FACULTY OF ENGINEERING & TECHNOLOGY
DEPARTMENT OF BIOTECHNOLOGY

Production of Streptomycin

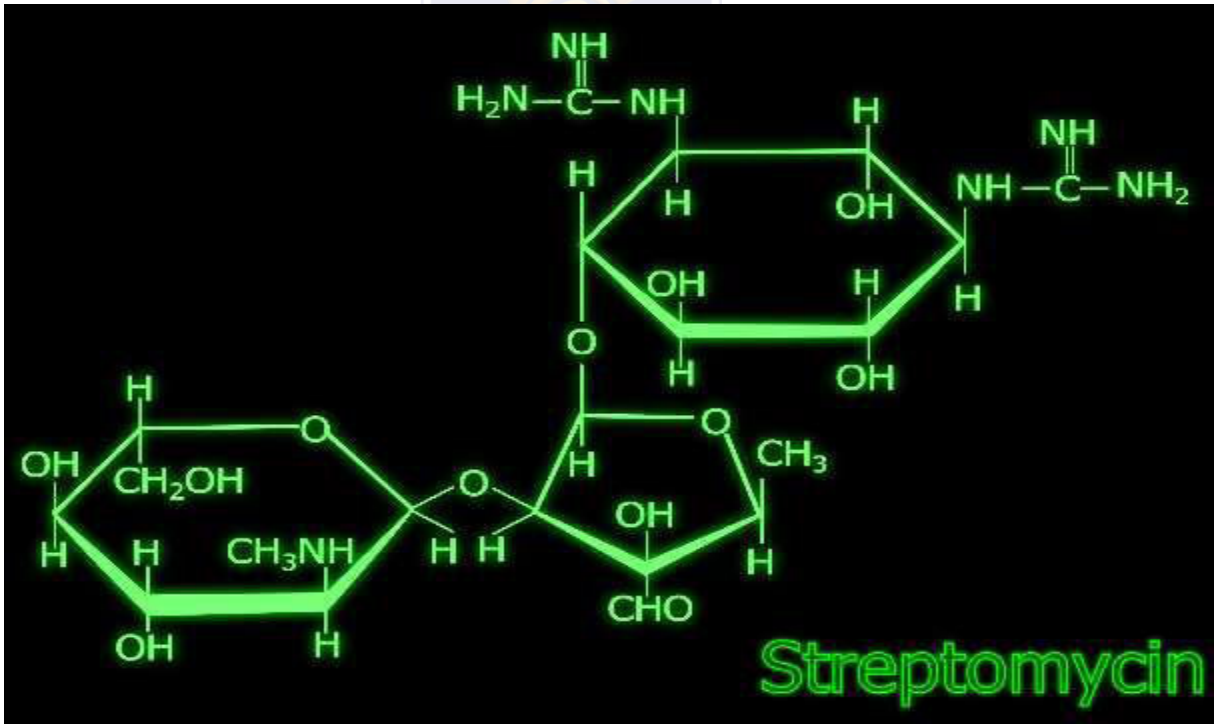
Introduction

- Streptomycin is an bactericidal antibiotic drug belonging to class aminoglycosides.
- Used against TB
- Derived from actinobacterium Streptomyces griseus.
- Used against gram negative bacteria especially.
- Dihydrostrepomycin 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 – $C_{21}H_{39}N_7O_{12}$



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 NH3 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 NH3

• 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 filteration & 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 iswith water & streptomycin eluted with HCl before concentration in vacuo almost to dryness.

•The streptomycin is dissolved in methanol & filtered.

•Acetone is used in filterate 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 charcoa& eluting with acid alcohol.

USES

•Treatment of diseases

1. Tuberculosis

2. Plague

3. Veterinary medicine against gram negative bacteria.

• Pesticide & fungicide.

•Cell culture.