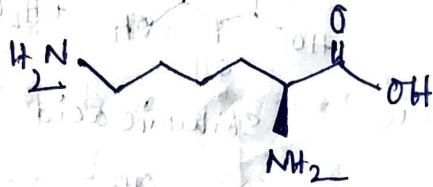


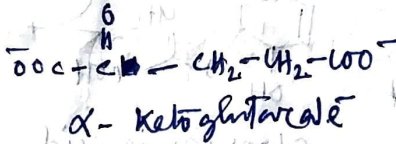
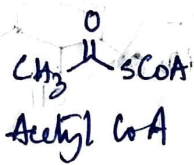
"Lysine fermentation"



Biosynthesis:

There are two path of biosynthesis - (A) and (B).

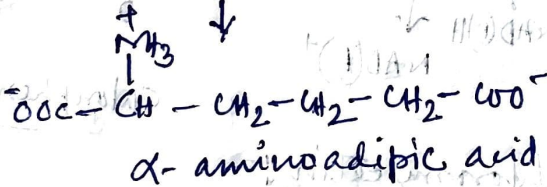
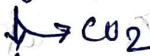
Path - A



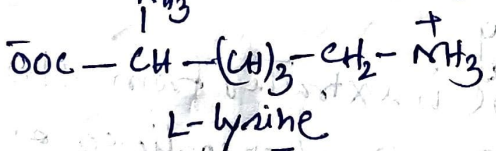
Homocitric acid



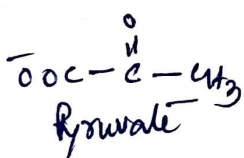
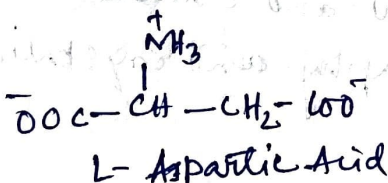
Oxaloglutaric acid

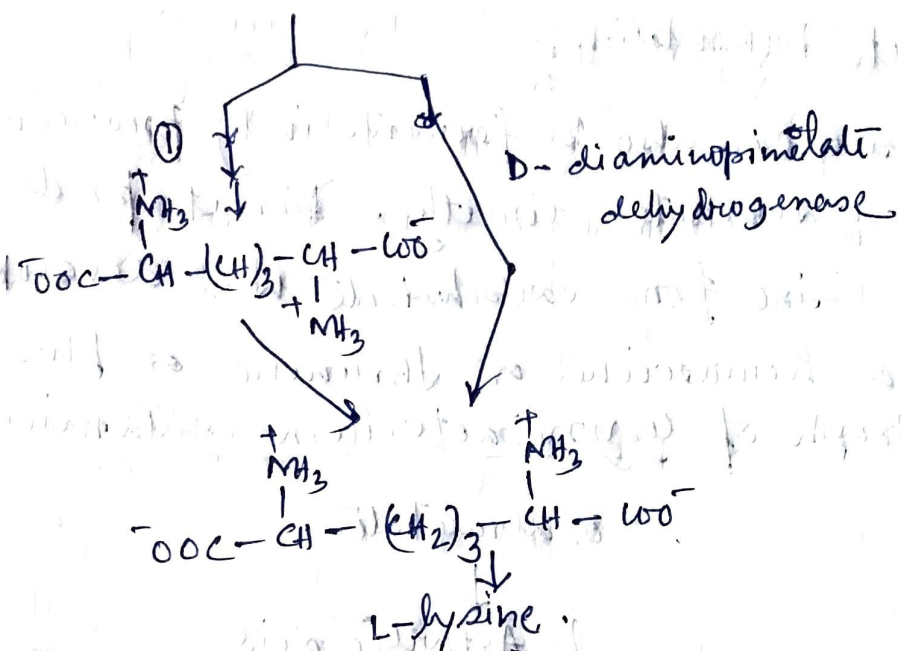


Saccharopine



Path - B



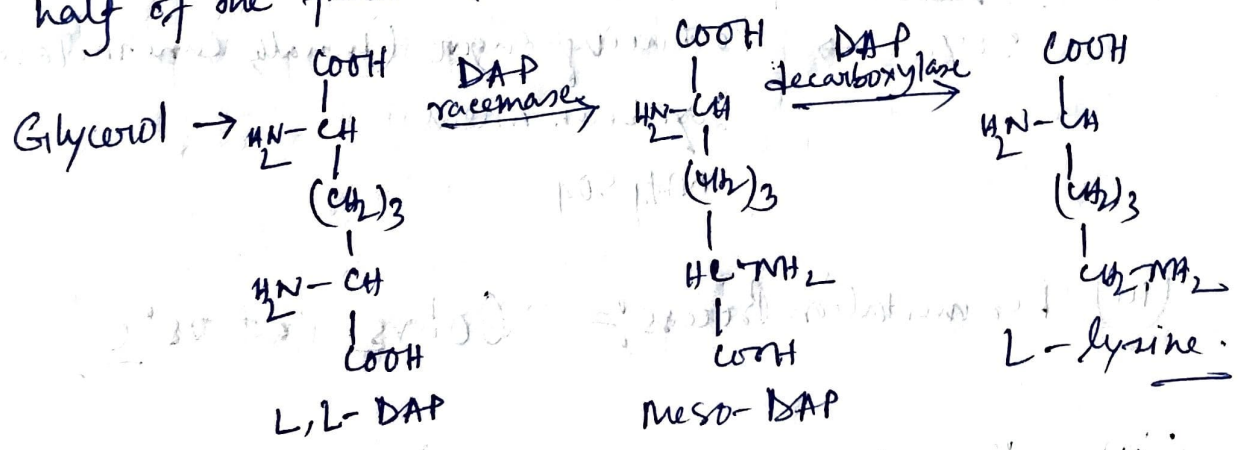


Fermentation := These two fermentation process -

(i) Indirect fermentation :=

It is also called as dual fermentation as two different microorganisms are employed in this fermentation process. Auxotrophic mutant of Escherichia coli is used in the first half of the fermentation and wild type or prototrophic E. coli or Aerobacter aerogenes is employed in the second half of the fermentation.

Diaminopimelic acid (DAP) produced in the first half of the fermentation by auxotroph of E. coli, is converted into L-lysine by A. Aerogenes in the second half of the fermentation.



(b) Direct-fermentation:

L-lysine can also be fermentatively produced from any of substrates directly. Direct production of L-lysine from carbohydrate was developed first with a homoserine or threonine ~~or~~ plus methionine auxotroph of Corynebacterium glutamicum.

oxaloacetate

↓
L-Aspartic acid

↓
Aspartokinase

↓
↓
L-aspartic acid
semialdehyde

↓ Dihydrofolinate
synthetase

↓
↓
L-lysine.

Fermentation Process:

(i) Preparation of inoculum: - Suitable and high yielding mutant strain of C. glutamicum usually used.

(ii) Preparation of medium: -

20% → Reducing sugar (usually cane molasses)
Soyabean meal
NH₄SO₄

(iii) Fermentation process: → 60 hrs; at 28°C

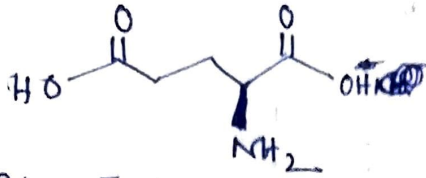
(iv) Harvest and Recovery: → (a) Precipitation at isoelectric point

(b) Ion exchange

(c) Electrophoresis

(d) extraction.

Production of Glutamic acid:



Glutamic acid Biosynthesis:

Glucose

↓
Glucose-6-phosphate

↓ 4-steps

3-phosphoglycerate

↓

Phosphoenolpyruvate

↓

Pyruvate

↓

Citrate

↙ Oxaloacetate

citric acid cycle (CAC)

↘ α-ketoglutarate

↓ Aspartate

↓ Glutamate

Fermentation:

(i) Inoculum Production: C. glutamicum.

(ii) Preparation of medium:

chemicals : Glucose (10%)

K₂HPO₄ (0.05%)

KH₂PO₄ (0.05%)

MnSO₄·7H₂O (0.025%)

FeSO₄·7H₂O (0.001%)

Urea: ~~(0.05%)~~ (0.5%)

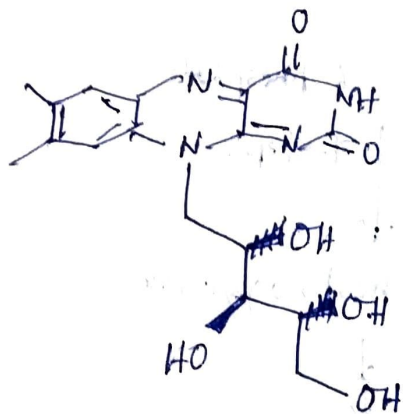
Biotin (2.5 mg lit⁻¹)

(iii) Fermentation Process: 40-48 hrs, 30°C, pH 7-8.

(iv) Harvest & Recovery: Same as L-lysine.

Production of Vit-B₂ :

Riboflavin



Riboflavin can be synthesized by many types of microorganisms. ~~Bacteria~~, Three groups of microorganisms have been found to synthesize riboflavin in significant amount. (i) bacteria - ~~clostridia~~ clostridium acetobutylicum (ii) certain Candida yeasts. and (iii) two closely related ancomycetes - (a) Erremothicum ashbyi (b) Ashbya gossypii.

Fermentation process:

- ① Culture medium: Cultures of E. ashbyi and A. gossypii are grown on solid agar medium in Petri dishes. Composite medium - glucose, peptone, yeast extract, malt extract, MgSO₄·7H₂O, K₂HPO₄.
- ② Fermentation Parameter:
 - (i) pH = 6.5
 - (ii) Temp @ 30°C
 - (iii) for max. yield glucose load 20g/lit.
- ③ ~~Purification~~ Purification: As usual.