

- Zoology Test

9/12-10

Q-1

Describe in detail pathway of fatty acid synthesis and its reaction.

Q-2 (a)

Distinguish between storage and structural lipid.

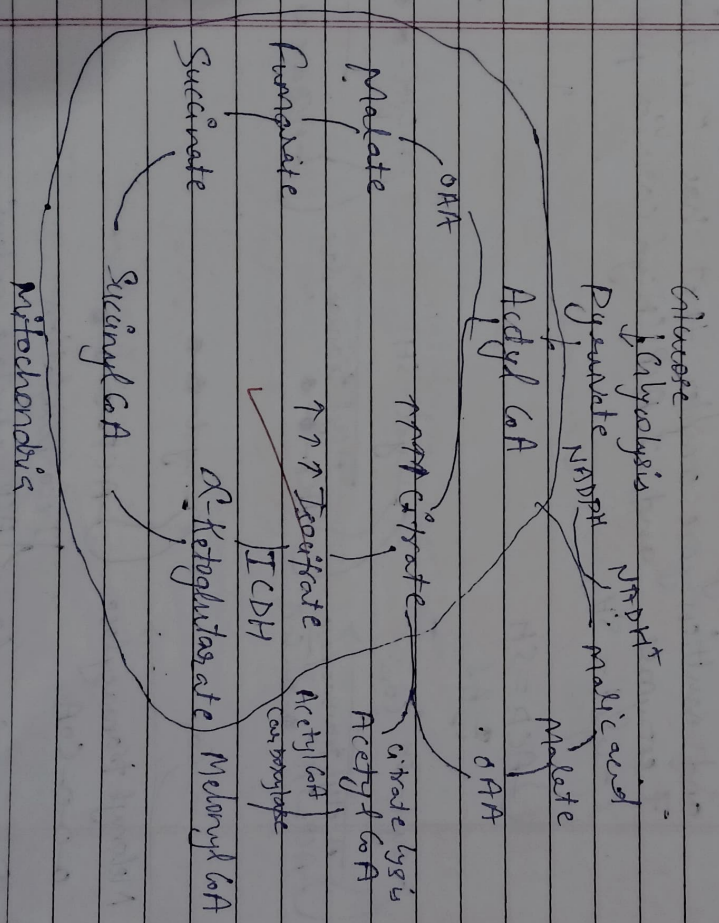
(b)

Saturated and unsaturated fatty acid (2)
Trans fatty acid and cis fatty acid (2)

Ans-1

Biosynthesis of fatty acid :-

- (a) occurs when glucose level in cytosol
- (b) Insulin level in cytosol
- (c) ATP level in cytosol



ICDH $\rightarrow$ isocitrate dehydrogenase

Regulation of Acetyl CoA carboxylase :-

Acetyl CoA carboxylase

It is also regulated by Epinephrine, norepinephrine, glucagon.

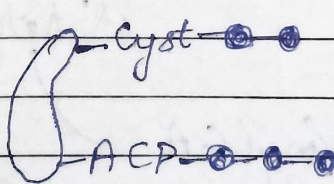
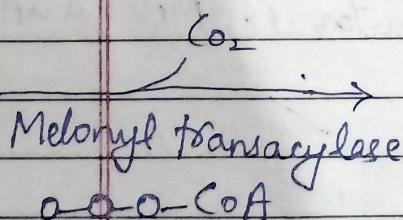
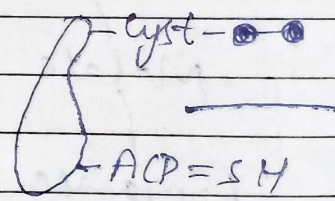
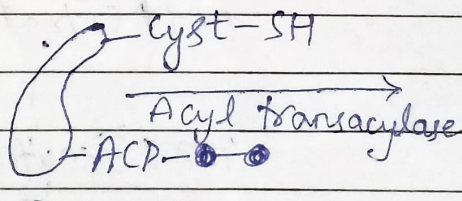
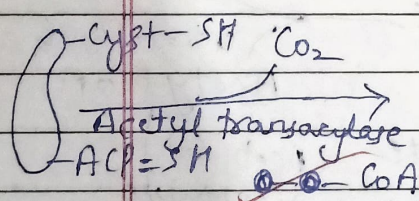
Detailed pathway $\rightarrow$

FAS $\rightarrow$ Fatty acid synthase is multifunctional and multi-enzyme complex that has function of 7 enzymes and 1 ACP (Acyl carrier protein)

AS-ty-0

$$\angle ACP = 54^\circ$$

FAS.

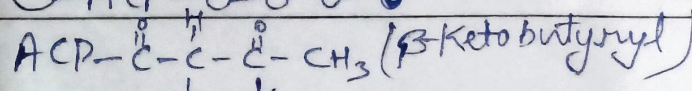
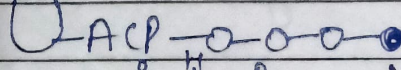
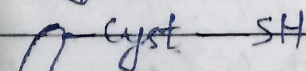


① Condensation

$$\text{CO}_2$$

Decarboxylation

ACP reductase condensing enzyme

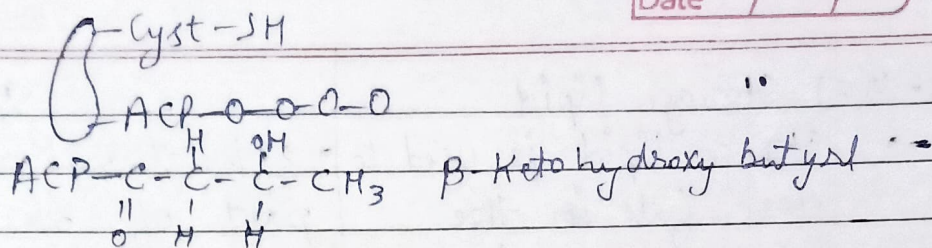


② Reduction

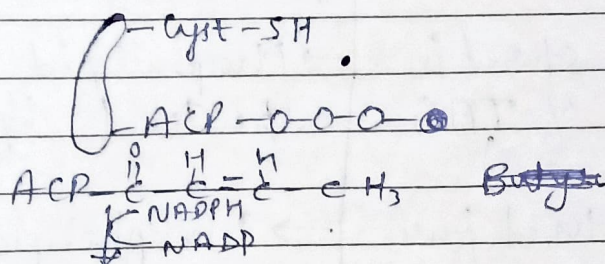
NADPH → NADH⁺

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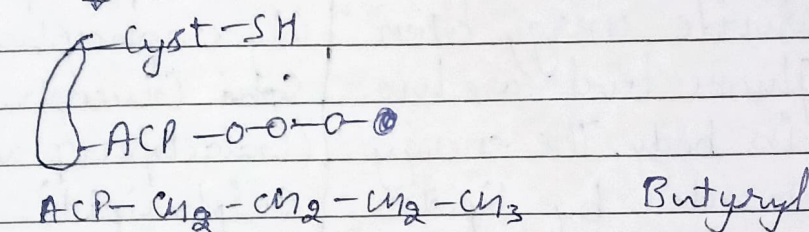
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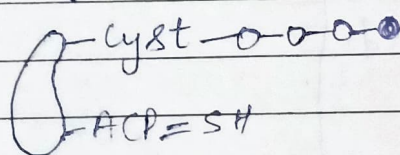
③ Dehydration



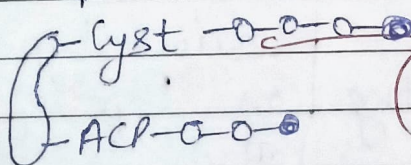
④ Reduction



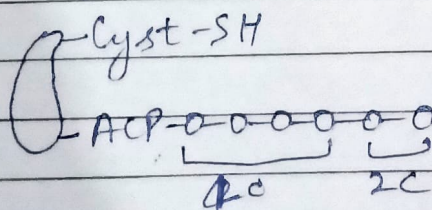
↓ Acyl transacylase



o-o-o-CA ↓ Malonyl transacylase



↓ CO_2



↓ Thioesterase

Ans-2(a) Storage lipid

- Storage lipid is used to store fat ~~in the~~ when glucose levels are high
- Lipids are stored in the form of TAG (Triacylglycerol)
- Lipid as stored fuel provide energy when glucose level are low in body. The energy provided by lipids are twice than those of polysaccharide and lipid do not need water to for its breakdown
- Storage lipid ~~also~~ require lipase for breakdown and it also provide energy for hibernating animals.

Structural lipid

- Structural lipids are part of structural component i.e. cell membrane of a cell
- Phospholipid is the structural lipid
- Phospholipids ~~are~~ include Glycerophospholipid, ~~Sphingolipid~~ Glycophospholipid (Galactophospholipid), Sulpholipid and archeal ether lipid.
- Structural lipid makes the cell membrane of various types depending on type of fatty acid attach to glycerol or sphingosine.

(2)

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(b) Saturated fatty acid

Unsaturated fatty acid

(1) Saturated fatty acid are fatty acid that has carboxylic acid attach to hydrocarbon chain and the hydrocarbon chain contain no double bond. i.e. carbon atoms are fully saturated with hydrogen.

(2) These ~~are~~ have waxy appearance at room temperature

(3) cis-trans condition is not possible in saturated fatty acid.

(4) Example:- Stearic acid

(1) Unsaturated fatty acid are fatty acids that has carboxylic acid attach to hydrocarbon chain and the hydrocarbon chain contains double bond. i.e. carbon atoms are not fully saturated

(2) These have oil appearance at room temperature

(3) cis-trans condition occur in unsaturated fatty acid

(4) Example:- linoleic acid

(c) Trans Fatty acid

cis Fatty acid

(1) Trans fatty acid occur when hydrogen atoms of double bonded carbon are at different position.

(2) Trans fatty acid promote LDL (bad cholesterol). Hence bad for health.

(1) cis fatty acid occur when hydrogen atoms of double bonded carbon are at same position

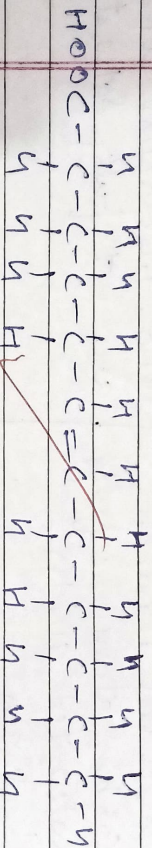
(2) cis fatty acid promote HDL (Good cholesterol). Hence good for health.

(3) Trans fatty acid is produced by partial hydrogenation of oils and in animals. (3) cis fatty acid usually occurs naturally.

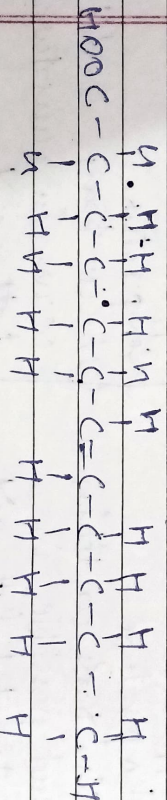
trans isomer of dairy animals.

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(4) Trans fatty acid has preservative action (4) cis fatty acid does not have preservative action



Trans is fatty acid



Trans fatty acid