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DEPERTEMENT BS RADIOLOGY

SECTION "B"

PAPER BIO-CHEMISTRY.

SEMISTER (SECOND/2nd)

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Q.No1 Write steps involed in Uric Acid Formation?

Ans:- **URIC ACID:**

Definition:-

The less toxic/ or the Break down of heigly toxic nitrogenous compound/ Bases purine / protein into less toxic one is called as uric Acid.

EXPLANATION:-

Uric Acid is a waste product which is produce in human being due to the break down of nitrogenous compounds mean purines. Uric Acid is a less toxic then purine. And human being eliminated uric acid by the help of kidney. and the removal of uric acid from human body the processes name is called as "uricotilic".

SYNTHESIS OF URIC ACID FORMATION AND STEPS INVOLED IN FORMATION:

The steps which are involed in urid acid formation are.

Step(i) purine nucleotides catabolism Give us (AMP, IMP, GMP).

Step(ii) AMP Give us Adensine and IMP Give us Inosine and GMP Give us Guanosine by the help of an enzyme called (Nucleotidase) and released an inorganic phos-phate.

Step(iii) AMP converted into IMP & Adenosine converted into inosine by the help of an enzyme (AMP → IMP) by AMP deaminses & Deaminase.

Step(iv) Guanosi Inosonic converted into Hypo xanthine by the action of an enzyme (purine Nucleotide phosphorylase).

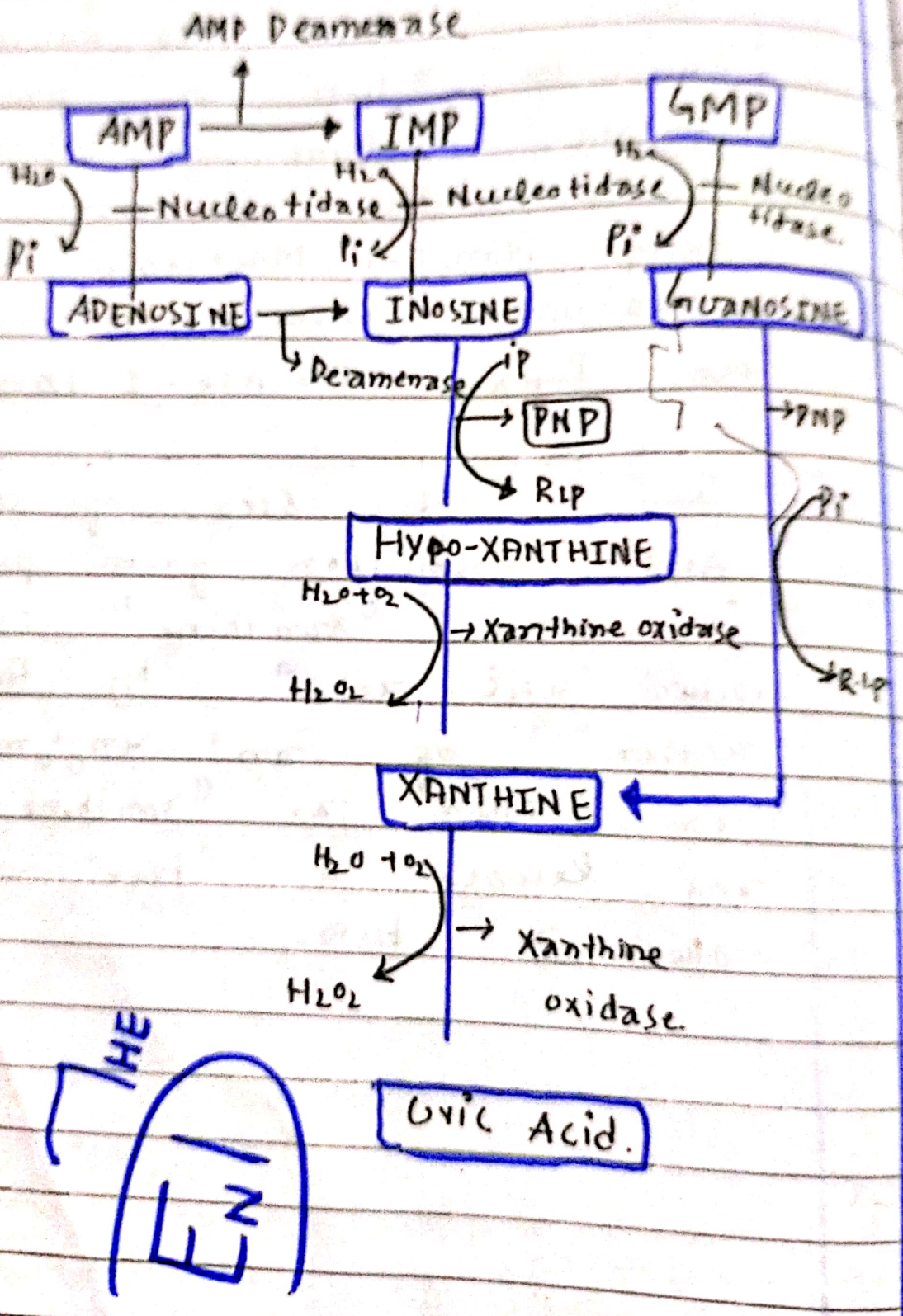
and Release R-1P mean Ribulose 1- phosphate from in-organic phosphate.

ep(v) Guanosine and Hypoxanth-ine converted into xanthine by the action of an enzyme (Xanthine oxidase) also called metal Flevo protein con-taing iron, FAD, Molebdenium. when Guanosine convert into xanthine then Release Ribulose 1- phosphate.

epvi) The last step of uric Acid formation from purine is when "Xanthine" convert into "uric acid" by the action of an enzyme is called as "Xanthine oxidase" and Release a free vedical called as H_2O_2.

Sketch of uric Acid formation.

Purine Nucleotide catabolism



Q No2. Write Down clinical Significance of the following enzyme?

a) Alkaline Phosphatase
b) Creatine Kinase
c) Gamma-glutamyl transferase.

Ans: ALKALINE PHOSPHATASE ENZYME

INTRODUCTION:-

Alkaline Phosphat-ase enzyme found in Blood stream. It helps Break down Proteins in the body and exists in different form. depending on where its ori-ginates.. Your/our liver is main sources of Alkaline phosphatase enzyme But some is also made in Bones, intestin Pancreas, and kidneys.

CLINICAL SIGNIFICANCE OF ALP.

→ ALP test is used to test liver disease, Bone disorder, biliary obstruction and cancer.

→ In condition affecting liver e.g hepatitis · damaged liver cells releases increase amount ALP in the Blood.

→ ALP test is used to detect biliary obstruction mean bile blocked duct.

→ Any condition that affect bone Growth or causes increased activity of bone cells can effect ALP levels in Blood.

→ Test may be used to detect cancers that have spread to.

8) **CLINICAL SIGNIFICANCE OF CERATINE KINASE (CK).**

- Elevation of ceratine kinase is an indication of damage to muscle. CK value is increased in myocardial infraction and muscle injury. Such as muscular dystrophy, acute rhabdomyolysis due to strenuous exercise, myocarditis, alcoholic myopathy and so on.
- Following myocardial infraction CK vises measurably with in 4 to 6 hour peviode, Maximal value are observed with 24-hours after which time the activity returns to normal.

e) **CLINICAL SIGNIFICANCE OF GAMMA GLUTAMYL TRANSFERASE:**

+ The clinical significane of GGT enzyme test is used to test elevated alkaline phosphatase enzyme. Both ALP and GGT are elevated in the disease of the bile duct biliary and in some liver disease. But only elevated in Bone.

→ GGT test is used to test level of ALP enzyme in Blood stream.

→ GGT are involed in the elevated diseases of bile mean biliary obstruction Blocked of bile duct.

→ GGT & ALP enzyme are involed in the elevated diseases of liver

→ ALP are only elevated in Bone diseases.

Qno 3 How many Proteins are involed in ETC. and how electron move in ETC?

And ETC:-

Definition:-

A cluster of proteins that transfer electrons through the membrane of mitochondria to form a gradient of protons that drives the creation of Adenosine tri phosphate.

PROTEIN INVOLED IN ETC:-

The electron transport chain is a series of four protein complexes that coupe redox reaction. and creating an electro-chemical gradient thay lead to the creation of ATP in a complete system named oxidative level phosphorylation. it occurs

in mitochondria of both cellular and non-cellular respiration.

Naming Of Proteins:-

The protein which are involved in electron transport chain is iron containing protein e.g. cytochrome b, cytochrome c, cytochrome a, cytochrome a_3.

ELECTRON MOVE IN ETC:-

1) First $NADH_2$ oxidized and transfer es to FAD^+(oxi) reducing it $FADH_2$ and it self oxidized to NAD^+ During this process some energy are released along with proton H^+. The released energy is used to form ATP from ADP and in-organic phosphate.

2) $FADH_2$ is oxidized and transfer es to (co.Q) Co-enzyme Reducing its and its self Get

oxidized FAD^+.

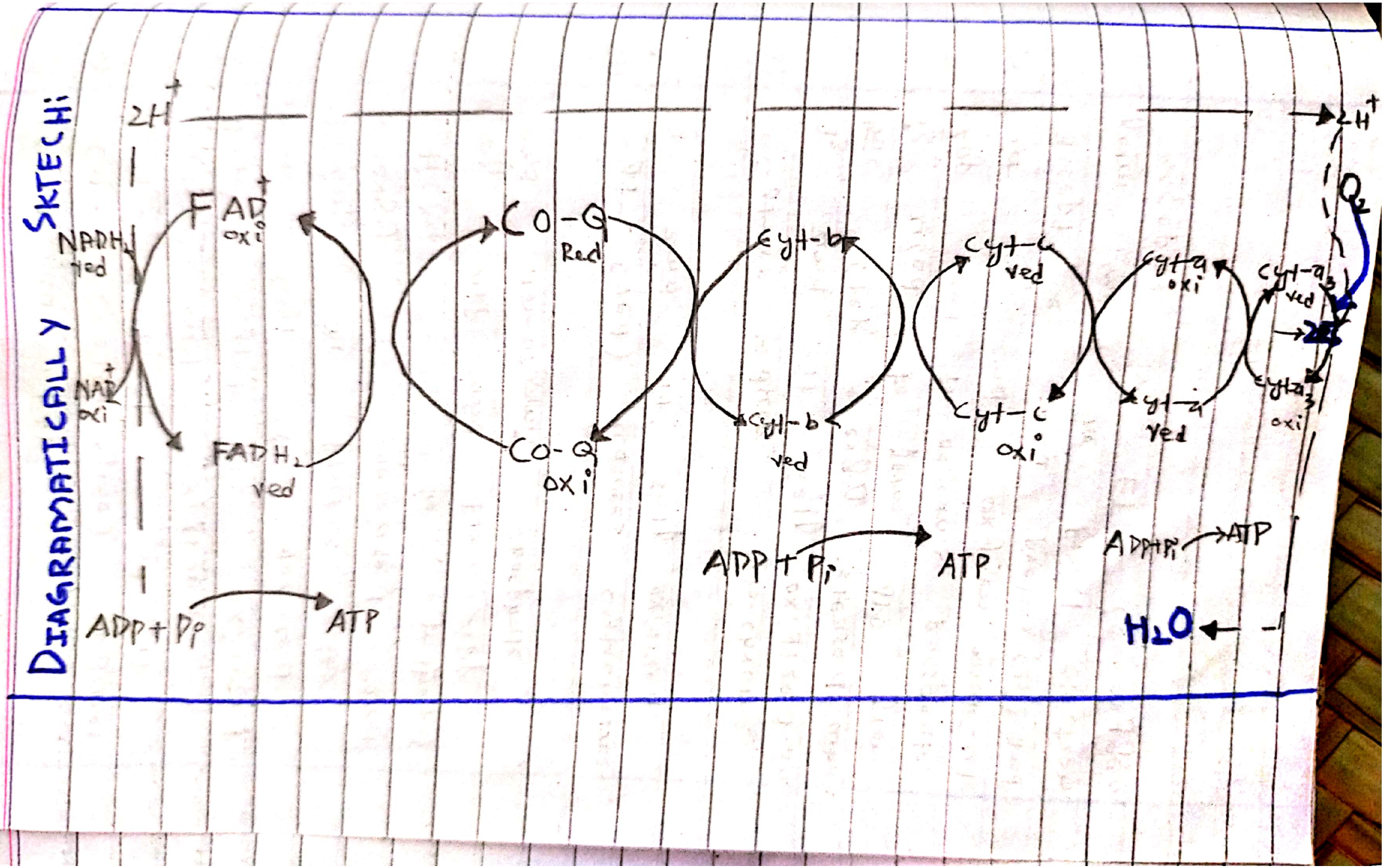
3) Co-Q (co-enzyme) reduces cyto-chrome "b" and it self Get oxidized.

4) Then cyt-b is oxidized and cyt-c is reduced. During the process the energy is released and utilized in the synthesis of ATP and From ADP and in-organic phosphate.

5) cyt-c (red) reduces cytochrome-a and it self oxidized.

6) cyt-a reduce cyto-chrome a_3 and it self oxidized. In this step energy released which is used to form ATP from ADP and in-organic phosphate

7) At the end oxygen molecule accept es and proton (H^+) and form water. The Final electron acceptor in ETC is oxygen.



Q No 4 Write down the four step involve in beta oxidation.

Ans: Beta Oxidation

Definition.

Beta oxidation is a metabolic process involving in multiple steps by which fatty acid molecule are broken down to produce energy more specifically beta oxidation consists in breaking down long fatty acid that have been converted acetyl-CoA chain into progressively smaller fatty acetyl-CoA chain. this reaction release acetyl-CoA FADH2 and NADH the three of which then enter another metabolic process called citric acid cycle or Krab cycle

in which ATP is Produced to be use as energy. beta oxidation goes on until two Acetyl-CoA molecule are Produced and the acyle-CoA. shown has been completely broken down in eukaryotic cell beta oxidation take place in the mitochondria whereas in Prokaryotic cell. it happen in cytosole. beta oxidation to take place fatty acid must enter the cell through the cell membrane then bon to coenzyme A (CoA) Forming fatty acyl CoA and in the case of eukaryotic cell. enter the mitochondria. where beta oxidation occure.

Where does Beta oxidation occure.

Beta oxidation occure in the mitochandria of eukaryotic cell. and in the cytosole of prokaryotic cell. however before this happen. Fatty acid must first enter the cell and in the case of eukaryotic cell. the mitochandria in case where fatty acid chain. are to long to enter the mitochandria. Beta oxidation can take place in peroxisomes.

First Fatty acid Protein transporting allow acid to cross the cell membrane. and enter the cytosol. Since the negatively charge fatty chain cannot cross it. otherwise. then the enzyme fatty acyle CoA. synthase (or FACS)

added CoA groups to the fatty acid chain. converting it to acyl-CoA

Depending on the length of the acyle CoA chain will enter the mitochondria in one of two way.

i)

ii) if the acyl-CoA chain is short it can freely diffuse through the mitochondrial membrane.

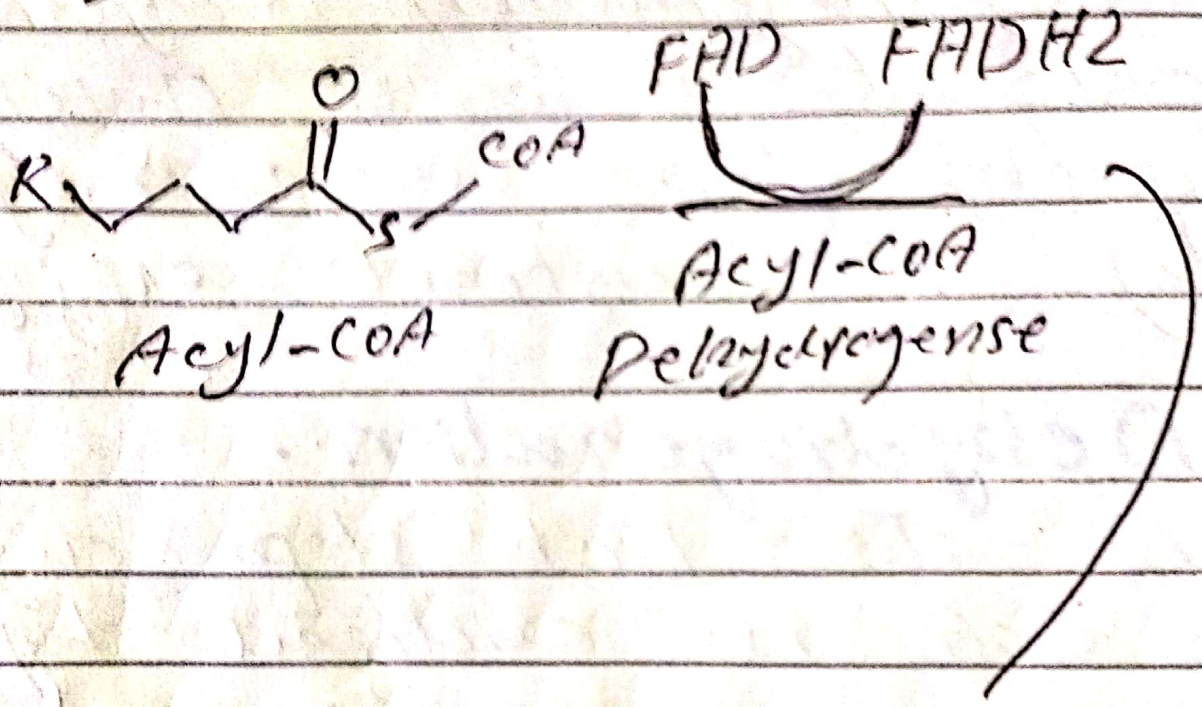
Beta Oxidation step.

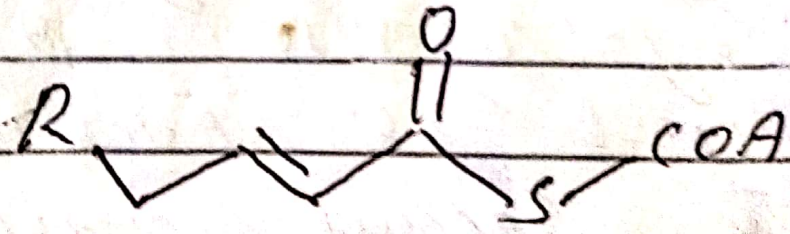
Beta oxidation take place in four step. Dehydrogenation, Hydration oxidation and thyolisis. Each step is catalyzed by a distinct enzyme

① Dehydrogenation.

in the first step acyl - CoA is oxidized by enzyme acyl CoA. Dehydrogense. A double bond is formed b/w the second and third carbon (C_2 and C_3) of the acyl-CoA chain entering the beta oxidation cycle. the end Product of this reation in tran-Δ^2-enoyl -CoA. (trans-delta 2 enoyl -CoA) this step Produced use FAD and Produce FADH2 which will enter the citric acid cycle.

and Formed ATP to be used as energy. Notice in the following figure.

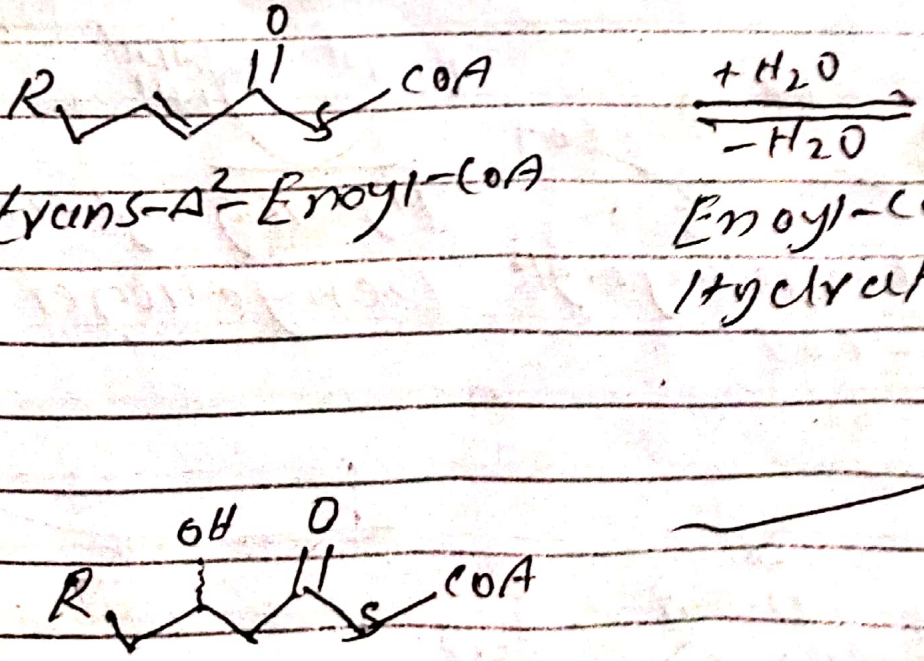




trans-Δ^2-Enoyl-COA

(2) **Hydration.**

in the second step the double bond b/w C_2 and C_3 of trans $-\Delta^2-$ enoyl - CoA is hydrated forming the end Product 2- B- Hydroxyacyl -CoA which has a hydroxyle groupe (OH) in C_2 in Place of the double bond. the reaction is catalyzed by another enzyme Enyl-CoA Hydratase this step requires water.

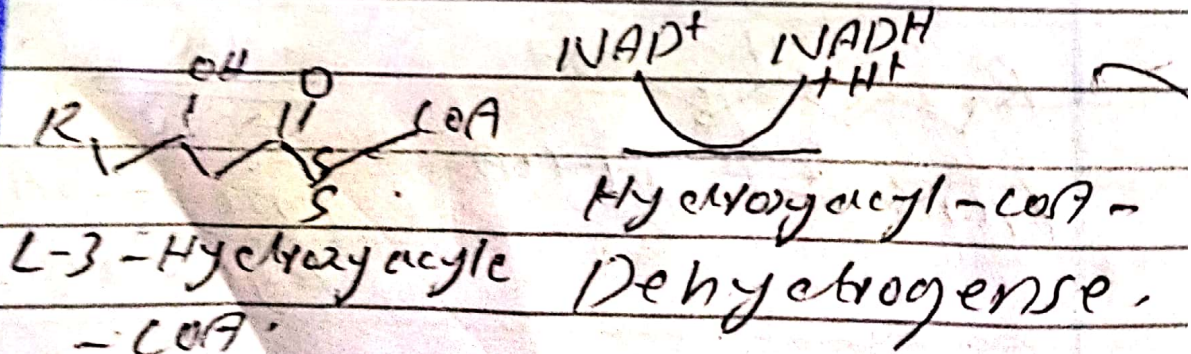


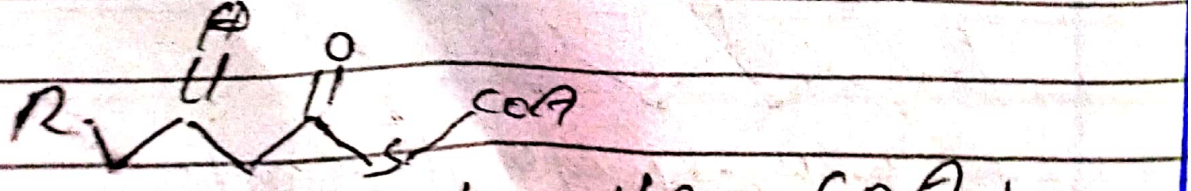
trans-Δ^2-Enoyl-CoA

L-3-Hydroxyacyl-CoA-

(3) Oxidation.

In the third step the hydroxyl groupe in C2 of L-β-hydroxyacyl-CoA is oxidized by NAD+ in a rection that is catalyzed by 3-hydroxyacyl-CoA Dehydrogenase ave β-ketoacyl-CoA and NADH + H. NADH will enter the citric acid cycle and Produce ATP that will be used by as energy.

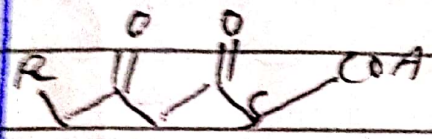




3-Ketoacyle-CoA.

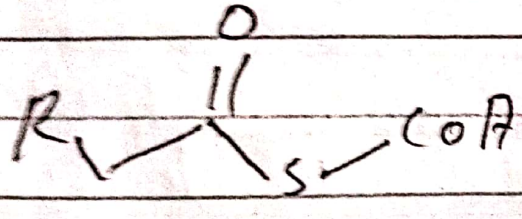
4) **Thiolysis.**

Finally in the four step β-ketoacyl CoA is cleaved by a thiol group (SH) of another (CoA) molecule (CoA-SH) the enzyme that catalyized the reaction is β-KetolThiolase the cleavage take place b/w C2 and C3 -

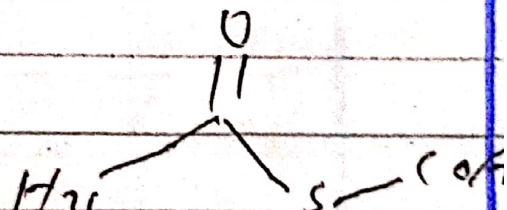


3-ketoacyl-CoA

+CoA-SH ⟷ Thiolase



Acyl-CoA +



Acyl-CoA

Q5 How Uric Acid Formation take Place in body

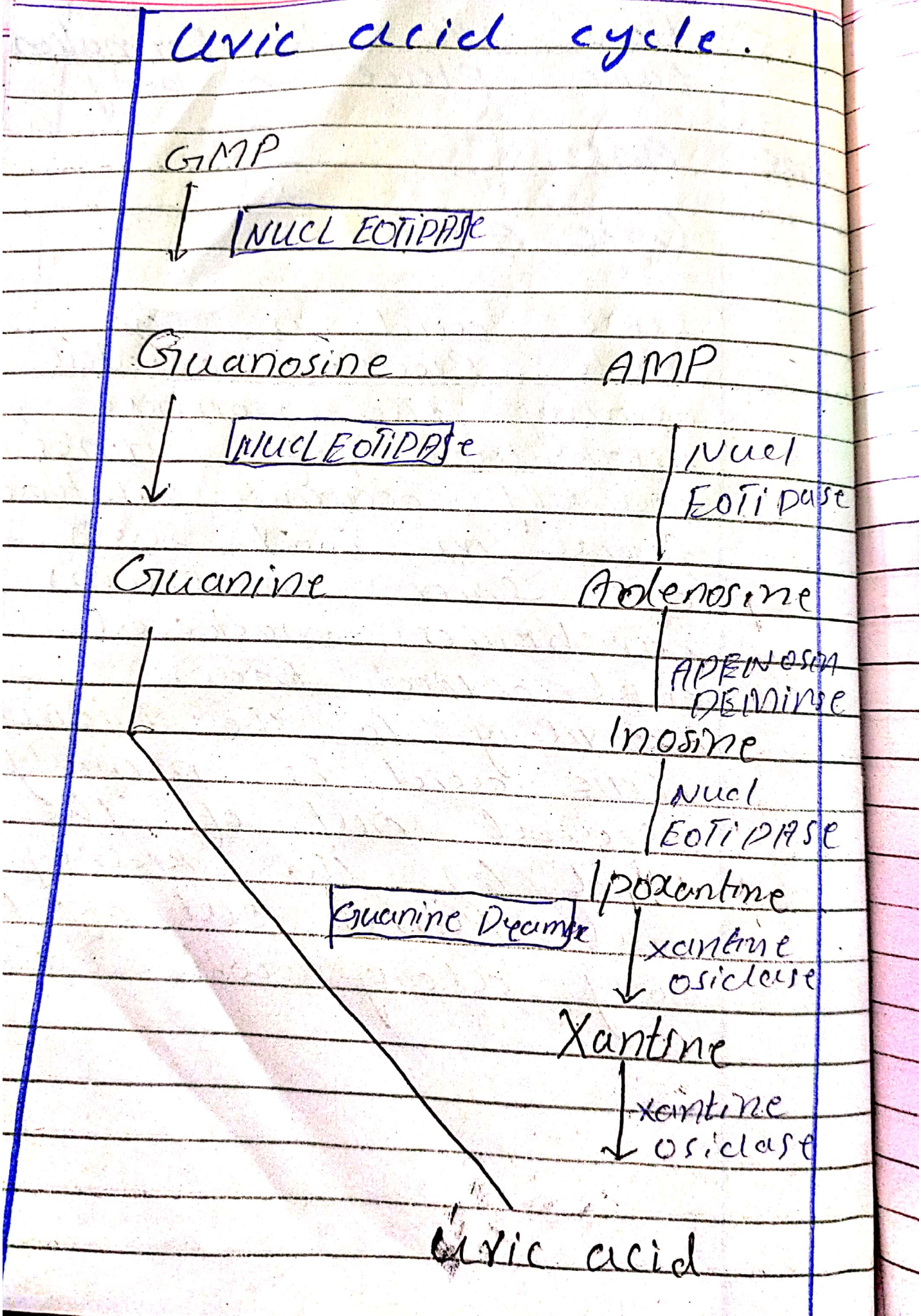
Ans:

Ans:.

Uric Acid

Uric acid is a waste product created during the normal breakdown of Purines naturally occuring substance found in food such as liver mushrooms, anchovies, mackerel and dried beans. According to the NIAMS, uric acid is normally cleared out of the blood by the kidney and passes out of the body along with urine.

Uric acid cycle.



High Uric Acid Level caused.

most of the time a high uric acid Level occure when your kidney don't elimenate uric acid efficiently things that may cause this slow down in the removel of uric acid, include rich food being overweight being diagnosed taking certain diuretics some time called water pills. and drinking to much alcohole.

Uric acid formation.

The formation of uric acid is through the enzyme xanthine oxidase which oxidase oxypurines. Normally a small amount of uric acid is present in the body - but there is an excess amount in the blood called hyperuricemia this can lead to gout and formation of kidney stone

Molecular formula $C_5H_4N_4O_3$
Molecular weight 168.11 g/mol

Uric acid cycle.