acid:Water (1:1): 50 mg/mL. Insoluble in methanol, diethyl ether.

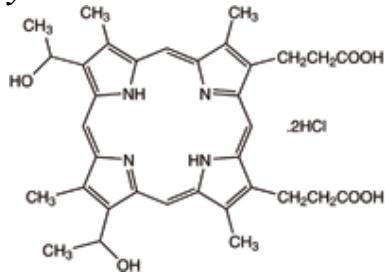
Formula Weight 283.24  
Storage & Sensitivity

Ambient temperatures.

Гуанозин используется в составе нуклеиновых кислот. Он используется в металлических красках, искусственном жемчуге, пластике, косметической промышленности и т. д. Он также использовался в фармакокинетике в качестве пролекарства. Гуанозин используется в клеточных культурах как предшественник GMP [137-138].

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# A18579 Hematoporphyrin dihydrochloride



A18579 Hematoporphyrin dihydrochloride [139]

## A18579 Hematoporphyrin dihydrochloride

CAS Number

17696-69-4

Synonyms

Haematoporphyrin dihydrochloride

Once available inventory is depleted, this item will no longer be available.

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

This item cannot be ordered online at this time. Please try again later, or request a bulk quote.

Bulk/Specialty

Product Overview

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### Hematoporphyrin dihydrochloride

MDL

EINECS

MFCD00013470

241-699-4

### Chemical Properties

Formula

Storage & Sensitivity

C<sub>34</sub>H<sub>38</sub>N<sub>4</sub>O<sub>6</sub>·2HCl

Ambient temperatures.

Formula Weight

Solubility

671.62

Insoluble in water. Soluble  
in pyridine (5%).

Эндогенный порфирин образуется в результате кислотного гидролиза гемоглобина. Он используется в качестве активного фармацевтического промежуточного соединения [140-141].

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## H26694 Meat Peptone

# H26694 Meat Peptone

CAS Number

73049-73-7

Synonyms

Peptones, meat

[◆ SDS](#)[▣ Certificate of Analysis](#) [ⓘ Product Specification](#) [ⓘ Technical Inquiry](#)

Stock No.	Size	Price (€)	Quantity	Availability
H26694.22	100g	45.10	<input type="text"/>	
H26694.36	500g	139.00	<input type="text"/>	

[🛒 Add to Cart](#)[Bulk/Specialty](#)[Print Quote](#)[Product Overview](#) [ⓘ Health & Safety](#) [ⓘ Documentation](#)

## Meat Peptone

MDL

MFCD00131829

EINECS

None

## Chemical Properties

Storage &amp; Sensitivity

Hygroscopic. Ambient temperatures.

Solubility

Soluble in water. Insoluble in alcohol.

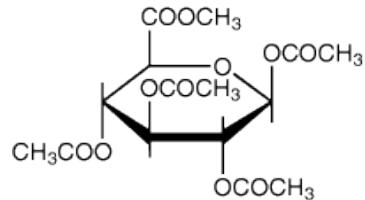
## H26694 Meat Peptone [142]

Пептон используется в питательных средах для выращивания бактерий и грибов. Мясо Пептон используется для обычного и массового культивирования организмов, который используется для производства антибиотиков, ферментов и витаминов. Он также полезен для выращивания различных микроорганизмов. Кроме того, он используется в питательных средах, в промышленности ферmentationи и в фармацевтической промышленности[143-144].

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### H31888 Methyl 1,2,3,4-tetra-O-acetyl-beta-D-glucuronate



H31888 Methyl 1,2,3,4-tetra-O-acetyl-beta-D-glucuronate [145]

### H31888 Methyl 1,2,3,4-tetra-O-acetyl-beta-D-glucuronate, 98%

CAS Number

7355-18-2

Synonyms

MTAG

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

H31888.MD

250mg

71.20

Q

H31888.03

1g

196.00

Q

Add to Cart

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Product Overview

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### Methyl 1,2,3,4-tetra-O-acetyl-beta-D-glucuronate, 98%

MDL

MFCD00069834

### Chemical Properties

Formula

C<sub>15</sub>H<sub>20</sub>O<sub>11</sub>

Melting point

177-181°

Formula Weight

376.32

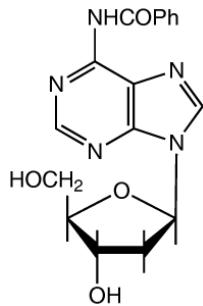
Storage & Sensitivity

Ambient temperatures.

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## H52303 N-Benzoyl-2'-deoxyadenosine



H52303 N-Benzoyl-2'-deoxyadenosine [146]

### H52303 N-Benzoyl-2'-deoxyadenosine, 98+%

CAS Number

4546-72-9

Synonyms

◆ SDS

◆ Certificate of Analysis

◆ Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

H52303.MD

250mg

40.80



H52303.03

1g

120.00



H52303.06

5g

477.00



Add to Cart

Bulk/Specialty

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### N-Benzoyl-2'-deoxyadenosine, 98+%

MDL

MFCD00009628

EINECS

224-903-6

### Chemical Properties

Formula

C<sub>17</sub>H<sub>17</sub>N<sub>5</sub>O<sub>4</sub>

Storage & Sensitivity

Ambient temperatures.

Formula Weight

355.35

Solubility

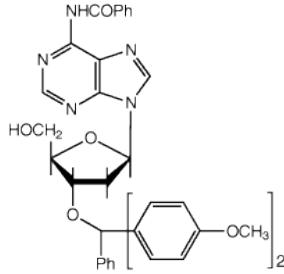
Soluble in water (slightly),  
and methanol (20 mg/ml).

Реагент в синтезе 2', 5'-дидезоксицитидинов и других производных 2'-дезоксицитидина. Реагент в синтезеmono- и диамино аналогов 2'-Деоксиаденозина, кордицепина, 9- (3-дезокси- $\alpha$ -D-трехпентофуранозил) -аденина и 9- (2-дезокси- $\alpha$ -D-трехпентофуранозила) аденин [147-148].

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## H52306 N-Benzoyl-3'-O-(4,4'-dimethoxytrityl)-2'-deoxyadenosine



H52306 N-Benzoyl-3'-O-(4,4'-dimethoxytrityl)-2'-deoxyadenosine [149]

### H52306 N-Benzoyl-3'-O-(4,4'-dimethoxytrityl)-2'-deoxyadenosine, 97+%

CAS Number

140712-79-4

Synonyms

◆ SDS

◆ Certificate of Analysis

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H52306.MD	250mg	84.20	<input type="text"/>	
H52306.03	1g	246.00	<input type="text"/>	
H52306.06	5g	988.00	<input type="text"/>	

Add to Cart

Bulk/Specialty

Print Quote

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### N-Benzoyl-3'-O-(4,4'-dimethoxytrityl)-2'-deoxyadenosine, 97+%

MDL

MFCD04972282

### Chemical Properties

Formula

C<sub>38</sub>H<sub>35</sub>N<sub>5</sub>O<sub>6</sub>

Formula Weight

657.73

Storage & Sensitivity

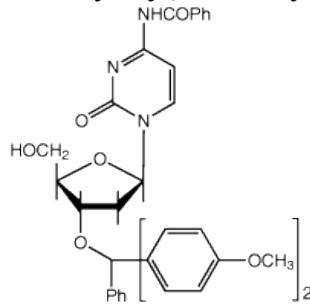
Ambient temperatures.

В качестве промежуточного фармацевтического продукта используется N-бензоил-3'-O- (4,4'-диметокситритил) -2'-дезоксиаденозин. N-бензоил-3'-O- (4,4'-диметокситритил) -2'-дезоксиаденозин используется в качестве промежуточного фармацевтического продукта.

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Взам. инв. №	
Инв. №	

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# H52799 N-Benzoyl-3'-O-(4,4'-dimethoxytrityl)-2'-deoxycytidine



H52799 N-Benzoyl-3'-O-(4,4'-dimethoxytrityl)-2'-deoxycytidine [150]

## H52799 N-Benzoyl-3'-O-(4,4'-dimethoxytrityl)-2'-deoxycytidine, 97%

CAS Number

140712-80-7

Synonyms

Once available inventory is depleted, this item will no longer be available.

◆ SDS

◆ Certificate of Analysis

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H52799.MD	250mg	65.20	<input type="text"/>	
H52799.03	1g	196.00	<input type="text"/>	
H52799.06	5g	783.00	<input type="text"/>	

◆ Add to Cart

Bulk/Specialty

Print Quote

◆ Product Overview

◆ Health & Safety

◆ Documentation

### N-Benzoyl-3'-O-(4,4'-dimethoxytrityl)-2'-deoxycytidine, 97%

MDL

MFCD04972285

### Chemical Properties

Formula

C<sub>37</sub>H<sub>35</sub>N<sub>3</sub>O<sub>7</sub>

Formula Weight

633.70

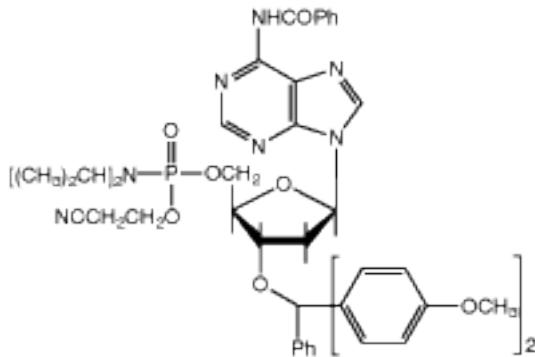
Storage & Sensitivity

Ambient temperatures.

Инв. №	Взам. инв. №	Инв. № дубл.	Подп. и дата

Изм.	Лист	№ докум.	Подп.	Дата	TH. YYY.001.БП1-1.М	Лист.
						85

**H52807 N-Benzoyl-5'-O-[(diisopropylamino)-(2-cyanoethoxy)phosphinyl]-3'-O-(4,4'-dimethoxytrityl)-2'-deoxyadenosine**



H52807 N-Benzoyl-5'-O-[(diisopropylamino)-(2-cyanoethoxy)phosphinyl]-3'-O-(4,4'-dimethoxytrityl)-2'-deoxyadenosine [151]

**H52807 N-Benzoyl-5'-O-[(diisopropylamino)-(2-cyanoethoxy)phosphinyl]-3'-O-(4,4'-dimethoxytrityl)-2'-deoxyadenosine, 97%**

CAS Number

140712-82-9

Synonyms

Once available inventory is depleted, this item will no longer be available.

◆ SDS

◆ Certificate of Analysis

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H52807.MD	250mg	89.80	<input type="text"/>	
H52807.03	1g	270.00	<input type="text"/>	

Add to Cart

Bulk/Specialty

Print Quote

Product Overview Health & Safety Documentation

**N-Benzoyl-5'-O-[(diisopropylamino)-(2-cyanoethoxy)phosphinyl]-3'-O-(4,4'-dimethoxytrityl)-2'-deoxyadenosine, 97%**

MDL

MFCD08706364

**Chemical Properties**

Formula

C<sub>47</sub>H<sub>52</sub>N<sub>7</sub>O<sub>8</sub>P

Formula Weight

873.95

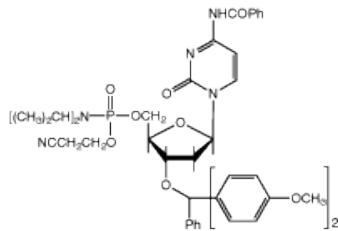
Storage & Sensitivity

Ambient temperatures.

Инв. №	Инв. № дубл.
Взам.инв.№	
Годл. и дата	

Изм.	Лист	№ докум.	Подп.	Дата	TH. YYY.001.БП1-1.М	Лист
						86

**H52732 N-Benzoyl-5'-O-[(diisopropylamino)-(2-cyanoethoxy)phosphinyl]-3'-O-(4,4'-dimethoxytrityl)-2'-deoxycytidine**



H52732 N-Benzoyl-5'-O-[(diisopropylamino)-(2-cyanoethoxy)phosphinyl]-3'-O-(4,4'-dimethoxytrityl)-2'-deoxycytidine [152]

**H52732 N-Benzoyl-5'-O-[(diisopropylamino)-(2-cyanoethoxy)phosphinyl]-3'-O-(4,4'-dimethoxytrityl)-2'-deoxycytidine, 97%**

CAS Number 140712-83-0

Synonyms

Once available inventory is depleted, this item will no longer be available.

◆ SDS

◆ Certificate of Analysis

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H52732.MD	250mg	83.00	<input type="text"/>	
H52732.03	1g	250.00	<input type="text"/>	
H52732.06	5g	999.00	<input type="text"/>	

Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

**N-Benzoyl-5'-O-[(diisopropylamino)-(2-cyanoethoxy)phosphinyl]-3'-O-(4,4'-dimethoxytrityl)-2'-deoxycytidine, 97%**

MDL

MFCD08706365

### Chemical Properties

Formula

C<sub>46</sub>H<sub>52</sub>N<sub>5</sub>O<sub>9</sub>P

Formula Weight

849.92

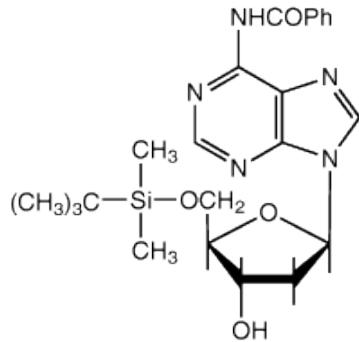
Storage & Sensitivity

Ambient temperatures.

Инв. №	Подп. и дата
Взам.инв.№	Инв. № дубл.
Годп. и дата	

Изм.	Лист	№ докум.	Подп.	Дата	TH. YYY.001.БП1-1.М	Лист.
						87

### H52309 N-Benzoyl-5'-O-tert-butyldimethylsilyl-2'-deoxyadenosine



H52309 N-Benzoyl-5'-O-tert-butyldimethylsilyl-2'-deoxyadenosine [153]

### H52309 N-Benzoyl-5'-O-tert-butyldimethylsilyl-2'-deoxyadenosine, 98+%

CAS Number

51549-39-4

Synonyms

◆ SDS

◆ Certificate of Analysis

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H52309.MD	250mg	49.50	<input type="text"/>	Q
H52309.03	1g	145.00	<input type="text"/>	Q
H52309.06	5g	630.00	<input type="text"/>	Q

◆ Add to Cart

Bulk/Specialty

Print Quote

Product Overview Health & Safety Documentation

### N-Benzoyl-5'-O-tert-butyldimethylsilyl-2'-deoxyadenosine, 98+%

MDL

MFCD04972281

### Chemical Properties

Formula

C<sub>23</sub>H<sub>31</sub>N<sub>5</sub>O<sub>4</sub>Si

Formula Weight

469.62

Storage & Sensitivity

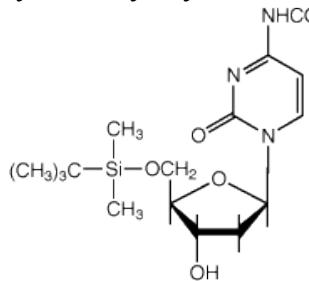
Ambient temperatures.

Н-Бензоил-5'-О-трет-бутилдиметилсилил-2'-дезоксиаденозин используется в качестве промежуточного фармацевтического продукта [154].

Инв. №	Подп. и дата
Взам. инв. №	Инв. № дубл.
Годп. и дата	Годп. и дата

Изм.	Лист	№ докум.	Подп.	Дата	TH. YYY.001.БП1-1.М	Лист.
						88

## H52296 N-Benzoyl-5'-O-tert-butyldimethylsilyl-2'-deoxycytidine



H52296 N-Benzoyl-5'-O-tert-butyldimethylsilyl-2'-deoxycytidine [155]

### H52296 N-Benzoyl-5'-O-tert-butyldimethylsilyl-2'-deoxycytidine, 98+%

CAS Number

51549-36-1

Synonyms

Once available inventory is depleted, this item will no longer be available.

◆ SDS

◆ Certificate of Analysis

◆ Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

H52296.03

1g

102.00



◆ Add to Cart

Bulk/Specialty

Print Quote

◆ Product Overview

◆ Health & Safety

◆ Documentation

### N-Benzoyl-5'-O-tert-butyldimethylsilyl-2'-deoxycytidine, 98+%

MDL

MFCD04972284

### Chemical Properties

Formula

C<sub>22</sub>H<sub>31</sub>N<sub>3</sub>O<sub>5</sub>Si

Formula Weight

445.59

Storage & Sensitivity

Ambient temperatures.

Инв. № подл.	Годл. и дата	Инв. № дубл.	Взам.инв.№
Изм.	Лист	№ докум.	Подп.

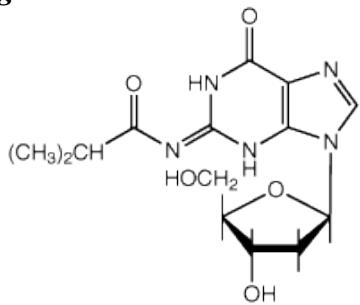
Изм.	Лист	№ докум.	Подп.	Дата
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TH.YYY.001.БП1-1.М

Лист

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## H52730 N-Isobutyryl-2'-deoxyguanosine



H52730 N-Isobutyryl-2'-deoxyguanosine [156]

### H52730 N-Isobutyryl-2'-deoxyguanosine, 97%

CAS Number

142554-22-1

Synonyms

◆ SDS

► Certificate of Analysis

?

 Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H52730.MD	250mg	38.30	<input type="text"/>	Q
H52730.03	1g	113.00	<input type="text"/>	Q
H52730.06	5g	448.00	<input type="text"/>	Q

Add to Cart Bulk/Specialty Print Quote

Product Overview Health & Safety Documentation

### N-Isobutyryl-2'-deoxyguanosine, 97%

MDL

MFCD02682949

### Chemical Properties

Formula

C<sub>14</sub>H<sub>19</sub>N<sub>5</sub>O<sub>5</sub>

Storage & Sensitivity

Ambient temperatures.

Formula Weight

337.34

Solubility

It is water soluble.

### Applications

N-Isobutyryl-2'-deoxyguanosine, is used as pharmaceutical intermediate.

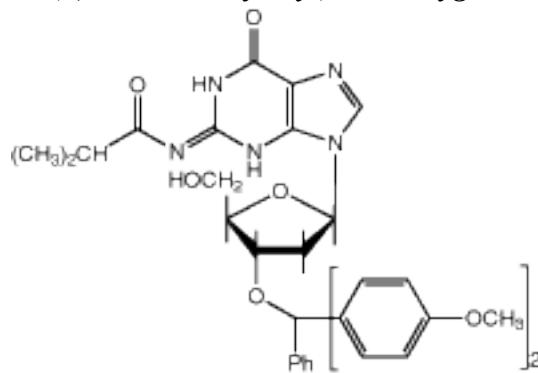
Н-Изобутирил-2'-дезоксигуанозин используется в качестве промежуточного фармацевтического продукта [157-158].

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Годп. и дата	

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TH.YYY.001.БП1-1.М

## H52746 N-Isobutyryl-3'-O-(4,4'-dimethoxytrityl)-2'-deoxyguanosine



H52746 N-Isobutyryl-3'-O-(4,4'-dimethoxytrityl)-2'-deoxyguanosine [159]

### H52746 N-Isobutyryl-3'-O-(4,4'-dimethoxytrityl)-2'-deoxyguanosine, 97%

CAS Number

Synonyms

Once available inventory is depleted, this item will no longer be available.

◆ SDS

◆ Certificate of Analysis

◆ Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

H52746.MD

250mg

84.60



H52746.03

1g

253.00



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### N-Isobutyryl-3'-O-(4,4'-dimethoxytrityl)-2'-deoxyguanosine, 97%

MDL

MFCD04972288

### Chemical Properties

Formula

C<sub>35</sub>H<sub>37</sub>N<sub>5</sub>O<sub>7</sub>

Formula Weight

639.71

Storage & Sensitivity

Ambient temperatures.

Инв. №	Бланк. №	Инв. № дубл.	Подп. и дата

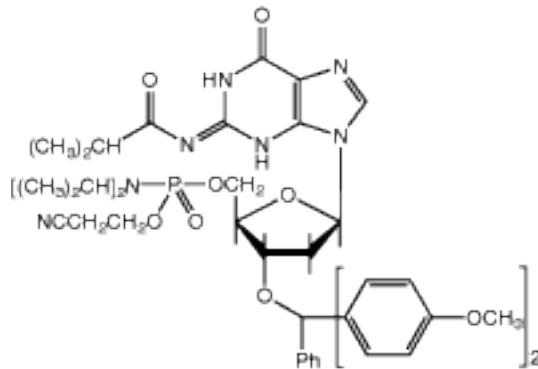
Изм.	Лист	№ докум.	Подп.	Дата

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Лист

91

**H52411 N-Isobutyryl-5'-O-[(diisopropylamino)-(2-cyanoethoxy)phosphinyl]-3'-O-(4,4'-dimethoxytrityl)-2'-deoxyguanosine**



H52411 N-Isobutyryl-5'-O-[(diisopropylamino)-(2-cyanoethoxy)phosphinyl]-3'-O-(4,4'-dimethoxytrityl)-2'-deoxyguanosine [160]

**H52411 N-Isobutyryl-5'-O-[(diisopropylamino)-(2-cyanoethoxy)phosphinyl]-3'-O-(4,4'-dimethoxytrityl)-2'-deoxyguanosine, 97%**

CAS Number

Synonyms

SDS

Certificate of Analysis

Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H52411.MD	250mg	90.00	<input type="text"/>	
H52411.03	1g	266.00	<input type="text"/>	

Add to Cart

Bulk/Specialty

Print Quote

Product Overview Health & Safety Documentation

**N-Isobutyryl-5'-O-[(diisopropylamino)-(2-cyanoethoxy)phosphinyl]-3'-O-(4,4'-dimethoxytrityl)-2'-deoxyguanosine, 97%**

MDL

MFCD04972289

**Chemical Properties**

Formula  
Storage & Sensitivity

C<sub>44</sub>H<sub>52</sub>N<sub>7</sub>O<sub>9</sub>P  
Ambient temperatures.

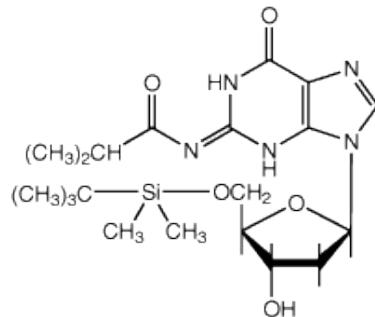
Formula Weight

853.91

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Взам.инв.№		
Годп.и дата		

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## H52726 N-Isobutyryl-5'-O-tert-butyldimethylsilyl-2'-deoxyguanosine



H52726 N-Isobutyryl-5'-O-tert-butyldimethylsilyl-2'-deoxyguanosine [161]

### H52726 N-Isobutyryl-5'-O-tert-butyldimethylsilyl-2'-deoxyguanosine, 97%

CAS Number

Synonyms



Stock No.

Size

Price (€)

Quantity

Availability

H52726.MD

250mg

53.50



H52726.03

1g

157.00



H52726.06

5g

626.00



### N-Isobutyryl-5'-O-tert-butyldimethylsilyl-2'-deoxyguanosine, 97%

MDL

MFCD04972287

### Chemical Properties

Formula

C<sub>20</sub>H<sub>33</sub>N<sub>5</sub>O<sub>5</sub>Si

Formula Weight

451.60

Storage & Sensitivity

Moisture Sensitive.  
Ambient temperatures.

Н-Изобутирил-5'-О-трет-бутилдиметилсилил-2'-дезоксигуанозин используется в качестве промежуточного фармацевтического продукта.

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Взам.инв.№	Инв. № дубл.
Инв. № подп.	Подп. и дата

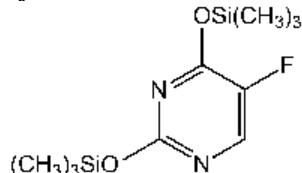
Изм.	Лист	№ докум.	Подп.	Дата
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Лист

93

# L16407 O,O'-Bis(trimethylsilyl)-5-fluorouracil



L16407 O,O'-Bis(trimethylsilyl)-5-fluorouracil [162]

## L16407 O,O'-Bis(trimethylsilyl)-5-fluorouracil, 97%

CAS Number

17242-85-2

Synonyms

2,4-Bis(trimethylsiloxy)-5-fluoropyrimidine

◆ SDS

◆ Certificate of Analysis

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
L16407.06	5g	102.00	<input type="text"/>	
L16407.14	25g	326.00	<input type="text"/>	

◆ Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### O,O'-Bis(trimethylsilyl)-5-fluorouracil, 97%

MDL  
EINECS

MFCD00042441  
000-000-0

### Chemical Properties

Formula  
Boiling Point  
Density  
Storage & Sensitivity

C<sub>10</sub>H<sub>19</sub>FN<sub>2</sub>O<sub>2</sub>Si<sub>2</sub>  
114°/14mm  
1.050  
Moisture Sensitive.  
Ambient temperatures.

Formula Weight  
Flash Point  
Refractive Index

274.44  
32°(89°F)  
1.4590

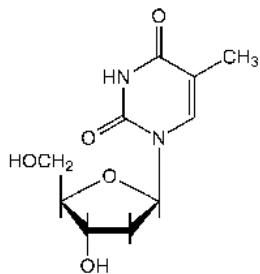
Инв. № подл.	Годл. и дата	Инв. № дубл.	Взам. инв. №	Взам. инв. №
Изм.	Лист	№ докум.	Подп.	Дата

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Лист

94

# A11493 Thymidine



A11493 Thymidine [163]

## A11493 Thymidine, 99%

CAS Number

50-89-5

Synonyms



SDS



Certificate of Analysis



Product Specification



Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
A11493.06	5g	82.50	<input type="text"/>	
A11493.14	25g	305.00	<input type="text"/>	
A11493.22	100g	717.00	<input type="text"/>	



Add to Cart



Bulk/Specialty



Print Quote

Product Overview

Health & Safety

Documentation

### Thymidine, 99%

MDL  
EINECS

MFCD00006537  
200-070-4

### Chemical Properties

Formula

C<sub>10</sub>H<sub>14</sub>N<sub>2</sub>O<sub>5</sub>

Melting point

186-190°

Solubility

Soluble in water, methanol, hot ethanol, hot acetone, hot ethyl acetate, pyridine, glacial acetic acid and hydrochloric acid. Slightly soluble in hot chloroform.

Formula Weight

Storage & Sensitivity

242.23

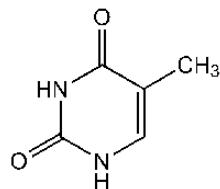
Ambient temperatures.

Тимидин используется при синтезе активного фармацевтического ингредиента, такого как зидовудин. Он также соединяется с дезоксиаденозином в двухцепочечной дезоксирибонуклеиновой кислоте. Он используется для синхронизации клеток в фазе G1 / ранней S в клеточной биологии [164-165].

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Взам.инв.№		
Инв. № подп.	Годп. и дата	

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						95

# A15879 Thymine



A15879 Thymine [166]

## A15879 Thymine, 97%

CAS Number 65-71-4

Synonyms

2,4-Dihydroxy-5-methylpyrimidine  
5-Methyluracil

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
A15879.14	25g	50.70	<input type="text"/>	
A15879.22	100g	161.00	<input type="text"/>	
A15879.36	500g	659.00	<input type="text"/>	

◆ Add to Cart

Bulk/Specialty

Print Quote

◆ Product Overview

◆ Health & Safety

◆ Documentation

### Thymine, 97%

MDL MFCD00006026  
EINECS 200-616-1

### Chemical Properties

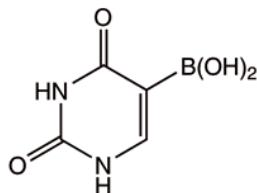
Formula C <sub>5</sub> H <sub>6</sub> N <sub>2</sub> O <sub>2</sub>	Formula Weight 126.12
Melting point 316-317°	Storage & Sensitivity Ambient temperatures.
Solubility Soluble in hot water. Slightly soluble in alcohol.	

Тимин является одним из четырех азотистых оснований, наряду с аденином, гуанином и цитозином, обнаруженных в дезоксирибонуклеиновых кислотах (ДНК). Тимин может быть использован для изучения химических процессов, которые влияют на структуру ДНК, таких как радиационно-индукционное образование радикалов, приводящее к реакциям сшивания оснований и дериватизациям. Тимин можно использовать для изучения параметров кинетики и энергии водородных связей с другими азотистыми основаниями, такими как аденин. Тимин используется для разработки чувствительных детекторов тяжелых металлов (ртути) на основе координационной химии и структур наночастиц [167].

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Взам. инв. №	Подп. и дата
Инв. № подп.	Подп. и дата

Изм.	Лист	№ докум.	Подп.	Дата	TH. YYY.001.БП1-1.М	Лист
						96

## H27219 Uracil-5-boronic acid



H27219 Uracil-5-boronic acid [168]

### H27219 Uracil-5-boronic acid, 95%

CAS Number

70523-22-7

Synonyms

2,4-Dioxo-1,2,3,4-tetrahydro-5-pyrimidinylboronic acid

SDS

Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

H27219.MD

250mg

183.00



H27219.03

1g

453.00



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### Uracil-5-boronic acid, 95%

MDL

MFCD01318983

### Chemical Properties

Formula

C<sub>4</sub>H<sub>5</sub>BN<sub>2</sub>O<sub>4</sub>

Melting point

>300°

Solubility

Slightly soluble in water.

Formula Weight

155.90

Storage & Sensitivity

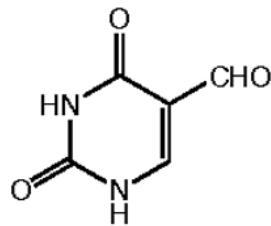
Store at -20°C.

Он находит свое применение при исследовании взаимодействий между бороновыми кислотами и цис-диол-содержащими биомолекулами с помощью аффинного капиллярного электрофореза. Он также используется в качестве активного фармацевтического промежуточного продукта [169].

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Изм.	Лист	№ докум.	Подп.	Дата	TH. YYY.001.БП1-1.М	Лист.
						97

# H51098 Uracil-5-carboxaldehyde



H51098 Uracil-5-carboxaldehyde [170]

## H51098 Uracil-5-carboxaldehyde, 97%

CAS Number 1195-08-0

Synonyms

5-Formyluracil

SDS

Certificate of Analysis

Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
H51098.MD	250mg	57.00	<input type="text"/>	
H51098.03	1g	184.00	<input type="text"/>	

Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### Uracil-5-carboxaldehyde, 97%

MDL

MFCD00192185

### Chemical Properties

Formula

C<sub>5</sub>H<sub>4</sub>N<sub>2</sub>O<sub>3</sub>

Formula Weight

140.10

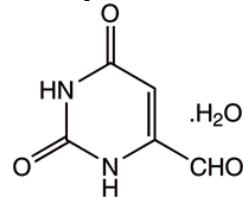
Storage & Sensitivity

Air Sensitive. Ambient temperatures.

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## H50469 Uracil-6-carboxaldehyde monohydrate



H50469 Uracil-6-carboxaldehyde monohydrate [171]

### H50469 Uracil-6-carboxaldehyde monohydrate, 98%

CAS Number

36327-91-0

Synonyms

6-Formyluracil monohydrate

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.

Size

Price (€)

Quantity

Availability

H50469.MD

250mg

68.40



H50469.03

1g

243.00



Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

### Uracil-6-carboxaldehyde monohydrate, 98%

MDL

MFCD03002359

#### Chemical Properties

Formula

C<sub>5</sub>H<sub>4</sub>N<sub>2</sub>O<sub>3</sub>·H<sub>2</sub>O

Formula Weight

158.11 (140.10anhy)

Storage & Sensitivity

Ambient temperatures.

Solubility

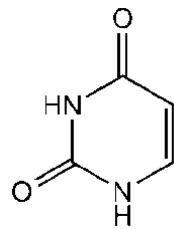
Slightly soluble in water.

Моногидрат урацил-6-карбоксальдегида используется в качестве промежуточных фармацевтических продуктов [172].

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# A15570 Uracil



A15570 Uracil [173]

## A15570 Uracil, 99+%

CAS Number 66-22-8

Synonyms

2,4-Dihydroxypyrimidine



Certificate of Analysis

Product Specification

Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
A15570.18	50g	40.20	<input type="text"/>	
A15570.30	250g	158.00	<input type="text"/>	
A15570.0B	1000g	513.00	<input type="text"/>	

Add to Cart

Bulk/Specialty

Print Quote

Product Overview

Health & Safety

Documentation

## Uracil, 99+%

MDL  
EINECS

MFCD00006016  
200-621-9

## Chemical Properties

Formula  
Melting point  
Solubility

C<sub>4</sub>H<sub>4</sub>N<sub>2</sub>O<sub>2</sub>  
ca 330°  
Soluble in water, aqueous ammonia, 1M sodium hydroxide solution and alkalies. Insoluble in ethanol and ether.

Formula Weight  
Storage & Sensitivity

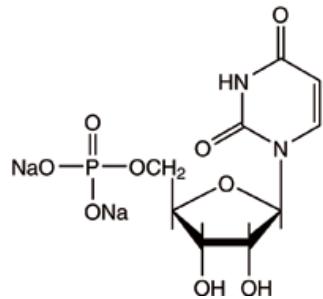
112.09  
Ambient temperatures.

Урацил производится путем гидролиза нукleinовой кислоты и используется в биохимических исследованиях. Он служит аллостерическим регулятором и коферментом для реакций в организме человека и растений. Он реагирует с фтором с образованием 5-фторурацила, который является противораковым препаратом. Кроме того, он используется для доставки лекарств и в фармацевтике. В дополнение к этому он используется в синтезе кофеина и при определении микробного загрязнения томатов [175-176]. Обзор использования урацилов в качестве исходных материалов в гетероциклическом синтезе [174].

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Инв.№ подп.		

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# A18601 Uridine-5'-monophosphate disodium salt



A18601 Uridine-5'-monophosphate disodium salt [177]

## A18601 Uridine-5'-monophosphate disodium salt, 99%

CAS Number

3387-36-8

Synonyms

5'-Uridylic acid disodium salt

◆ SDS

◆ Certificate of Analysis

◆ Product Specification

◆ Technical Inquiry

Stock No.	Size	Price (€)	Quantity	Availability
A18601.06	5g	73.70	<input type="text"/>	Q
A18601.14	25g	188.00	<input type="text"/>	Q
A18601.22	100g	541.00	<input type="text"/>	Q

◆ Add to Cart

Bulk/Specialty

Print Quote

◆ Product Overview

◆ Health & Safety

◆ Documentation

### Uridine-5'-monophosphate disodium salt, 99%

MDL

MFCD00006525

EINECS

222-211-9

### Chemical Properties

Formula

C<sub>9</sub>H<sub>11</sub>N<sub>2</sub>Na<sub>2</sub>O<sub>9</sub>P

Melting point

ca 209° dec.

Formula Weight

368.15

Storage & Sensitivity

Keep Cold.

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## Innovativeness

The innovation of the solution lies in the acceleration of the production of isotopically labeled nucleosides in comparison with the method of growing biological organisms in an isotopic medium, for example, *E. coli* in an isotopic ammonia medium, with the subsequent isolation of the drug.

## Created commercial product and its characteristics.

Based on the above, our team proposes to develop, within the framework of R&D, a technology for isotope labeling of nucleosides using a thermal neutron laboratory setup.

## Sources of alpha radiation

Элемент	Тип/код источника	$I_\alpha$ , Бк	$E_\alpha$ , МэВ	Назначение
Америций-241	АРИА(обр) AAm1.1.S1 AAm1.1.S2 AAm1.2.S1	- 500 1000 3000	5,4 – 5,5	Эталонные и контрольные источники
Кюрий-244	A3K244.28	$\geq 1,4 \cdot 10^8$	$\leq 5,2$	Для рентгенофлюоресцентного анализа
Плутоний-239	АИП-МИР-ЗА АИП-РИГ АДИ АИП-РИД АИП-ЭДГХ	$5,9 \cdot 10^7$ $4,10 \cdot 10^7$ $2,1 \cdot 10^7$ $2,1 \cdot 10^5$ $2,1 \cdot 10^7$	$\leq 5,2$	извещатели дыма, газовая хромотография, газоанализаторы, герметичные - придется разбирать
Pu-239	1П9 2П9 3П9 4П9 5П9 6П9	$4-1,6 \cdot 10^7$	$\leq 5,2$	для проверки и градуировки радиометрической аппаратуры в качестве мер активности
U-234	1У4 2У4 3У4 4У4 5У4 6У4	$1 \cdot 10^1 - 1 \cdot 10^3$	$\leq 4,8$	
U-238	1У8 2У8 3У8 4У8 5У8 6У8		$\leq 4,3$	

Table 2 - Sources of alpha radiation of the State Corporation "Rosatom" JSC "Isotop"

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neutron sources

Элемент	Тип/код источника	$I_n$ , Бк	$E_n$ , МэВ	Назначение
$^{252}\text{Cf}$ Калифорний-252	NCf2.P01	1200-40000	2,12	источник нейтронного излучения
$^{244}\text{Cm}$ Кюрий-244	NCm4.15.1 NCm4.15.2 NCm4.15.3 NCm4.15.4	$0,1 \cdot 10^4 - 3,0 \cdot 10^4$	быстрые	источник нейтронного излучения
$^{244}\text{Cm}$ Кюрий-248	HK248M11.44 HK248M11.26	$\leq 2,3 \cdot 10^5$	-	источники нейтронного излучения закрытые используются в качестве образцовых при аттестации источников нейтронного излучения и установок для нейтронных измерений.

Table 3 - Sources of neutron radiation of the State Corporation "Rosatom" JSC "Izotop"

**Sources of gamma radiation**

Элемент	Тип/код источника	$I_\gamma$ , МБк	$E_\gamma$ , МэВ	Назначение
$^{238}\text{Pu} + ^{13}\text{C}$	GPu8-C3	$\leq 0,185$	6,13	эталонный источник
Кобальт-57	ОИДК	0,037-370	0,0144 - 0,1365	эталонный источник
Кобальт-60		0,037-3,7	1,1732 - 1,3325	
Барий-133		0,037-37	0,0810-0,38385	
Цезий-137		0,037-37	0,6617	
Натрий-22	ОСГИ	0,001-1,000	1,274	для проверки и градуировки средств измерений
Титан-44			0,0689-1,157	фотонного излучения
Марганец-54			0,8348	
Железо-55			0,0059-0,0065	
Кобальт-57			0,0144-0,1365	
Кобальт-60			1,1732-13325	
Цинк-65			1,11554	
Иттрий-88			0,898-1,8361	
Кадмий-109			0,088	
Олово-113			0,2551-0,3917	
Барий-133			0,081-0,356	

Table 4 - Sources of gamma radiation of the State Corporation "Rosatom" JSC "Izotop"

As a result of the work, products with the following characteristics will be obtained:

Code	Quantity, mg	Price, €
H50287.03	1000	642
L19664.06	5000	366
H33038.06	5000	231
L03686.06	5000	272,4
44748.06	5000	495
A11166.06	5000	489
A16026.06	5000	489
H27412.03	1000	1251
H52741.06	5000	2745
H52408.06	5000	2487
B21190.MD		250
H61919.03		1000
L01996.06		5000

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L02292.06		5000		212,1
L01918.06		5000		435
44378.06		5000		867
L04452.06		5000		82,8
H27260.06		5000		963
B21034.MD		250		450
A14799.06		5000		63,3
A18507.03		1000		177,6
44639.06		5000		1680
L08490.06		5000		1311
L10861.03		1000		468
L16496.03		1000		262,2
L01682.06		5000		498
B25173.06		5000		552
A18994.09		10000		153,6
H64259.14		25000		195,3
H55913.06		5000		510
A12448.14		25000		129,3
44815.04		2000		1416
H52780.03		1000		810
H52301.03		1000		333
H52782.06		5000		2487
L16196.03		1000		387
44379.06		5000		4152
B25448.22		100000		327
L03332.22		100000		112,8
B21131.02		500		636
B21068.MA		10		89,7
B21985.06		5000		420
L01875.03		1000		149,1
H51694.03		1000		942
H66634.MD		250		1179
B24191.22		100000		58,8
44467.06		5000		702
L03544.03		1000		396
L02992.06		5000		210
A16964.09		10000		100,2
L14029.03		1000		136,8
L14051.06		5000		164,4
L14522.06		5000		459
A10781.09		10000		90,3
L09020.06		5000		453
H26557.22		100000		124,2
A13707.36		500000		133,2
H52427.MC		100000		945
H27853.03		1000		1359
H26507.06		5000		444
A14495.ME		500000		444
A12024.14		25000		125,1

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A11532.09	10000	88,5
A11328.14	25000	151,2
A18579	0	0
H26694.22	100000	135,3
H31888.03	1000	588
H52303.06	5000	1431
H52306.06	5000	2964
H52799.06	5000	2349
H52807.03	1000	810
H52732.06	5000	2997
H52309.06	5000	1890
H52296.03	1000	306
H52730.06	5000	1344
H52746.03	1000	759
H52411.03	1000	780
H52726.06	5000	1878
L16407.06	5000	306
A11493.06	5000	247,5
A15879.14	25000	152,1
H27219.03	1000	1359
H51098.03	1000	552
H50469.03	1000	729
A15570.18	50000	120,6
A18601.06	5000	221,1

And also for each article a production technology and drug control will be drawn up.

## **Plans for the creation and protection of intellectual property.**

In the course of work on the project, Heavy Nucleosides LLC plans to develop a technology for isotopic labeling of nucleosides. The developed technologies will be patented, and the software created during the development process will undergo state registration.

During the preliminary study of the proposed R&D project, the patent landscape was studied using the databases of the European Patent Office (espacenet.com). A preliminary patent search showed that there are no titles of protection that in any way hinders the promotion of the proposed product on the European market.

## **PROSPECTS FOR COMMERCIALIZATION**

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# **The volume and capacity of the product market, analysis of the current state and development prospects of the industry in which the innovative project is being implemented.**

Isotope-labeled nucleosides are used in genetic analysis and biotechnology research. The market is currently growing steadily.

The options for using the system by industry are considered:

- livestock and agriculture - development of PCR tests, production and conduct of PCR tests
- bigrama - conducting clinical trials of drugs on animals
- medicine - development and implementation of tests
- biology - study of molecular structures, development and implementation of tests
- materials science - neutron optics, spectrometry, structure analysis, production of new materials with isotopic doping
- quantum information systems - production, quality control
- radio industry - reliability tests under radiation background, quality control
- chemistry - studying the conditions of chemical processes, structures, production of radioisotope reagents
- geology - the study of the chemical composition and structure
- archeology - clarification of characteristics of isotope age determination

As you can see, the scope of application of labeled nucleosides is wide and the main goal will be to reduce the cost of drugs and the time of their production.

## **Competitive advantages**

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Working with sources of ionizing radiation requires certification and bringing laboratory equipment and organizational structure (job descriptions, work schedules, working conditions, personnel qualifications) in accordance with radiation safety standards, which in some cases will be either impossible or difficult for some reason: organizational , financial, political, environmental, etc. Therefore, faced with a similar problem, laboratories are forced to look for another way of research. Our product solves this problem. We label with long-lived non-radioactive isotopes. The use of isotopic methods can significantly accelerate scientific research in comparison with indirect methods, and conducting research in the immediate vicinity of the facility will allow the use of labeling with short-lived isotopes, which may be useful in studies of the kinetics of the process.

## **Planned cost of the product. Cost calculation.**

The cost of a product consists of the following components:

1. One-time, which in turn are divided into:

- 1.1. Laboratory retrofitting costs
- 1.2. Software development costs - marketing platform

These costs are one-time

2. Current, which are divided into:

- 2.1. Direct costs of making experiments:
  - 2.2.1. Materials.
  - 2.2.2. Works and services performed by third parties.
- 2.2. Direct costs of maintaining a marketing platform

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### 2.3. Indirect costs

The development time will be 1 year and the cost is 3 million rubles.

Cost item	Сумма, €
Wage	15 000
Tax	1 500
Payment for the work of co-executors	10 000
Materials	23 500
Overheads	10 000
Total:	40 000

Target segments of consumers of the created product and assessment of effective demand

In the B2B sector, our clients can be:

- Laboratories for genetic analysis.
- Biotech companies
- Chemical industry - studying the conditions of chemical processes, structures, production of radioisotope reagents
- Livestock and agriculture - development of PCR tests, production of PCR tests
- Bigfarma - labeling of clinical drugs
- Medicine - development of labeled tests
- Biology - study of molecular structures, test development
- Materials science - neutron optics, spectrometry, structure analysis, production of new materials with isotopic doping

## Description of the business model of the project. Promotion strategy.

Initially, it is planned to create a laboratory, purchase material and conduct experiments to obtain the timing and volumes of the yield of useful products, after which the conclusion of contracts for the production of isotopically labeled nucleosides. After analyzing the market, material will be purchased for the production of finished products, without prior ordering. Production will be gradually automated and the transition to an automated technological process will be fully implemented.

Based on the results of the laboratory's work and the demand for drugs, the system will be scaled up - expanding the existing laboratory and organizing new production laboratories.

## PROJECT TEAM

### The number of employees, the direction of their activities and their qualifications

Currently, the project employs 3 people:

Неп.нр.	Full name	Employment type	Role in the project team	Qualification
1	Yukhnovsky Ilya Alexandrovich	In the state	CEO, founder	Physicist, programmer
2	Trubin Mikhail Yurievich	In the state	Founder	Chemist, programmer
3	Yukhnovskaya Natalia Nikolaevna	In the state	Founder	Accountant, clerk

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# TECHNICAL SUPPORT OF PROJECT IMPLEMENTATION

## Calendar plan

The entire startup is planned to be implemented in 12 months

The following stages will be identified in the project implementation timeline:

Stage 1: organizing a laboratory, purchasing nucleosides, conducting experiments

Stage 2: laboratory automation, creation of the basic functionality of a cloud marketing application, production.

## Availability of fixed assets and required space for project implementation

For the implementation of the project in Russia, it is possible to use a laboratory certified for working with radioactive materials and an agreement was obtained with the director of the V.I. academician F.M. Mitenkov.

Also, the institute is going to meet the project in the joint use of the available laboratory equipment. Lab images are shown below:



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If interested organizations or universities have it, it is possible to create a laboratory on their territory, and due to the fact that the requirement for the heat flux of neutrons is low, it is possible to replace the thermal column with an alpha radiation source with a beryllium target, in accordance with radiation safety standards and regulatory requirements for work with ionizing radiation of the state where the beneficiary is located.

## FINANCIAL PLAN

### Total project financing

The total need for funds required for the project is 40,000 euros. It is planned to raise funds by participating in an accelerator and business development programs, attracting the full amount for 49% of the company's share. The participants' own contribution to the project will be carried out by knowledge and intellectual work.

### Previously attracted financing for the implementation of the project from budgetary and non-budgetary sources

Previously, no funds were attracted from any credit sources for the development of the project. Much has already been done at its own expense, namely, the idea of a biotechnological laboratory was born in the Docophila startup, competencies in nuclear medicine and bioengineering have been developed by the participants for over 20 years.

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# Key economic targets

The preliminary planning period for calculating the economic indicators of the project is 1 year. According to the planned economic calculations (see Appendix 1), it is planned to make a profit starting from the 1st year of the project implementation. Payback ratio (ROI) by the end of the planning period 2021-2022 reaches the level of 159.13%.

## Possible moments, types and sources of risks, measures

### to reduce them

During the preparation of the business plan for the project, an analysis was made for the project's resistance to various kinds of risks. During the analysis, it was possible to classify the risks into groups. The result of the analysis showed a good level of resistance and a margin of safety to the risks of different groups. In order to further increase resilience, it is necessary to consider groups of risks and assess the possibility of occurrence for each case.

#### Scientific and technical risks

Since the project is at the development stage, despite the good scientific groundwork, there is a risk of outstripping and entering the market for similar products of competing companies. However, given the wide range of applications of the technology, it is possible to quickly modify the functionality of laboratory equipment, taking into account the customer's requirements. Thus, the risk of this group can be assessed as "Low", however, the company will still take measures to reduce the risks of this group, protecting the property rights to algorithms, robotic units, reactors and software developed as part of the project.

#### Market risks

Market risk is the appearance on the market of new competitors of the company, which could not be taken into account in the course of the analysis. Reducing the risks of this group is due to the rather tight deadlines for research and development. The risks of this group can be characterized as "Medium".

#### Operational risks

The risks were considered:

- Late procurement of laboratory equipment
- Rising prices for components used in the project and laboratory equipment
- Force majeure of co-executors providing reactor production services
- Sharp rise in prices for consumables

Most of the risks that fall into this group are rated as "Medium", but we will try to minimize them by urgently purchasing equipment and consumables to minimize the risk of inflation. We estimate the risks of non-fulfillment of obligations by the contractors as "Low".

#### Regulatory risks

Regulatory risks include changes in the regulatory framework that prohibit our use of sources of ionizing radiation. According to our estimates, this option is referred to as "Medium" risk levels.

#### Financial risks

The main risk of this group is the possible failure to fulfill the credit obligations assumed. This risk will be minimized by a possible refusal to attract credit funds at the start stage, not counting sowing. According to our estimates, this option is referred to as "Medium" risk levels.

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H50287.03	19260	214		
L19664.06	10980	122		
H33038.06	6930	77		
L03686.06	8172	90,8		
44748.06	14850	165		
A11166.06	14670	163		
A16026.06	14670	163		
H27412.03	37530	417		
H52741.06	82350	915		
H52408.06	74610	829		
B21190.MD	15480	172		
H61919.03	8514	94,60		
L01996.06	3492	38,8		
L02292.06	6363	70,7		
L01918.06	13050	145		
44378.06	26010	289		
L04452.06	2484	27,6		
H27260.06	28890	321		
B21034.MD	13500	150		
A14799.06	1899	21,10		
A18507.03	5328	59,20		
44639.06	50400	560		
L08490.06	39330	437		
L10861.03	14040	156		
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B25173.06	16560	184		
A18994.09	4608	51,2		
H64259.14	5859	65,1		
H55913.06	15300	170		
A12448.14	3879	43,1		
44815.04	42480	472		
H52780.03	24300	270		
H52301.03	9990	111		
H52782.06	74610	829		
L16196.03	11610	129		
44379.06	124560	1384		
B25448.22	9810	109		
L03332.22	3384	37,6		
B21131.02	19080	212		
B21068.MA	2691	29,9		
B21985.06	12600	140		
L01875.03	4473	49,7		
H51694.03	28260	314		
H66634.MD	35370	393		
B24191.22	1764	19,6		
44467.06	21060	234		
L03544.03	11880	132		
L02992.06	6300	70		
A16964.09	3006	33,4		
L14029.03	4104	45,6		
L14051.06	4932	54,8		
L14522.06	13770	153		
A10781.09	2709	30,1		
L09020.06	13590	151		
H26557.22	3726	41,4		
A13707.36	3996	44,4		
H52427.MC	28350	315		
H27853.03	40770	453		
H26507.06	13320	148		

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A14495.ME			13320		148	
A12024.14			3753		41,7	
A11532.09			2655		29,5	
A11328.14			4536		50,4	
A18579			0		0	
H26694.22			4059		45,1	
H31888.03			17640		196	
H52303.06			42930		477	
H52306.06			88920		988	
H52799.06			70470		783	
H52807.03			24300		270	
H52732.06			89910		999	
H52309.06			56700		630	
H52296.03			9180		102	
H52730.06			40320		448	
H52746.03			22770		253	
H52411.03			23400		260	
H52726.06			56340		626	
L16407.06			9180		102	
A11493.06			7425		82,5	
A15879.14			4563		50,7	
H27219.03			40770		453	
H51098.03			16560		184	
H50469.03			21870		243	
A15570.18			3618		40,2	
A18601.06			6633		73,7	
H50287.03			19260		214	
Накладные расходы			320 000	3 555		
Продажи готовой продукции					5 520	61 338
					393	
H50287.03					57780	642
L19664.06					32940	366
H33038.06					20790	231
L03686.06					24516	272,4
44748.06					44550	495
A11166.06					44010	489
A16026.06					44010	489

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H27412.03				112590	1251
H52741.06				247050	2745
H52408.06				223830	2487
B21190.MD				46440	516
H61919.03				25542	283,8
L01996.06				10476	116,4
L02292.06				19089	212,1
L01918.06				39150	435
44378.06				78030	867
L04452.06				7452	82,8
H27260.06				86670	963
B21034.MD				40500	450
A14799.06				5697	63,3
A18507.03				15984	177,6
44639.06				151200	1680
L08490.06				117990	1311
L10861.03				42120	468
L16496.03				23598	262,2
L01682.06				44820	498
B25173.06				49680	552
A18994.09				13824	153,6
H64259.14				17577	195,3
H55913.06				45900	510
A12448.14				11637	129,3
44815.04				127440	1416
H52780.03				72900	810
H52301.03				29970	333
H52782.06				223830	2487
L16196.03				34830	387
44379.06				373680	4152
B25448.22				29430	327
L03332.22				10152	112,8
B21131.02				57240	636
B21068.MA				8073	89,7
B21985.06				37800	420
L01875.03				13419	149,1
H51694.03				84780	942
H66634.MD				106110	1179
B24191.22				5292	58,8
44467.06				63180	702
L03544.03				35640	396
L02992.06				18900	210
A16964.09				9018	100,2
L14029.03				12312	136,8
L14051.06				14796	164,4
L14522.06				41310	459
A10781.09				8127	90,3
L09020.06				40770	453
H26557.22				11178	124,2

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A13707.36			11988	133,2
H52427.MC			85050	945
H27853.03			122310	1359
H26507.06			39960	444
A14495.ME			39960	444
A12024.14			11259	125,1
A11532.09			7965	88,5
A11328.14			13608	151,2
A18579			0	0
H26694.22			12177	135,3
H31888.03			52920	588
H52303.06			128790	1431
H52306.06			266760	2964
H52799.06			211410	2349
H52807.03			72900	810
H52732.06			269730	2997
H52309.06			170100	1890
H52296.03			27540	306
H52730.06			120960	1344
H52746.03			68310	759
H52411.03			70200	780
H52726.06			169020	1878
L16407.06			27540	306
A11493.06			22275	247,5
A15879.14			13689	152,1
H27219.03			122310	1359
H51098.03			49680	552
H50469.03			65610	729
A15570.18			10854	120,6
A18601.06			19899	221,1
Итого:	3 000 000		5 520 393	61 338

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