

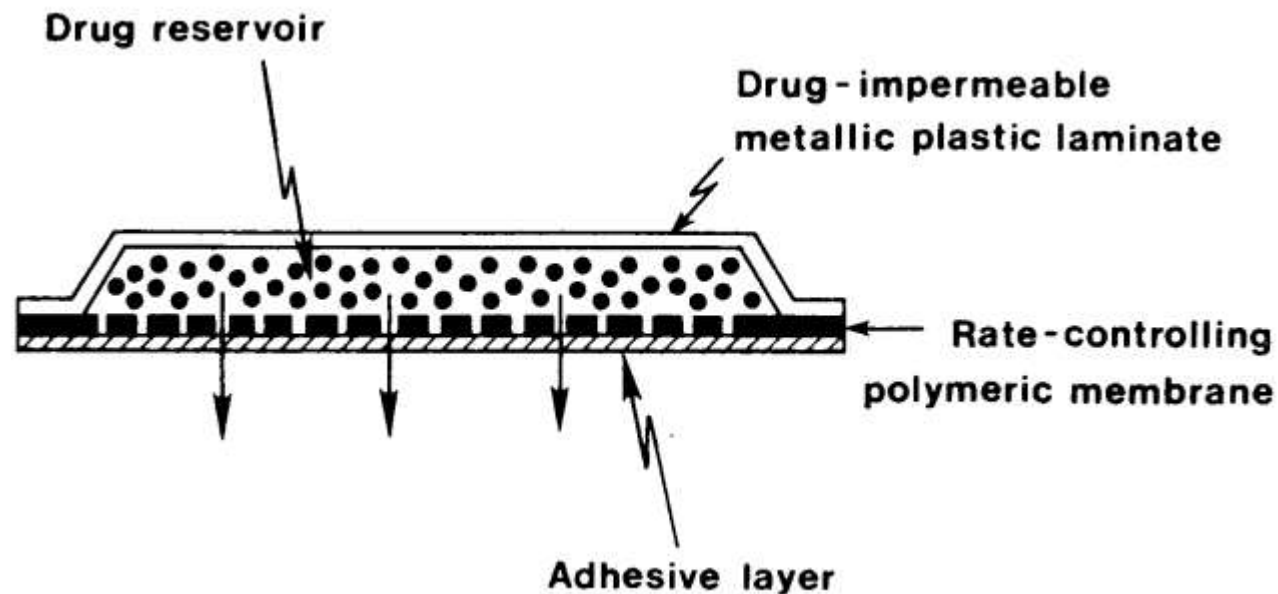
Classification of TDDS/Approaches

- 1. Polymer membrane permeation-controlled.**
- 2. Polymer matrix diffusion- controlled**
- 3. Drug reservoir gradient-controlled**
- 4. Micro reservoir dissolution-controlled**

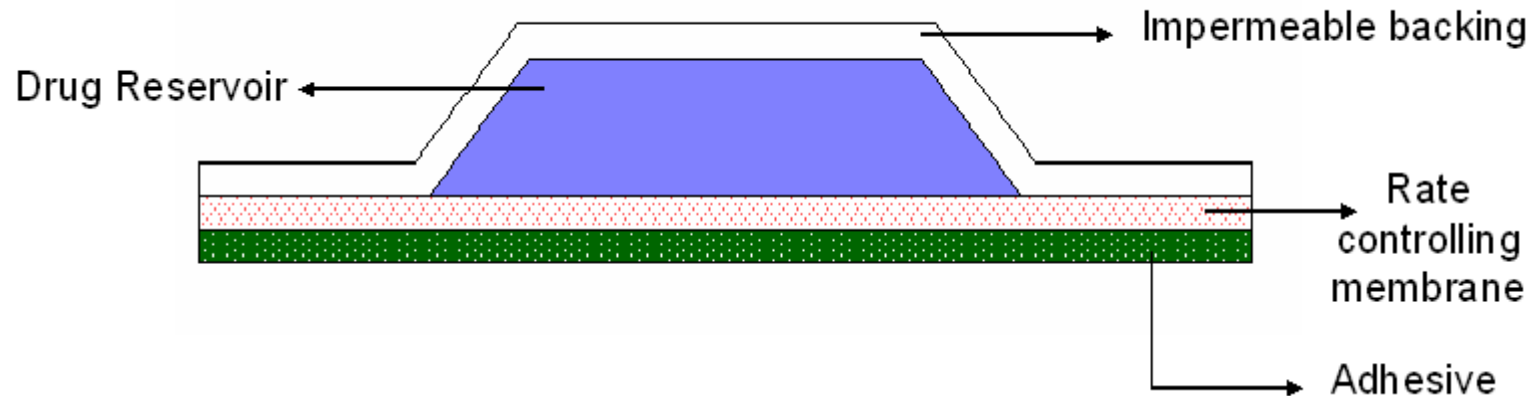
Formulation of TDDS

1. Membrane-moderated or Permeation controlled TDDS (Reservoir type)

- Drug reservoir (homogenous dispersion of drug with polymeric matrix or suspension of drug in un leachable viscous liquid medium such as silicone fluid) is encapsulated within drug impermeable metallic plastic laminate and a rate controlling polymeric membrane (ethylene vinyl acetate co polymer)
- The cross sectional view of this system is shown in the following Fig.1



RESERVOIR SYSTEM (MEMBRANE MODERATED TDDS)



TransdermScop® (Scopolamine) for 3 days protection of motion sickness

The drug reservoir is encapsulated in a shallow compartment moulded from a drug impermeable metallic – plastic lamination whilst the drug delivery side is covered by controlling polymeric membrane.

A thin layer of silicone or poly acrylate adhesive may be applied to the external surface of the rate controlling membrane to achieve intimate contact of the TDDS and the skin surface

- Release rate of this TDDS depends upon the polymer composition, permeability coefficient and thickness of the rate controlling membrane and adhesive
- The intrinsic rate of drug release from this TDDS is calculated by the following formula.1

$$dQ/dt = \frac{CR}{1/P_m + 1/P_a}$$

CR-conc. of drug in the reservoir compartment

P_m-permeability coefficient of rate controlling polymeric membrane

P_a- permeability coefficient of adhesive

Drug mixed with polymer solution



Drug suspended in polymer solution



Volume controlled injection pump system



Molding as TDDS using primary packing material



Packing machinery using secondary packing material



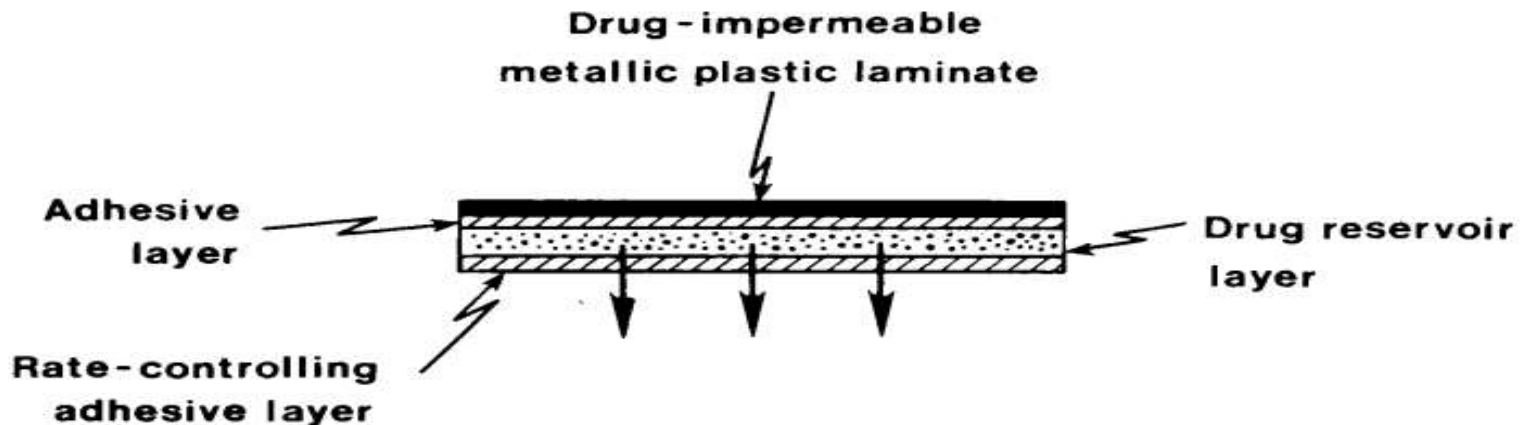
Transdermal therapeutic system

Example of this system are

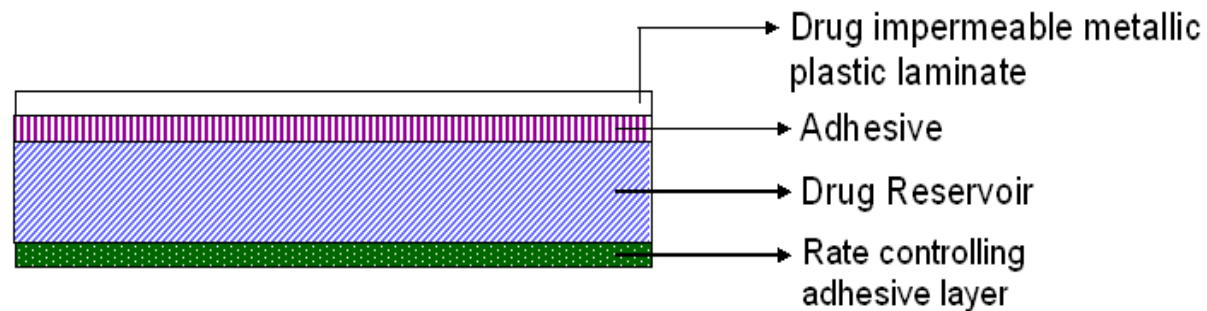
1. Nitro glycerin releasing TDDS (Transderm-Nitro/ciba,USA)for once a day medication in angina pectoris
2. Scopolamine releasing TDDS (Transderm-Scop/ciba,USA)for 72 hrs.prophylaxis of motion sickness
3. Estradiol releasing TDDS (Estraderm/ciba)for treatment of menopausal syndrome
4. Clonidine releasing TDDS (Catapres/Boehringer Ingelheim)for 7 day therapy of hyper tension
5. Prostaglandin-derivatives TDDS

2. Adhesive diffusion/dispersion-controlled TDDS Drug reservoir

- homogenous dispersion of drug with adhesive polymer (poly(isobutylene) or poly acrylate)
- Then spreading of this medicated adhesive polymer on flat sheet of drug impermeable metallic plastic backing to form thin drug reservoir layer
- On top of the drug reservoir layer, thin layers of rate controlling adhesive polymer of specific permeability and constant thickness are applied to produce an adhesive diffusion/dispersion-controlled TDDS
- The cross sectional view of this system is shown in the following Fig.2



- It is the simplified form of membrane moderated drug delivery system
- It is prepared by directly dispensing the drug in an adhesive polymer & then spreading the medicated adhesive by solvent film casting method over a flat sheet of drug impermeable metallic or plastic backing membrane, this forms a thin drug reservoir layer.



Deponit® (Nitroglycerine) for once a day medication of angina pectoris

The rate of drug release in this system is defined by

$$\frac{dQ}{dt} = \frac{K_a/r \cdot D_a}{h_a} \cdot c_R$$

Where

K_a/r -partition co-efficient of drug bw adhesive layer and reservoir layer

D_a -diffusion co-efficient of drug in the adhesive layer

h_a -thickness of adhesive layer

Examples for this system

1. Iso sorbide dinitrate-releasing TDDS

2. Verapamil releasing TDDS