



FACULTY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF BIOTECHNOLOGY

Production of Streptomycin

Introduction

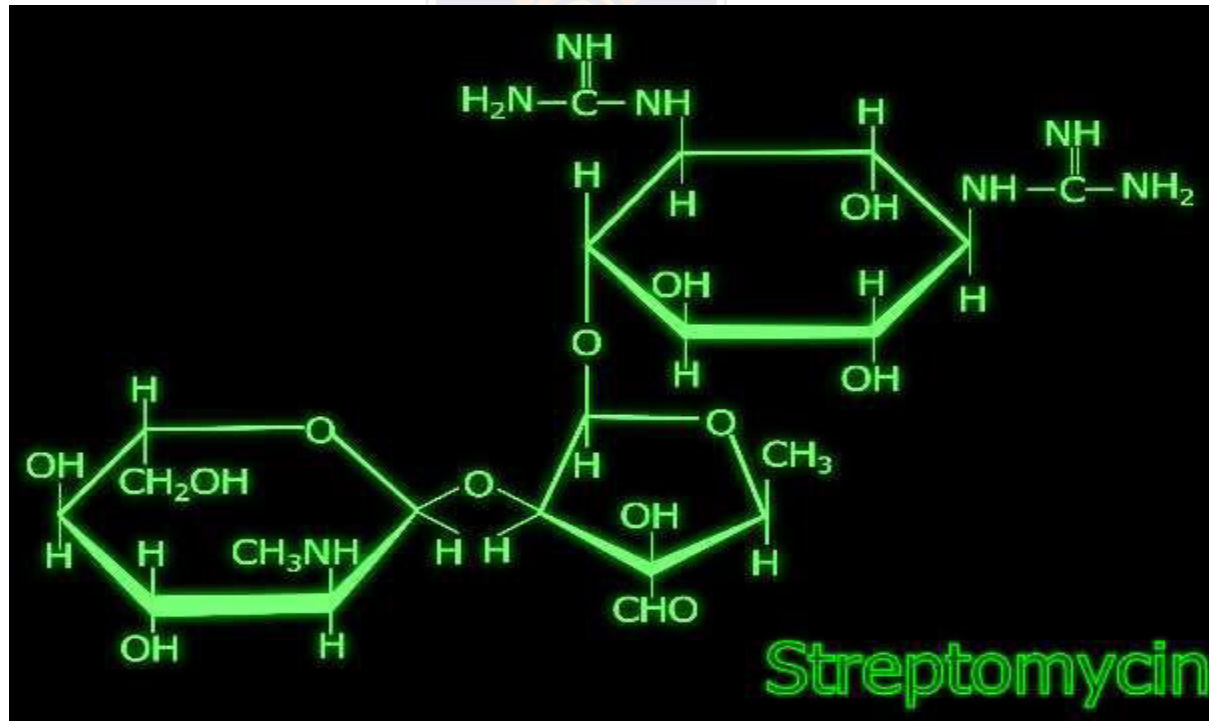
- Streptomycin is an bactericidal antibiotic drug belonging to class aminoglycosides.
- Used against TB
- Derived from actinobacterium Streptomyces griseus.
- Used against gram negative bacteria especially.
- Dihydrostreptomycin prepared by hydrogenation of streptomycin with platinum as catalyst & is commercially more successful.



Structure of Erthyromycin

Chemically, it contains 3 sugars derived from glucose with C, N, O & H elements.

•Formula – C₂₁H₃₉N₇O₁₂



THE HOCKENHULMEDIUM

GLUCOSE	2.5%
EXTRACTED SOYA MEAL	4%
DISTILLERS DRIED SOLUBLE	0.5%
SODIUM CHLORIDE	0.25%
pH	7.3 – 7.5

FERMENTATION PROCESS

- Spores of *S. griseus* are inoculated into a medium to establish a culture with high mycelial biomass for introduction into inoculum tank, using inoculum to initiate the fermentation process.

- Yield in production vessel responds to high aeration & agitation conditions.

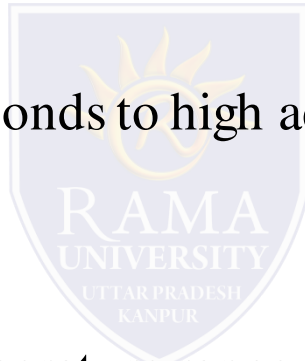
Other conditions involve-

Temperature range 25-30°C

pH range 7-8

Time 5-7 days

- The fermentation process for production of Streptomycin involves 3 phases.



PHASE 1

- Initial fermentation phase and there is little production of streptomycin. Rapid growth with production of mycelial biomass.
- Proteolytic enzymatic activity of *S. griseus* releases NH_3 from soya meal, raising the pH to 7.5
- Characterized by release of ammonia.
- Carbon nutrients of soya meal are utilized for growth.
- Glucose is slowly utilized with slight production of Streptomycin.



PHASE 2

- Little production of mycelia.
- Glucose added to the medium & the NH_3
- released from soya meal are consumed.
- pH remains fairly constant ranging between 7.6 to 8.



PHASE 3

- Final phase of fermentation.
- Depletion of carbohydrates from medium.
- Streptomycin production ceases & bacterial cells begin to lyse.
- Ammonia from lysed cells increase the pH.

RECOVERY & PURIFICATION

- Mycelium is separated from broth by filtration & streptomycin is recovered.
- Recovery process – broth is acidified, filtered & neutralized. Then its subjected to column containing cation exchange resin to adsorb Streptomycin from the broth & column is with water & streptomycin eluted with HCl before concentration in vacuo almost to dryness.
- The streptomycin is dissolved in methanol & filtered.
- Acetone is used in filtrate to precipitate the antibiotic.
- Precipitate is washed with acetone & dried in vacuo.
- Purification is done by dissolving in methanol to form pure S. chloride complex. Further by, adsorbing it onto activated charcoal & eluting with acid alcohol.

USES

- Treatment of diseases

1. Tuberculosis

2. Plague

3. Veterinary medicine against gram negative bacteria.

- Pesticide & fungicide.

- Cell culture.

