$$P_{\text{eff}} = \frac{1}{A} Q_{\text{in}} \frac{(C_{\text{in}} - C_{\text{out}})}{C_{\text{in}}}$$

where Q_{in} is the perfusion flow rate, A is the area of the intestinal segment, C_{in} and C_{out} are the inlet and outlet concentrations of the drug in the perfusate.

1.4. Drug Delivery Systems for Oral Use

Drug delivery systems (DDS) are a strategic tool for expanding markets and indications, extending product life cycles, and generating new market opportunities. The reader is encouraged to explore the literature for information on the numerous and diverse drug delivery systems that are available for assessment. Some of these systems improve palatability, while others may improve stability, solubility, or permeability—subsequently improving bioavailability. Other systems can sustain the release of drug from the delivery system and thus reduce the frequency of dose administrations. A brief description of these oral delivery systems can be found elsewhere (21).

2. TRANSDERMAL DRUG DELIVERY

Transdermal drug delivery is used for the administration of drug molecules through the skin into the circulatory system.

The advantages of transdermal over conventional routes include avoidance of the variables associated with gastrointestinal absorption, reduction of first-pass metabolism (deactivation by enzymes in the liver), and improved therapeutic management of disease by the absence of pulsed delivery. The dosage units used to achieve transdermal drug delivery are called transdermal drug delivery systems (TDDS).

TDDS typically produce a constant plasma drug concentration as opposed to the broader peaks and troughs of intermittent dosing. Since first-pass metabolism is bypassed or reduced, the required dosage is in some cases considerably lower than the amount required orally. Also, bypassing the liver can reduce potential risk of hepatotoxicity that would otherwise be higher due to first-pass exposure. The continuous administration provides sustained plasma levels of the drug and improves patient compliance. Further, it provides an easy method for terminating drug delivery by simply removing the patch from the skin. Since better control of release is possible with TDDS, drugs with low therapeutic indices can be formulated for delivery across the skin.

However, there are several disadvantages of TDDS. The main disadvantage is that there are relatively few suitable drug candidates for transdermal delivery. The poor permeability of human skin to most drugs