system can thus be described as a single-unit system. The erosion in its simplest form can be described as a continuous liberation of matrix material (both drug and excipient) from the surface of the tablet, i.e. surface erosion. The consequence will be a continuous reduction in tablet weight during the course of the release process (Fig. 30.16). Drug release from an erosion system can thus be described in two steps:

1. Matrix material, in which the drug is dissolved or dispersed, is liberated from the surface of the tablet.
2. The drug is subsequently exposed to the gastrointestinal fluids and mixed with (if the drug is dissolved in the matrix) or dissolved in (if the drug is suspended in the matrix) the fluid.

The release rate of a drug from an eroding system can often approximate to zero order for a significant part of the total release time.

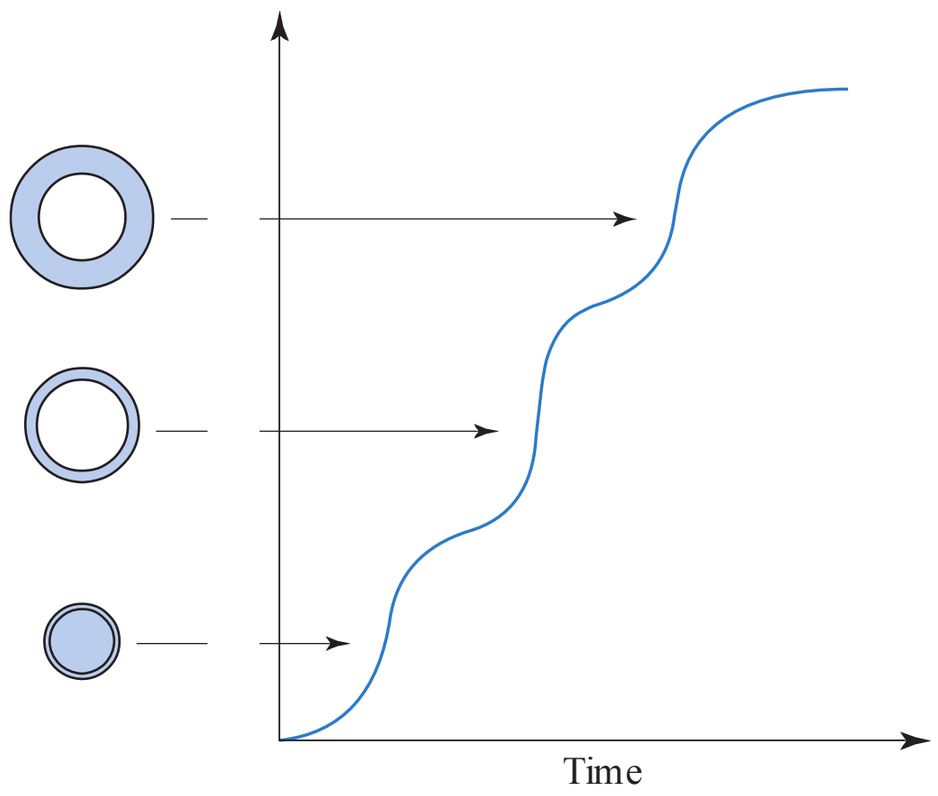

Fig. 30.15 • Schematic representation of the cumulative amount of drug released from a dissolution-based (due to differences in coating thickness) pulsatile-release preparation.

The eroding matrix can be formed from different substances. One example is lipids or waxes, in which the drug is dispersed. Another example is polymers that gel when in contact with water (e.g. hydroxyethyl cellulose). The gel will subsequently erode and release the drug dissolved or dispersed in the gel. However, as discussed above, a prolonged-release tablet based on a gel-forming matrix may also be classified as a diffusion-controlled release system. Diffusion may be the dominating release mechanism in some cases.

Osmosis-controlled release systems

In osmosis-controlled prolonged-release systems, the flow of liquid into the release unit, driven by a difference in osmotic pressure between the inside and the outside of the release unit, is used as the release-controlling process. Osmosis can be defined as the flow of a solvent from a compartment with a low concentration of solute to a compartment with a high concentration. The two compartments are separated by a semi-permeable membrane, which allows flow of solvent but not of solute.

In the most simple type of osmosis-controlled drug release, the following sequence of steps is involved in the release process:

1. Osmotic transport of liquid into the release unit.
2. Dissolution of drug within the release unit.
3. Convective transport of a saturated drug solution by pumping of the solution through a single orifice or through pores in the semi-permeable membrane.

The pumping of the drug solution can be accomplished in different ways. One example is a tablet which includes an expansion layer, i.e. a layer of a substance that swells in contact with water, the expansion of which will press out the drug solution from the release unit. Alternatively, the increased volume of fluid inside the release unit will increase

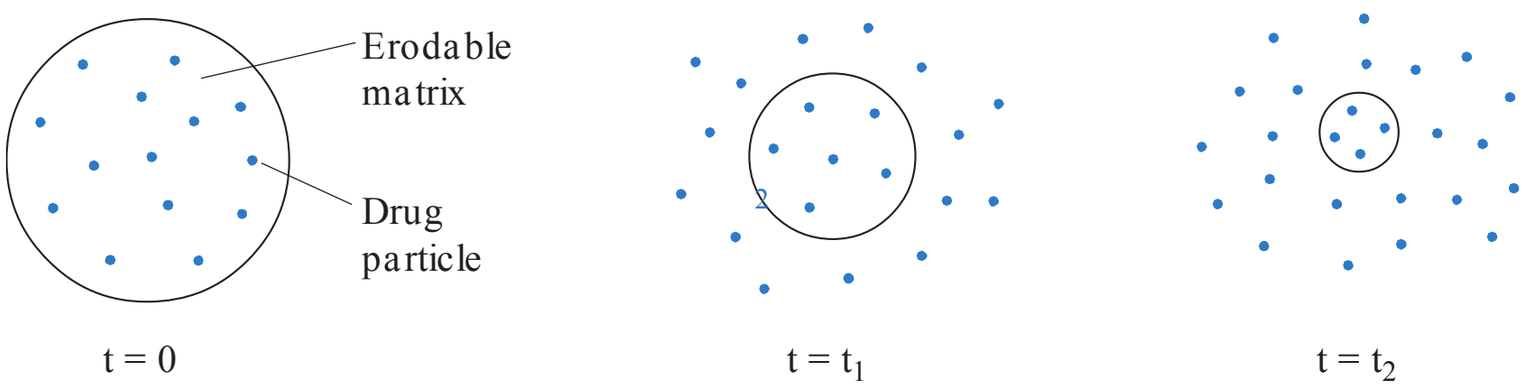

Fig. 30.16 • Schematic illustration of the mechanism of drug release from an erosion tablet.