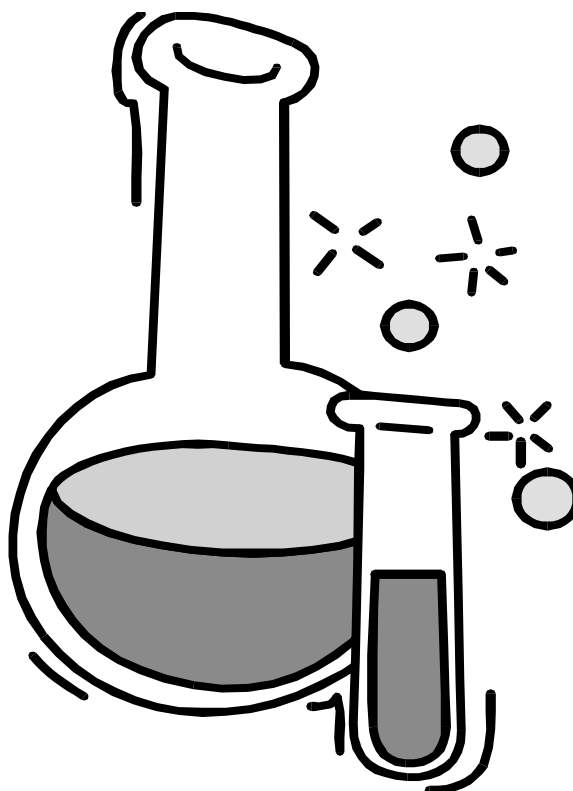


V. A. Philippova, A.V. Lusenкова, L. V.Chernishova

Structure of compounds studied in bioorganic chemistry



Gomel 2011

MINISTRY OF HEALTH CARE REPUBLIC OF BELARUS
GOMEL STATE MEDICAL UNIVERSITY

Department of general and bioorganic chemistry

V. A. Philippova, A.V. Lusenкова, L. V.Chernishova

Structure of compounds studied in bioorganic chemistry

УДК 577.(072)=20
ББК 24.2я73
Ф 53

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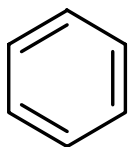
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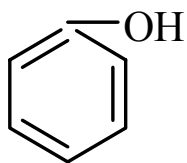
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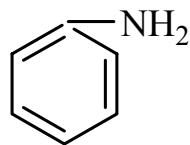
AROMATIC & CONJUGATED MOLECULAS



Benzene



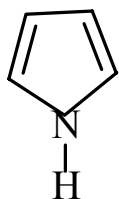
Phenol



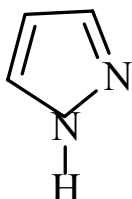
Aniline



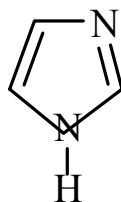
Cyclopentadienyl
anion



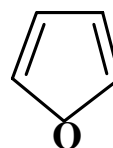
Pyrrole



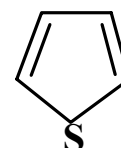
Imidazole



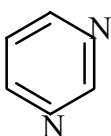
Imidazole



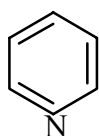
Furan



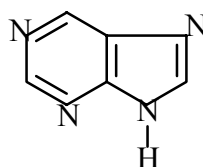
Thiophene



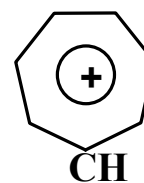
Pyrimidine



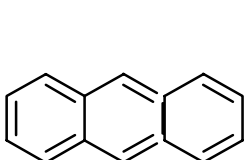
Pyridine



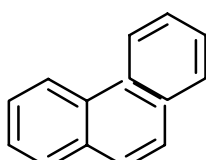
Purine



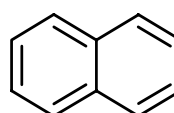
Cycloheptatrienyl
cation



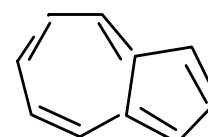
Anthracene



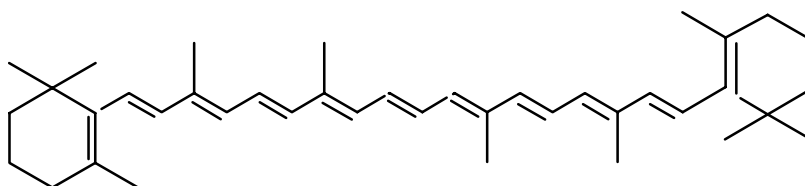
Phenanthrene



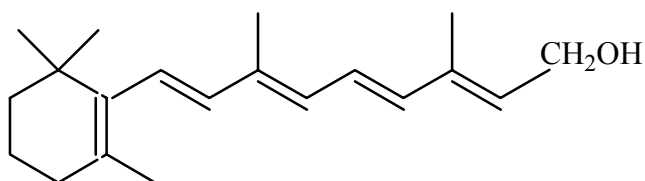
Naphthalene



Azulene

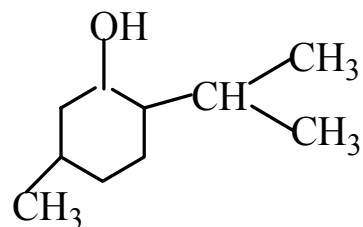
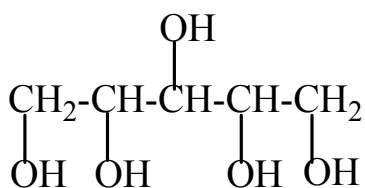
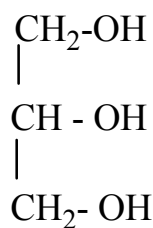
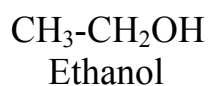


β -Carotene



Vitamin A (retinol)

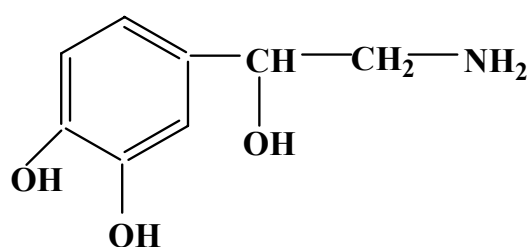
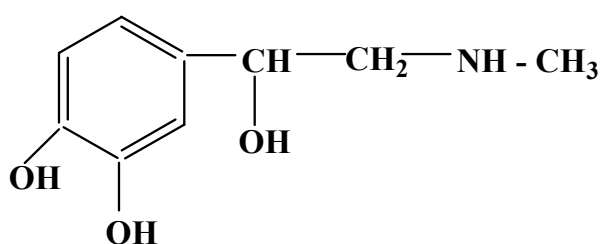
ALCOHOLS



Glycerol

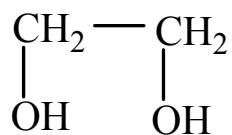
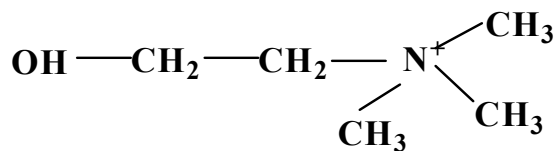
Xylitol

Menthol



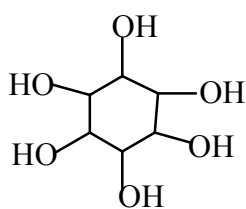
Adrenaline

Noradrenalin

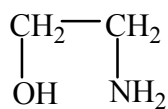


Choline

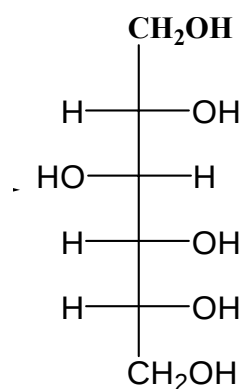
Ethyldiol-1,2



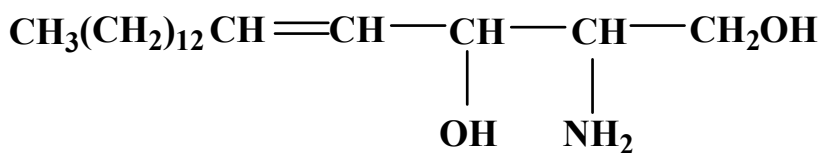
Inosit



Ethanolamine or Colamine

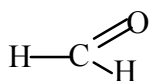


Sorbitol

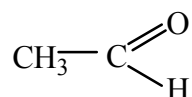


Sphingosine

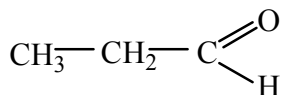
ALDEHYDES & KETONES



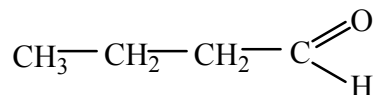
Methanal or formaldehyde



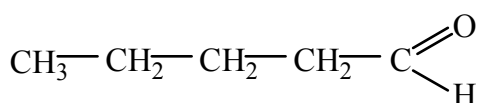
Ethanal or acetaldehyde



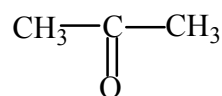
Propanal or propionic aldehyde



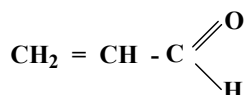
Butanal or butyric aldehyde



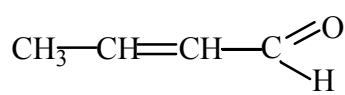
Pentanal or valeric aldehyde



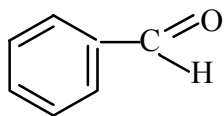
acetone



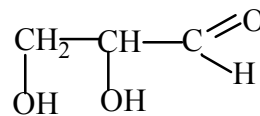
Propenal or Acroleine



Butene-2-al or Crotonic aldehyde



Benzoic aldehyde



Glyceraldehyde

CARBOXYLIC ACIDS

Saturated monocarboxylic acids



Formic or methanoic acid



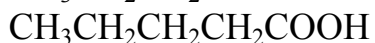
Acetic or ethanoic acid



Propionic or propanoic acid



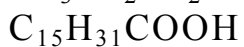
Butyric or Butanoic acid



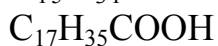
Valeric or Pentanoic acid



Caproic or Hexanoic acid



Palmitic acid

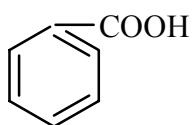


Steric acid

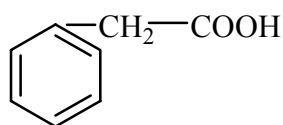
Saturated dicarboxylic acids

$\text{HOOC}-\text{COOH}$ Oxalic or ethanedioic acid
 $\text{HOOC}-\text{CH}_2-\text{COOH}$ Malonic or propanedioic acid
 $\text{HOOC}-\text{CH}_2-\text{CH}_2-\text{COOH}$ Succinic or butanedioic acid
 $\text{HOOC}-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{COOH}$ Glutaric or pentanedioic acid

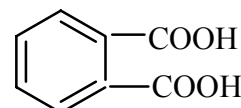
Aromatic carboxylic acids



Benzoic or
Benzene carboxylic acid

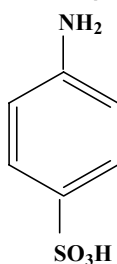


Phenyl-acetic acid

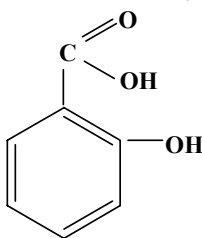


Terephthalic acid

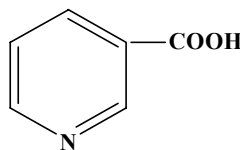
Hetero functional aromatic carboxylic acids



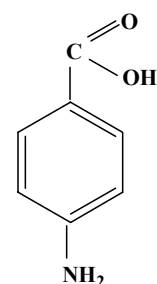
p- sulfanilic acid



salicylic acid



Nicotinic acid



PABA
(para-aminobenzoic acid)

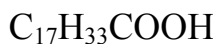
Unsaturated carboxylic acid



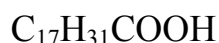
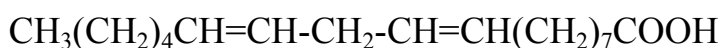
Acrylic acid
Propenoic acid



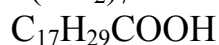
Crotonic acid
Butane-2-oic acid



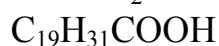
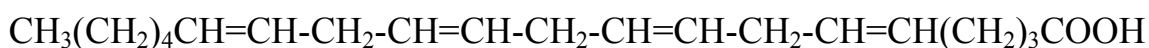
Oleic acid



Linoleic acid

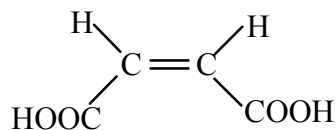


Linolenic acid

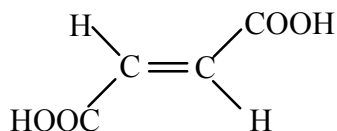


Arachidonic acid

Unsaturated dicarboxylic acids

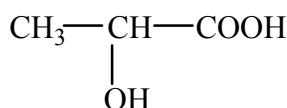


Maleic acid or
cis-butenedioic acid

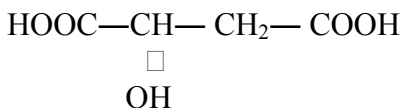


Fumaric acid or
trans- butenedioic acid

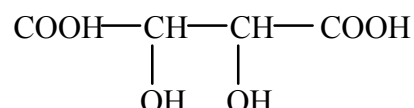
Hydroxy carboxylic acids



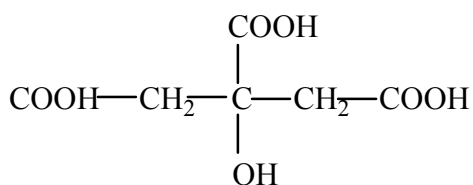
Lactic acid
2-Hydroxy propanoic acid



Malic acid

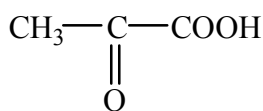


Tartaric acid

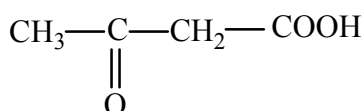


Citric acid

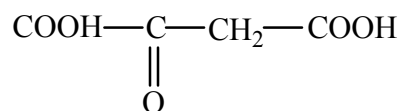
Keto carboxylic acids or oxo carboxylic acid



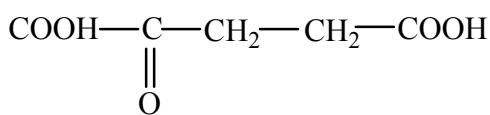
Pyruvic acid



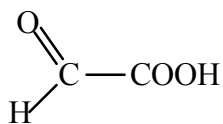
Acetoacetic acid



Oxaloacetic acid

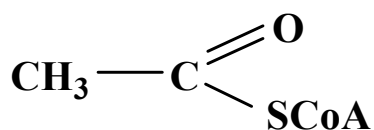


α -Ketoglutaric acid

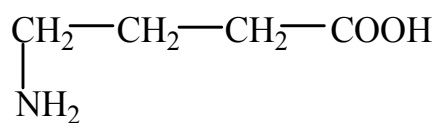


glyoxilic acid

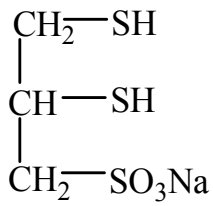
OTHER COMPOUNDS



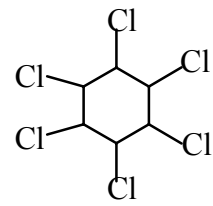
Acetyl Co A (Acetyl coenzyme A)



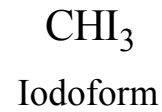
γ -aminobutyric acid



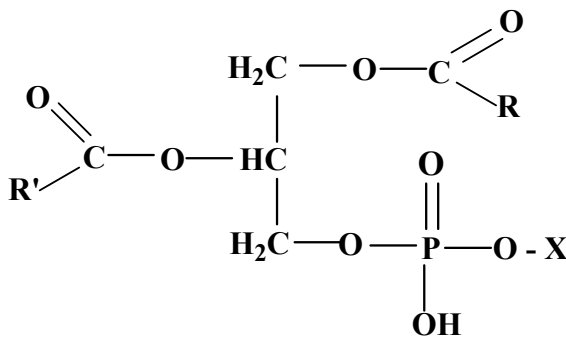
BAL



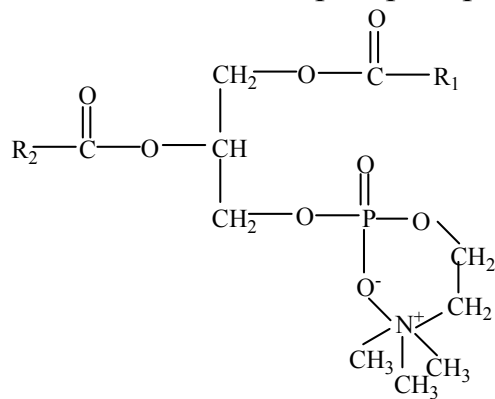
Hexachloran



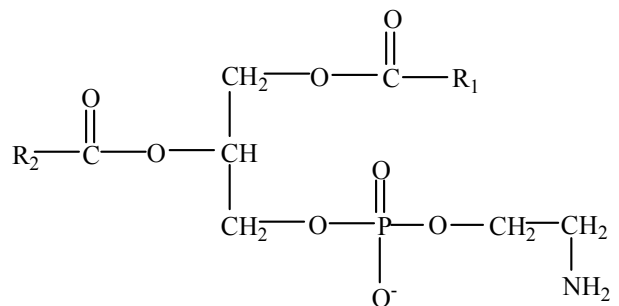
LIPIDS



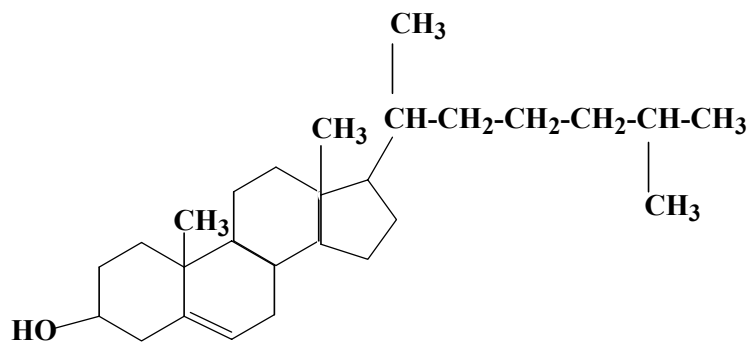
General formula for phospholipids



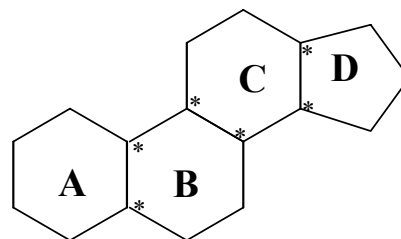
Phosphatidylcholine (lecithin)



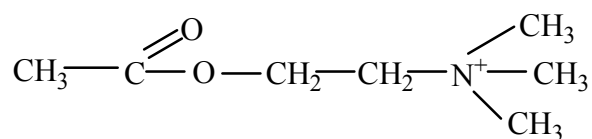
phosphatidylethanolamine (cephaline)



Cholesterol

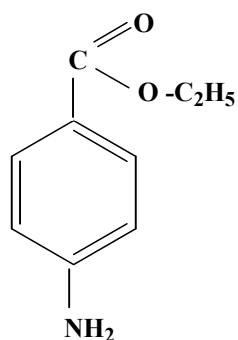


Steroid ring



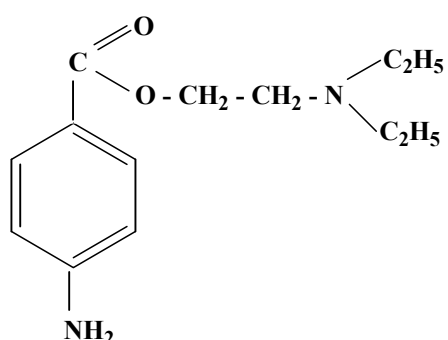
Acetylcholine

HETERO FUNCTIONAL COMPOUNDS



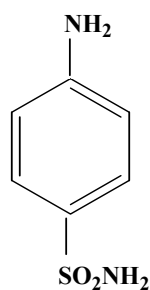
Anesthesine

Ethyl Ester of PABA

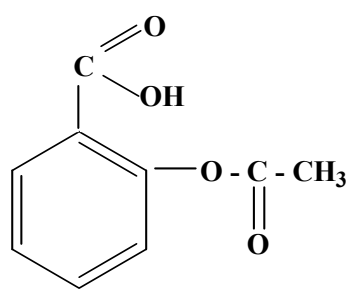


Novocain

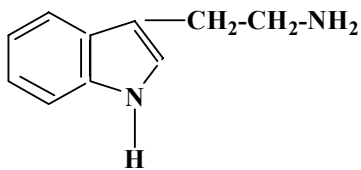
Ester of PABA and
N-diethylaminoethanol



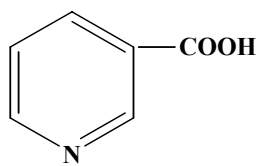
Sulfanilamide



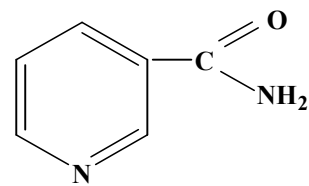
Aspirin (Acetylsalicylic acid)



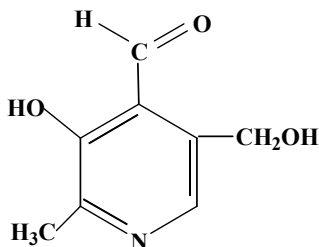
Tryptamine



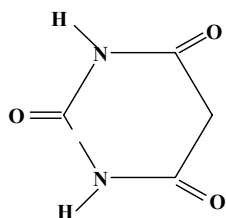
Nicotinic acid



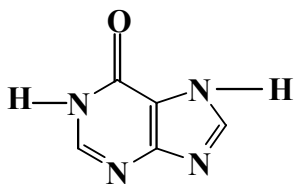
Nicotinamide



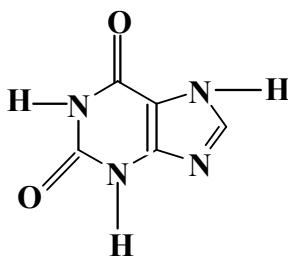
Pyridoxine



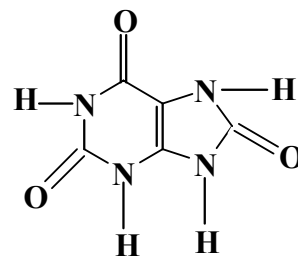
Barbituric acid



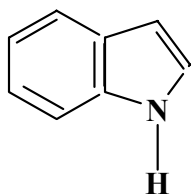
Hypoxanthine
6-oxopurine



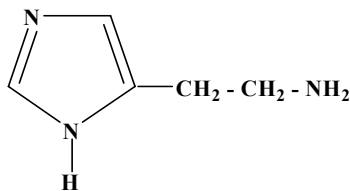
Xanthine
2,6-dioxopurine



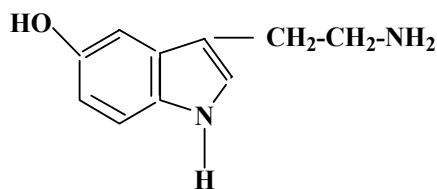
Uric acid
2,6,8-trioxopurine



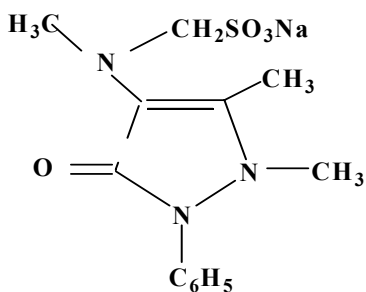
Indole



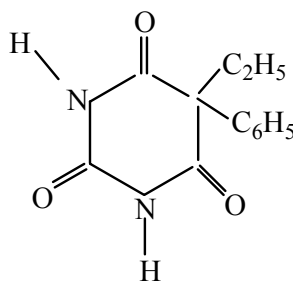
Histamine



Serotonin



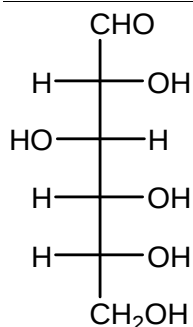
Analine



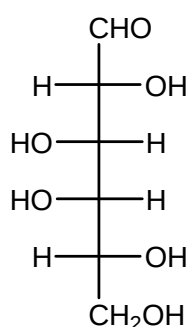
Phenobarbital

CARBOHYDRATES

Monosaccharides

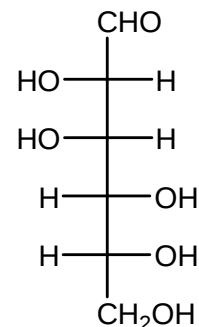


D-glucose



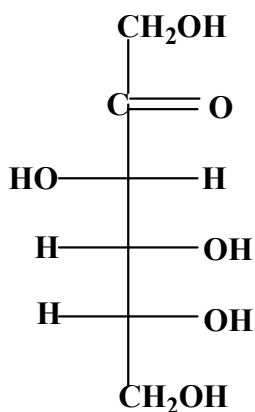
D-galactose

Epimer of glucose at C-4

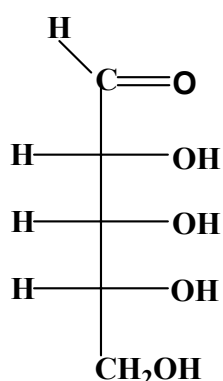


D-mannose

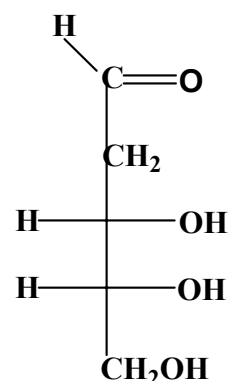
Epimer of glucose at C-2



D-fructose

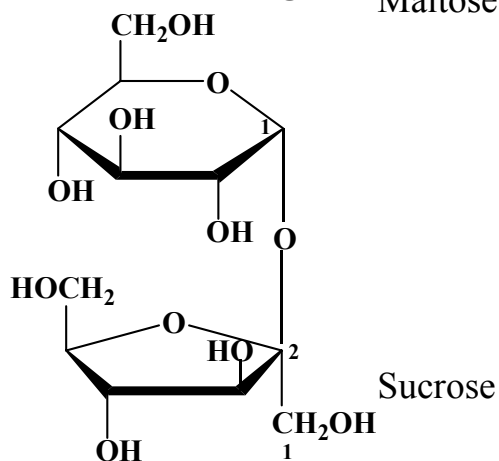
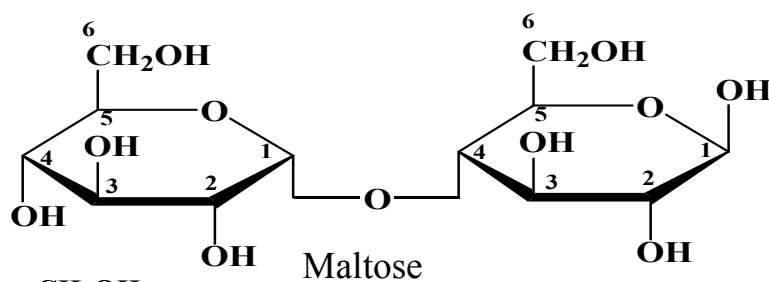


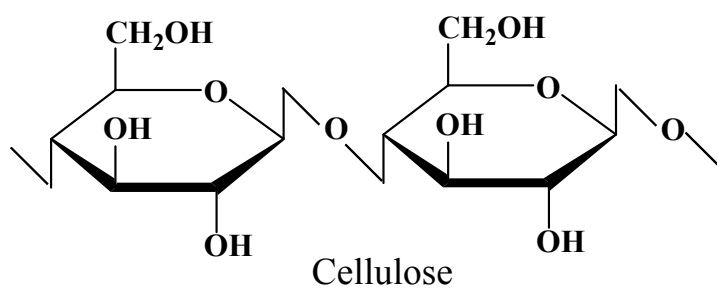
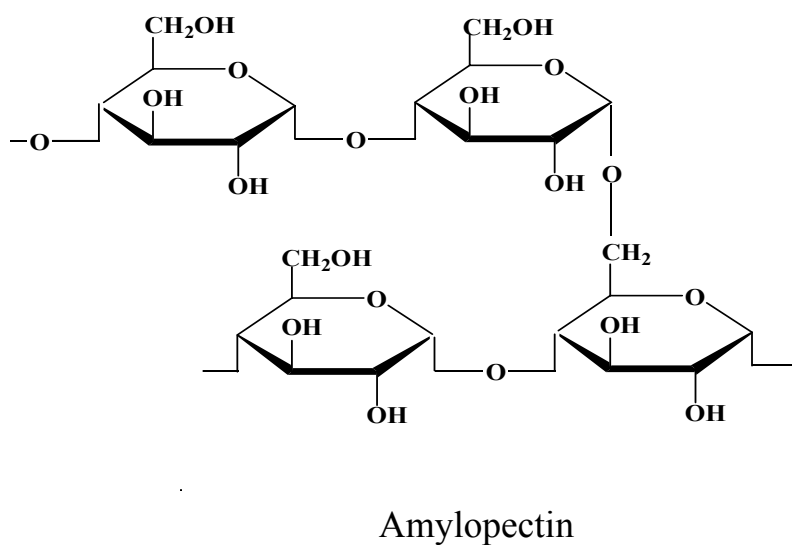
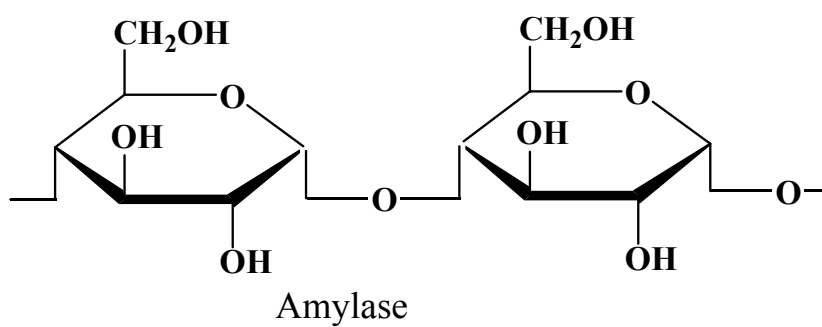
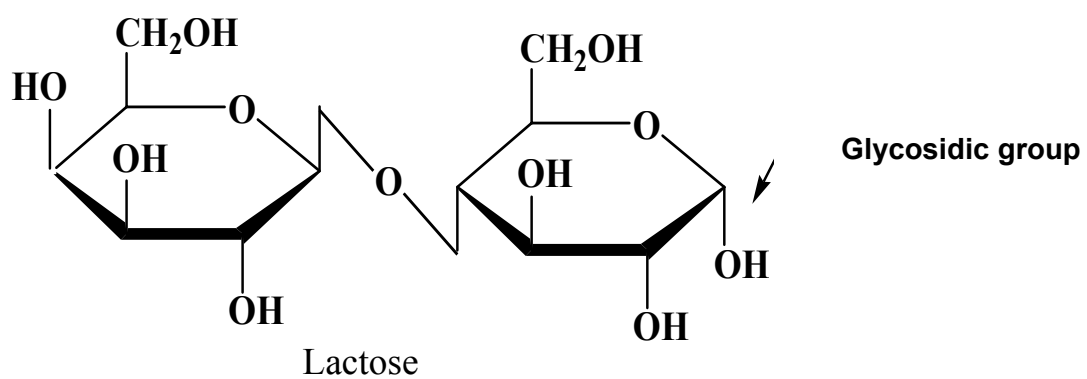
D-ribose

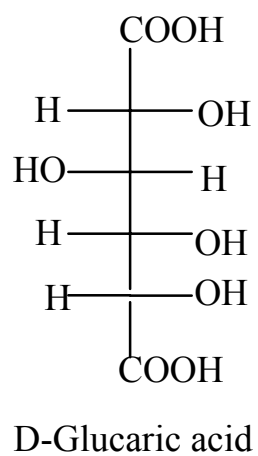
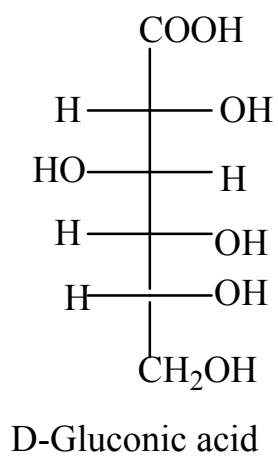
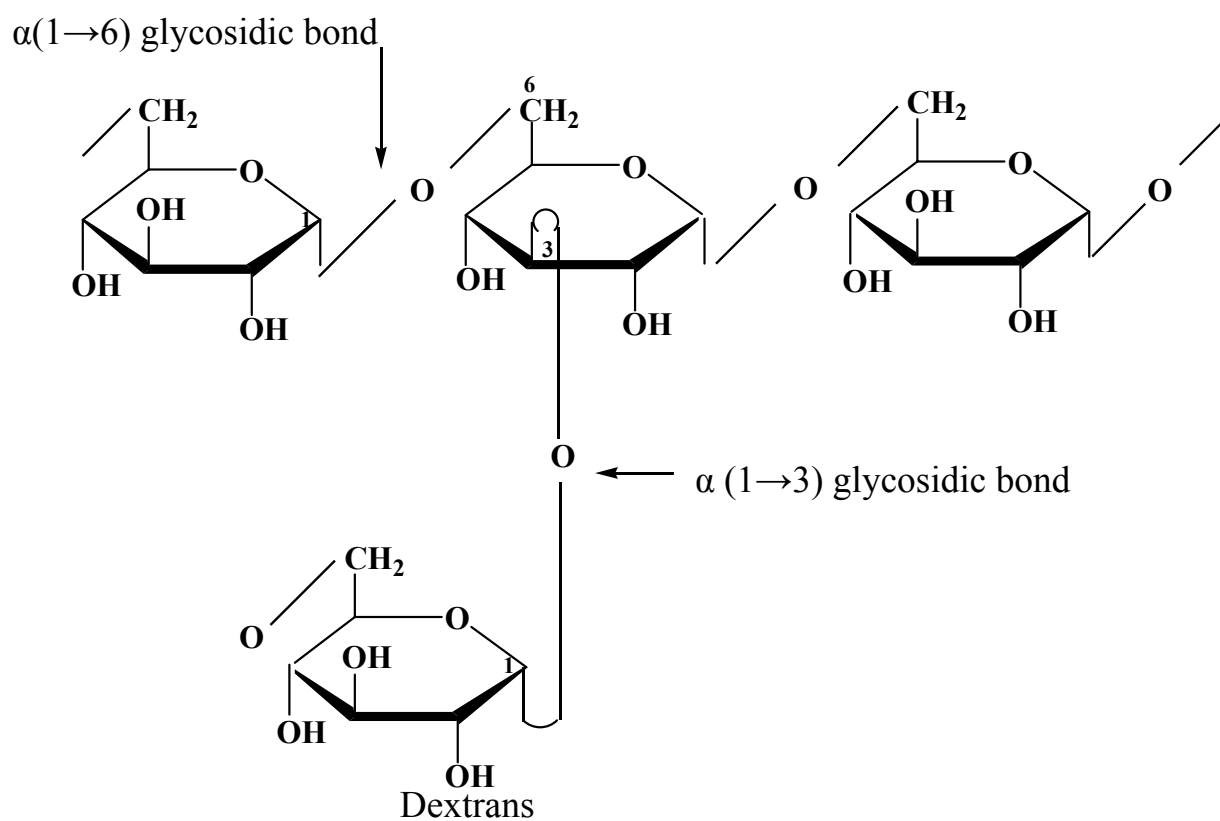


D-deoxyribose

Di- and Polysaccharides



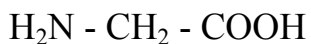




α-AMINO ACIDS

I. ALIPHATIC AMINO ACIDS

MONOAMINO MONOCARBOXYLIC ACIDS



Amino acetic acid, 2-amino ethanoic acid, Glycine (Gly)



α – aminopropionic acid, 2-aminopropanoic acid, Alanine (Ala)



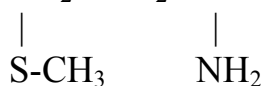
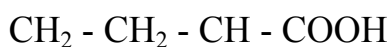
α-amino-β-hydroxy propionic acid,

2-amino-3-hydroxypropanoic acid, serine, (Ser)



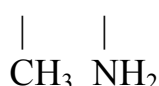
α-amino-β-thio propionic acid,

2- amino-3-mercaptopropanoic acid, Cystein (Cys)



α-amino-γ-methylthiobutyric acid,

2-amino-4-methylthiobutanoic acid, Methionine (Met)

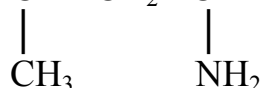
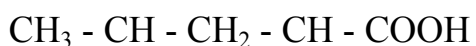


α-aminoisovaleric acid, 2-amino-3-methylbutanoic acid, Valine (Val)

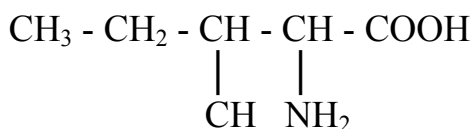


α-amino-β-hydroxybutyric acid,

2-amino-3-hydroxybutanoic acid, Threonine (Thr)

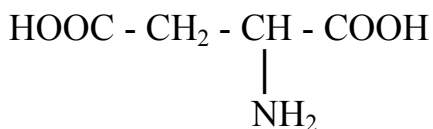


α-amino isocaproic acid, 2-amino-4-methylpentanoic acid, Leucine (Leu)

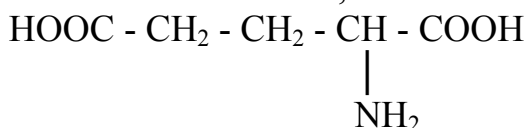


α -amino- β -methylvaleric acid,
2-amino-3-methylpentanoic acid, Isoleucine (Ile)

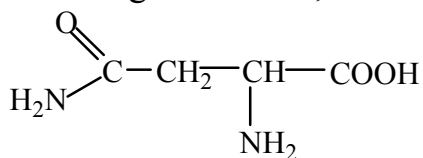
MONOAMINO DICARBOXYLIC ACIDS



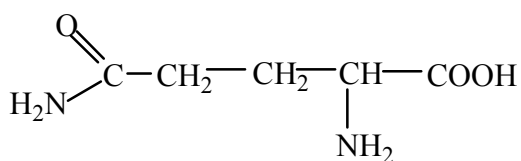
α -amino succinic acid, 2-amino butanedioic acid, Aspartic acid (Asp)



α -aminoglutaric acid, 2-aminopentanedioic acid, Glutamic acid (Glu)

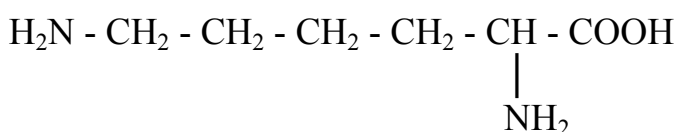


Aspartic acid amide, **Asparagine (Asn)**

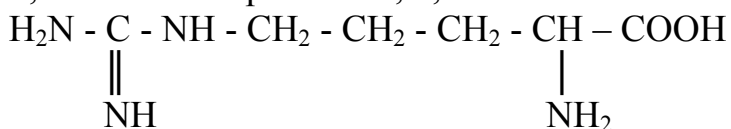


Glutamic acid amide, **Glutamine (Gln)**

DIAMINO MONOCARBOXYLIC ACIDS

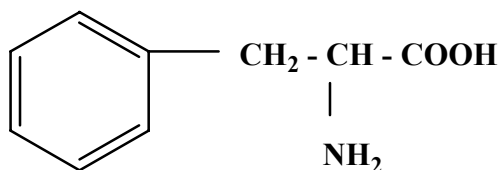


α,ϵ -diamino caproic acid, 2,6-diaminohexanoic acid, Lysine (Lys)

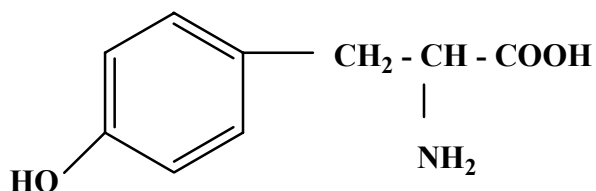


α -amino- Δ -guanidyl valeric acid,
2-amino-5-guanidylpentanoic acid, Arginine (Arg)

II. AROMATIC α -AMINO ACIDS

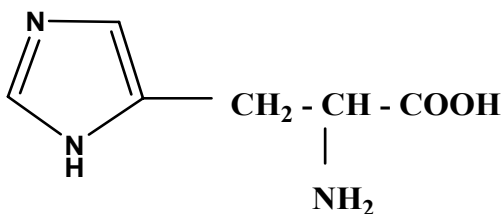


α -amino- β -phenyl propionic acid,
2-amino-3-phenyl propanoic acid,
Phenylalanine (Phe)

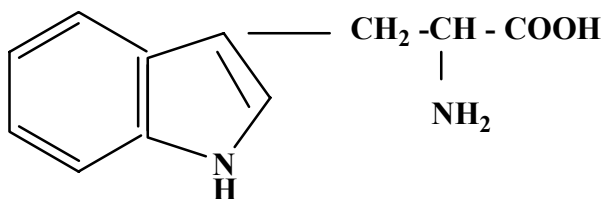


2-amino-3-(4-hydroxyphenyl)-propanoic
acid,
Tyrosine (Tyr)

III. HETEROCYCLIC α -AMINO ACIDS

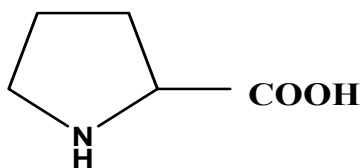


α -amino- β -imidazolyl propionic acid,
2-amino-3-imidazolyl propanoic acid
Histidine (His)

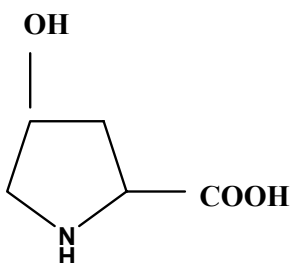


α -amino- β -indolyl propionic acid
2-amino-3-indolyl propanoic acid
Tryptophan (Trp)

IV. IMINO ACIDS



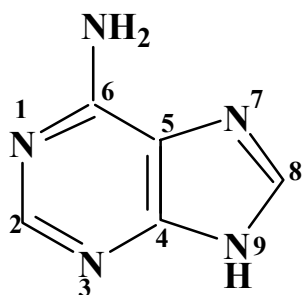
Pyrrolidine-2-carboxylic acid,
Proline (Pro)



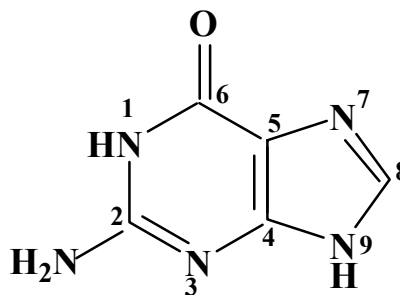
4-hydroxy pyrrolidine-2-carboxylic acid,
Hydroxy proline (HO-Pro)

NUCLEIC ACIDS

THE PURINES BASES

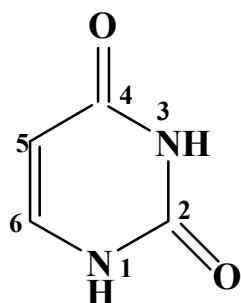


Adenine – A
6-aminopurine

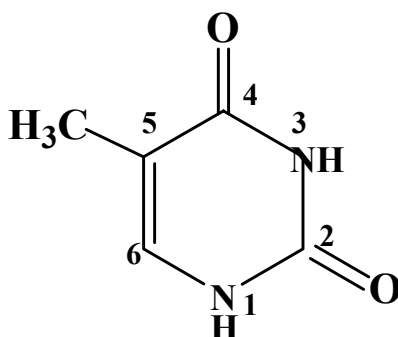


Guanine – G
2-amino -6-oxopurine

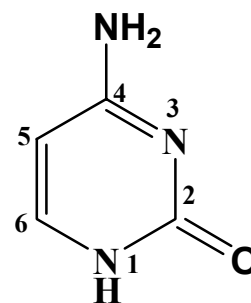
THE PYRIMIDINES BASES



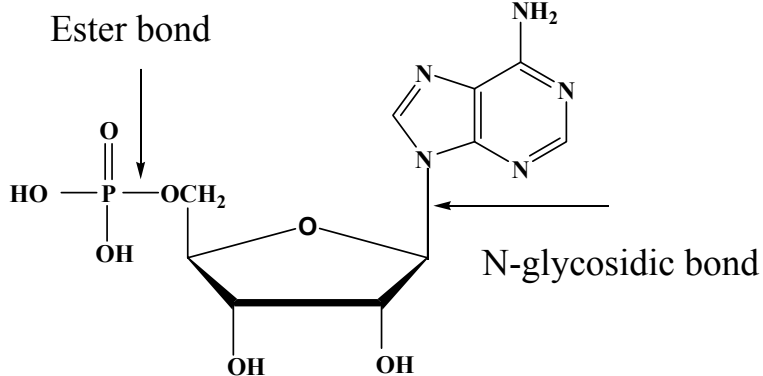
uracil – U
2,4-dioxopyrimidine



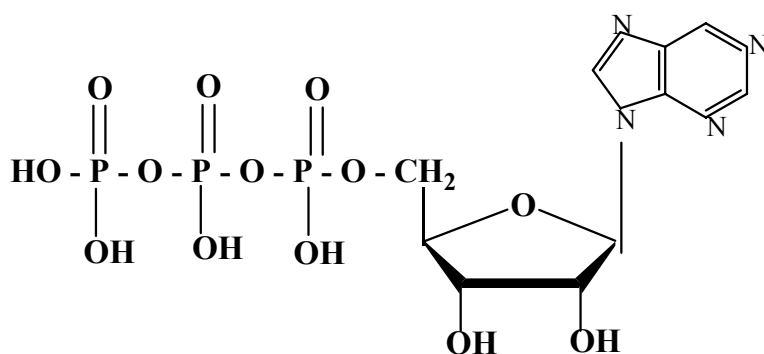
Thymine – T
5-methyl -2,4-dioxo-
pyrimidine

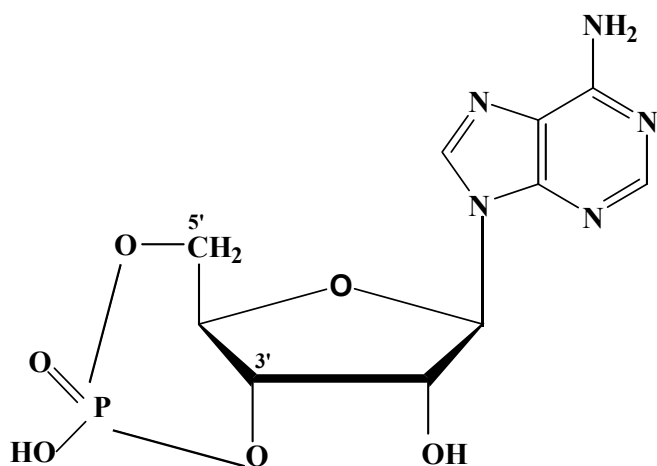


Cytosine – C
4-amino -
- 2-oxopyrimidine

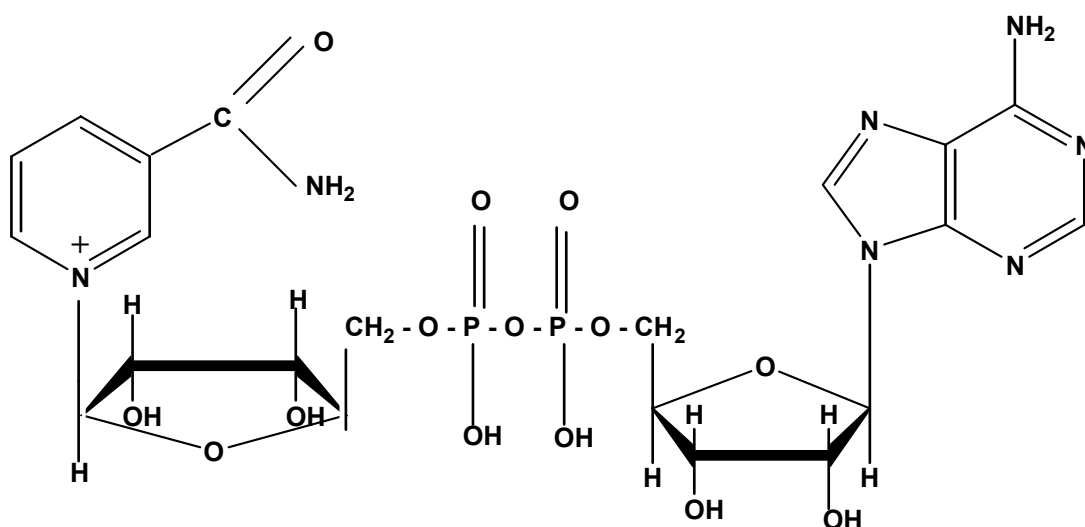


Ac





Adenosine -3'-5'-cyclic monophosphate or cyclic AMP or c-AMP



Nicotinamide adenine dinucleotide or NAD^+

Acetaldehyde	3	Crotonic acid	4
Acetic or Ethanoic acid	3	Crotonic aldehyde	3
Acetoacetic acid	5	cyclic AMP	16
Acetone	3	Cycloheptatrienyl cation	1
Acetyl coenzyme	5	Cyclopentadienyl anion	1
Acetylcholine	7	Cystein (Cys)	12
Acroleine	3	Cytosine – C	15
Acrylic acid	4	Deoxyribose	9
Adenine – A	14	Dextrans	11
Adenosine-5'-monophosphate	15	Ethanal	3
Adrenaline	2	Ethanol	1
Alanine (Ala)	12	Ethanolamine	2
Amylase	10	Ethyldiol-1,2	2
Amylopectin	10	Fhenantrene	1
Analgin	8	Formaldehyde	3
Aniline	1	Formic or Methanoic acid	3
Antracene	1	Fructose	9
Arachidonic acid	4	Fumaric acid	5
Arginine (Arg)	13	Furan	1
Asparagine (Asn)	13	Galactose	9
Aspartic acid (Asp)	13	Glucaric acid	11
Aspirin (Acetylsalicylic acid)	7	Gluconic acid	11
Aspirin (Acetylsalicylic acid)	7	glucose	9
ATP	15	Glutamic acid (Glu)	13
Azylene	1	Glutamine (Gln)	13
BAL	6	Glutaric or pentanedioic acid	4
Barbituric acid	8	Glyceraldehyde	3
Benzene	1	Glycerol	2
Benzoic	4	Glycine (Gly)	12
Benzoic aldehyde	3	Glyoxalic acid	5
Butanal	3	Guanine – G	14
Butene-2-al	3	Hexachloran	6
butyric aldehyde	3	Histamine	8
Butyric or Butanoic acid	3	Histidine (His)	14
Carotene-β	1	Hydroxy proline (HO-Pro)	14
Cellulose	10	Hypoxanthine	8
Chloroform	6	Imidazole	1
Cholesterol	7	Indole	8
Choline	2	Inosit	2
Citric acid	5	Iodoform	6
Colamine	2	Isoleucine (ILe)	13
	17		
Lactic acid	5	Pyridine	1

Lactose	10	Pyridoxine	8
Leucine (Leu)	12	Pyrimidine	1
Linoleic acid	4	Pyroazole	1
Linolenic acid	4	Pyrrole	1
Lysine (Lys)	13	Pyruvic acid	5
Maleic acid	5	Ribose	9
Malic acid	5	Salicylic acid	4
Malonic or propanedioic acid	4	Serine (Ser)	12
Maltose	9	Serotonin	8
Mannose	9	Sorbitol	2
Menthol	2	Sphingosine	2
Methanal	3	Steric acid	3
Methanol	2	Steroid ring	7
Methionine (Met)	12	Succinic or butanedioic acid	4
Naphthalene	1	Sucrose	9
Nicotinamide	8	Sulfanilamide	7
Nicotinamide adenine dinucleotide or NAD ⁺	16	Tartaric acid	5
Nicotinic acid	4	Thiofene	1
Nicotinic acid	8	Threonine (Thr)	12
Noradrenalin	2	Thymine – T	15
Novocain	7	Tryptamine	8
Oleic acid	4	Tryptophan	8
Oxalic or ethanedioic acid	4	Tryptophan (Trp)	14
Oxaloacetic acid	5	Tyrosine (Tyr)	14
p- Sulfanilic acid	4	Uracil – U	15
Palmitinic acid	3	Uric acid	8
p-Aminobenzoic acid	4	valeric aldehyde	3
Pentanal	3	Valeric or Pentanoic acid	3
Phenobarbital	8	Valine (Val)	12
Phenol	1	Vitamin A (retinol)	1
Phenyl-acetic acid	4	Xanthine	8
Phenylalanine (Phe)	14	Xylitol	2
Phosphatidylcholine (lecithin)	6	α -Ketoglutaric acid	5
Phosphatidylethanolamine (cephaline)	6	γ -aminobutyric acid	5
Phthalic acid	4		
Proline (Pro)	14		
Propanal	3		
Propenal	3		
propionic aldehyde	3		
Propionoic or Propanoic acid	3		
Purine	1		