DOSAGE FORM DESIGN

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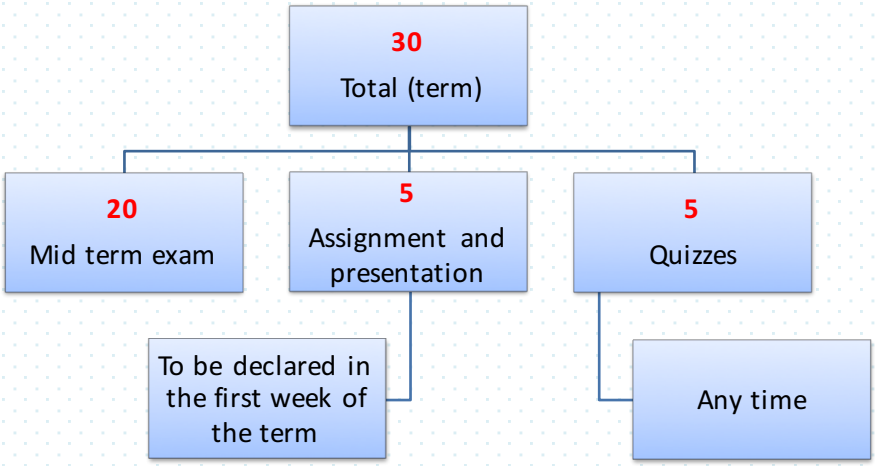
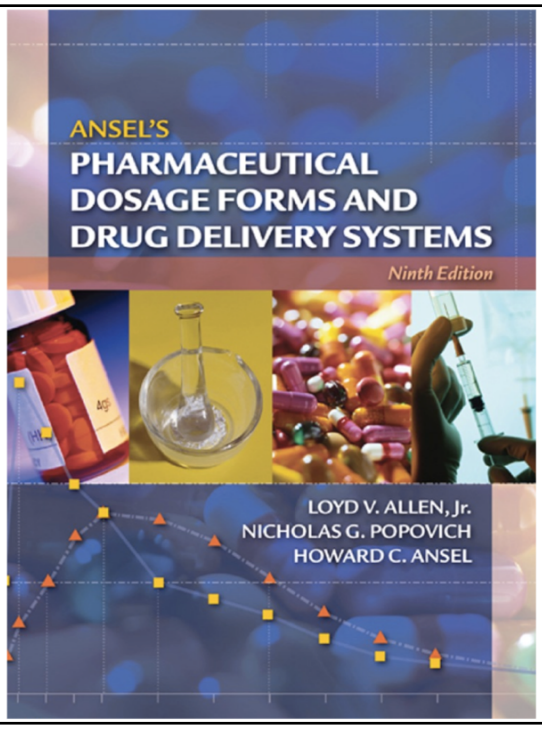
Marks Allocation



INTRODUCTION

This course enables students to:

1. Understand the principles and factors that influence dosage forms design.
2. Learn about the applications of these principles in the practice of pharmaceutical industry.



Introduction

- The need for the dosage form.
- General considerations of dosage form design
- Physicochemical properties of drugs
  - Pre-formulation; physical description, microscopic examination.
  - Melting point; phase rule; particle size; polymorphism; solubility.
  - Permeability; pH; partition coefficient; pka; kinetics;.
  - Stability, rate reaction, shelf life, enhancing stability.

Introduction

- Formulation consideration:
  - Excipients; definition and types; appearance; palatability; flavoring; sweetening; coloring pharmaceuticals; preservatives; sterilization; preservatives selection; disintegrants; suspending agents; antioxidants; diluents; solvents; etc.

Introduction

- Biopharmaceutical considerations:
  - Principle of drug absorption; dissolution of the drugs.
  - Bioavailability and bioequivalancy; FDA requirements.
  - Assessment of bioavailability; bioequivalence among drug products.
  - Pharmacokinetic principles: half life; clearance; dosage regimen considerations.

Pharmaceutical dosage form

- Dosage form: it is the formulation to which drug in included with the excipients
- A drug can not be given alone.
- Excipients solubilize, suspend, thicken, dilute, emulsify, stabilize, preserve, colour, flavour, and fashion medicinal agents into efficacious and appealing dosage forms.

Pharmaceutical dosage form

- Proper dosage from design ensures obtaining the required features like:
  - Stability
  - Compatibility
  - Efficacy.
  - Elegance.
  - Easy administration by the patient.
  - Etc..

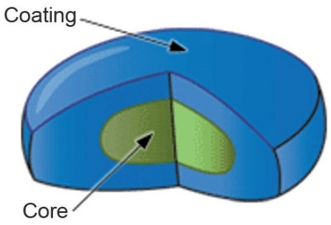
The need for the dosage form

- Most drugs administered in small quantities (mg or µg) too small to be formulated as a tablet or cap.
  - Volume would be so small.
  - A filler here is needed.

Drug	Usual dose (mg)	Category
Betaxolol	10	Antianginal
Enalapril	5	Antihypertensive
Clonazepam	1	Anticonvulsant
Digoxin	0.25	Carditonic
Levothyroxine	0.1	Thyroid

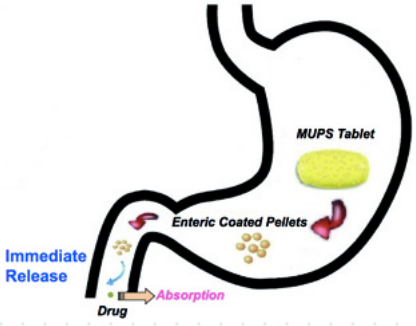
The need for the dosage form

- To protect the drug substance from the destructive influences of atmospheric oxygen or humidity, (increasing stability)
  - Coating
  - Sealed ampoules.
  - Tablet filler
  - Capsule shell
  - Opaque bottle
  - Antioxidants



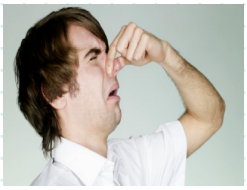
The need for the dosage form

- To protect the drug substance from the destructive influence of gastric acid after oral administration.
  - Enteric-coated tablets.
  - Pellets shell shell



The need for the dosage form

- To mask the bitter, salty, or offensive taste or odour of a drug substance.
  - capsules,
  - Coated tablets,
  - flavoured syrups.



API	Taste Masking Agent	Comment
Sweetener, flavorant, and other excipient addition		
Epinephrine	Aspartame, acesulfame potassium	Reduction in bitter taste of API
Cetirizine hydrochloride	Aspartame, sucralose, lemon flavor, and citric acid	Palatable formulation obtained, addition of citric acid enhances lemon flavor note
Famotidine	Aspartame, menthol flavor, and peppermint flavor	Palatable formulation which was comparable to ethyl cellulose coated formulation
Denatonium benzoate	Sodium cyclamate, zinc sulfate	Zinc sulfate inhibited bitterness of API and did not interfere with sweetness attributed by sodium cyclamate
Complexation		
Primaquine phosphate	Beta cyclodextrin	Complete taste masking of API
Lornoxicam	Beta cyclodextrin	Complete taste masking of API
Ibuprofen	Hydroxy propyl beta cyclodextrin	Bitterness of API, decreased to an extent
Dextramethorphan HBr	Beta cyclodextrin and gamma cyclodextrin	Bitterness of API, decreased to an extent
Coating		
Acetaminophen	Shellac	Tablet coating was done, which taste masked bitter API taste
Theophylline	Acrylic polymer containing hydroxy propyl methyl cellulose	Tablet coating was done, which taste masked bitter API taste
Oxybutynin HCl	Aminoalkyl methacrylate copolymers	Coating of API particles by microencapsulation was found to be effective
Diclofenac sodium	Ethyl cellulose	Coating of API and diluent particles by microencapsulation was found to be effective
Matrix entrapment		
Primaquine phosphate	Mono ammonium glycyrrhyzinate pentahydrate	API was entrapped in polymeric matrix by solid dispersion technique and taste masked formulation was achieved
Ondansterone Hydrochloride	Indion 294	API was entrapped in cationic exchange resinous matrix by ion exchange method and taste masking of API was achieved to an extent
Paracetamol	Gellan gum	API was effectively taste masked in gel matrix
Chloroquine phosphate	Egg phosphatidyl choline	API was effectively taste masked in lipoidal matrix
Prodrug formation		
Chloramphenicol	Palmitate ester	Taste masked drug which converts into its active form intestinal esterases
Nalbuphine HCl	Alkyl esters	Taste masked drug which converts into its active form plasma esterases
Ibuprofen	Ibuprofen basic salts	Taste masked API synthesized
Aspirin	Aspirin magnesium salt	Taste masked API synthesized

The need for the dosage form

- To protect the drug from harmful effect of microorganisms
  - Addition of preservatives

The need for the dosage form

- To provide liquid preparations of substances that are either insoluble or unstable in the desired vehicle.
  - Suspensions.

The need for the dosage form

- To provide clear liquid dosage forms of substances
  - Syrups, solutions.
    - Solvent, solubilizing agent.

The need for the dosage form

- To provide rate-controlled drug action
  - Various controlled-release tablets, capsules, and suspensions.

The need for the dosage form

- To provide optimal drug action from topical administration sites
  - Ointments, creams, transdermal patches, and ophthalmic, ear, and nasal preparations.
    - Ointment base (liquid paraffin)

The need for the dosage form

- To provide a way for insertion of a drug into one of the body's orifices (rectal or vaginal suppositories).