



S.G.V.C Vidya Prasarak Trust's

M.G.V.C ARTS, COMMERCE AND SCIENCE COLLEGE MUDDEBIHAL

(NAAC Accredited IV Cycle 3.31 CGPA)

DEPARTMENT OF CHEMISTRY

Teachers Use ICT enabled tools for Effective teaching learning process

Name of the Staff Member: Shri-U. A. HALYAL

Topic: Antibiotics

Class: B.Sc VI Sem

Date: 11.03.2025

Time: 09:30 AM to 10:30 AM



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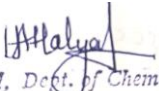
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INTRODUCTION:

Antibiotics are chemical substances that are used to kill bacteria or inhibit their growth. They are among the most important discoveries in modern medicine and have greatly reduced deaths caused by bacterial infections.

Antibiotics are effective against **bacterial infections**, but they do not work against viruses such as those that cause the common cold or influenza. They may be produced naturally by microorganisms or manufactured and modified to improve their effectiveness.

The discovery of antibiotics, particularly **penicillin**, transformed the treatment of infectious diseases and contributed significantly to the development of modern medicine.

Definition of Antibiotics

An antibiotic is a substance that, at a suitable concentration, **kills bacteria (bactericidal action) or prevents their growth and multiplication (bacteriostatic action)**.

Examples include:

- Penicillin
- Amoxicillin
- Tetracycline
- Erythromycin
- Ciprofloxacin
- Gentamicin

History of Antibiotics

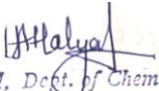
The modern era of antibiotics began with the discovery of **penicillin by Alexander Fleming in 1928**. Fleming observed that a substance produced by the fungus *Penicillium* could inhibit the growth of certain bacteria. Later, scientists including Howard Florey and Ernst Chain helped develop penicillin for medical use. During the 1940s, large-scale production of penicillin made it possible to treat many serious bacterial infections.

Since then, many different classes of antibiotics have been discovered and developed.

Classification of Antibiotics

Antibiotics can be classified according to their chemical structure, mechanism of action, or range of activity.

Based on Mechanism of Action


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1. Cell wall synthesis inhibitors

- Penicillin
- Amoxicillin
- Cephalosporins
- Vancomycin

2. Protein synthesis inhibitors

- Tetracycline
- Erythromycin
- Azithromycin
- Gentamicin

These interfere with bacterial protein production.

3. Nucleic acid synthesis inhibitors

- Ciprofloxacin
- Rifampicin

These interfere with processes required for bacterial DNA or RNA synthesis.

4. Metabolic pathway inhibitors

- Sulfonamides
- Trimethoprim

These interfere with important biochemical pathways in bacteria.

5. Cell membrane-disrupting antibiotics

- Polymyxins

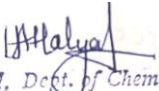
These damage the bacterial cell membrane.

How Antibiotics Work

Different antibiotics act on different structures or processes within bacterial cells.

For example: **Penicillin** interferes with bacterial cell-wall formation.

- **Tetracycline** inhibits bacterial protein synthesis.
- **Ciprofloxacin** interferes with bacterial DNA replication.
- **Rifampicin** interferes with bacterial RNA synthesis.


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Because human cells differ from bacterial cells, many antibiotics can selectively target bacteria. However, antibiotics can also cause side effects and should therefore be used appropriately.

Uses of Antibiotics

Antibiotics are used to treat many bacterial diseases, including:

- Tuberculosis
- Bacterial pneumonia
- Urinary tract infections
- Bacterial skin infections
- Some intestinal bacterial infections
- Certain sexually transmitted bacterial infections
- Bacterial meningitis

The choice of antibiotic depends on the type of infection, the suspected or identified bacterium, resistance patterns, patient factors, and other clinical considerations.

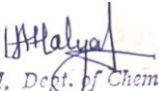
Antibiotic Resistance

Antibiotic resistance occurs when bacteria develop the ability to survive exposure to antibiotics that would normally kill them or stop their growth.

Resistance can develop naturally through genetic changes, but inappropriate or excessive antibiotic use can accelerate the selection and spread of resistant bacteria.

Causes of antibiotic resistance

- Unnecessary use of antibiotics
- Using antibiotics for viral infections
- Incorrect dosage or duration
- Self-medication
- Poor infection-control practices
- Overuse of antibiotics in some agricultural settings
- Infections become more difficult to treat.
- Treatment may require more expensive or toxic medicines.


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