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# PHARMACEUTICS – I

## UNIT 4

TOPIC :

- **Pharmaceutical incompatibilities :** Definition, classification, physical, chemical and therapeutic incompatibilities with examples.

# Pharmaceutical Incompatibilities

→ Pharmaceutical incompatibilities occur when two or more substances in a prescription interact in a way that affects the safety, efficacy, or physical properties of the medication. These interactions can be physical, chemical, or therapeutic.

→ Pharmaceutical incompatibility refers to undesirable interactions between drugs or between drugs and excipients that result in changes in the drug's:

→ **Physical appearance** (e.g., color change, precipitation)
→ **Chemical composition** (e.g., decomposition, hydrolysis)
→ **Therapeutic effect** (e.g., antagonism, toxicity)

## Classification of Pharmaceutical Incompatibilities

Pharmaceutical incompatibilities are broadly classified into:

- ❖ **Physical Incompatibility**
- ❖ **Chemical Incompatibility**
- ❖ **Therapeutic Incompatibility**

# Physical Incompatibility

→ Physical incompatibilities occur when two or more substances in a pharmaceutical formulation interact in a way that causes a visible, non-chemical change in the product. These changes affect the physical properties of the medication but do not necessarily alter its chemical structure.

**Examples**

| Type | Example |
|---|---|
| **Precipitation** | Tannic acid + Ferric chloride → Ferric tannate (black ppt) |
| **Liquefaction** | Camphor + Menthol → Eutectic mixture (forms oily liquid) |
| **Immiscibility** | Water + Oil → Two separate layers (requires emulsifier) |
| **Volatilization** | Ammonium carbonate stored in open → Loss of content |

# Chemical incompatibilities

→ Chemical incompatibilities occur when two or more substances in a pharmaceutical formulation undergo a chemical reaction, leading to:
→ Formation of inactive or toxic products
→ Decomposition of active ingredients
→ Loss of therapeutic efficacy
→ Changes in color, odor, or physical state due to chemical alteration

**Examples:**

| Reaction Type | Example |
|---|---|
| **Oxidation** | Potassium permanganate + Alcohol → Violent oxidation |
| **Precipitation** | Silver nitrate + Sodium chloride → White ppt of AgCl |
| **Hydrolysis** | Aspirin + moisture → Salicylic acid + acetic acid |
| **Neutralization** | Sodium bicarbonate + citric acid → Effervescence |
| **Complexation** | Tetracycline + calcium salts → Inactive chelate |

# Therapeutic incompatibility

→ Therapeutic incompatibility refers to a situation where two or more drugs, when administered together, interact in a way that alters their expected therapeutic effects, leading to:
→ Reduced effectiveness (antagonism)
→ Exaggerated effects or toxicity (synergism)
→ Unwanted side effects
→ This type of incompatibility occurs after administration due to pharmacological interaction (not due to formulation or compounding).

**Examples:**

1. **Aspirin + Warfarin**
   → Increased risk of bleeding (synergistic effect on blood thinning)
2. **Tetracycline + Antacid (containing calcium)**
   → Reduced absorption of tetracycline (pharmacokinetic interaction)
3. **Adrenaline + Propranolol**
   → Antagonistic effects (one increases heart rate, the other blocks it)