

- ENZYME Activated Drug Delivery System
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- pH-Activated Drug Delivery System
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- Mechanically Activated Drug Delivery System
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- Osmotic Activated Drug Delivery System.

# ENZYME ACTIVATED DRUG DELIVERY SYSTEM

- This type of biochemical system depends on the enzymatic process to activate the release of drug.
- Drug reservoir is either physically entrapped in microspheres or chemically bound to polymer chains from biopolymers.
- The release of drug is activated by enzymatic hydrolysis of biopolymers by specific enzyme in target.

# pH-activated drug delivery Systems

- This type of chemically activated system permits targeting the delivery of drug only in the region with selected pH range.
- It is fabricated by coating the drug-containing core with a pH-sensitive polymer combination.
- Intestinal pH activated DDS.



The drug is released by drug dissolution and pore channel diffusion mechanism.



In the stomach, coating membrane resists the action of gastric fluid ( $\text{pH} < 3$ ) & the drug molecule thus protected from acid degradation.



After gastric emptying the DDS travels to the small intestine & intestinal fluid ( $\text{pH} > 7.5$ ) activates the erosion in intestinal fluid soluble

— This leaves a micro porous membrane constructed from the intestinal fluid insoluble polymer, which controls the release of drug from the core tablet.



— The drug solute is thus delivered at a controlled manner in the intestine by a combination of drug dissolution & pore-channel diffusion.

Stomach ( $\text{pH} < 3$ )

↓ Gastric emptying

Gastric fluid-labile drug

Coating of  
Intestinal fluid-insoluble  
Intestinal fluid-soluble  
polymer

Intestinal fluid ( $\text{pH} 7.5$ )

Gastric fluid-labile drug

Microporous  
membrane of  
intestinal fluid-  
insoluble  
polymer.

Drug



# Mechanically activated drug delivery system

- In this type, drug reservoir is in solution form retained in a container equipped with mechanically activated pumping system.
- A measured dose of the drug formulation is reproducible delivered in to a body cavity.

Ex — The nose through the spray head upon manual

# Osmotic activated drug

## delivery systems

- In this type, drug reservoir  
- can be either solution or solid  
formulation contained with semi  
permeable housing with controlled  
water permeability.
- The drug is activated to  
release in solution form at a  
constant rate through a  
special delivery orifice.



- The rate of drug release is modulated by controlling the gradient of osmotic pressure.
- For the drug delivery system containing a solution formulation, the intrinsic rate of drug release is defined by,

$$\frac{Q}{t} = \frac{P_w A_m}{h_m} (\pi_s - \pi_e)$$

For solid formulation -

$$\frac{Q}{t} = \frac{P_w A_m}{h_m} (\pi_s - \pi_e)$$

# Ex - Alzet Osmotic pump.

