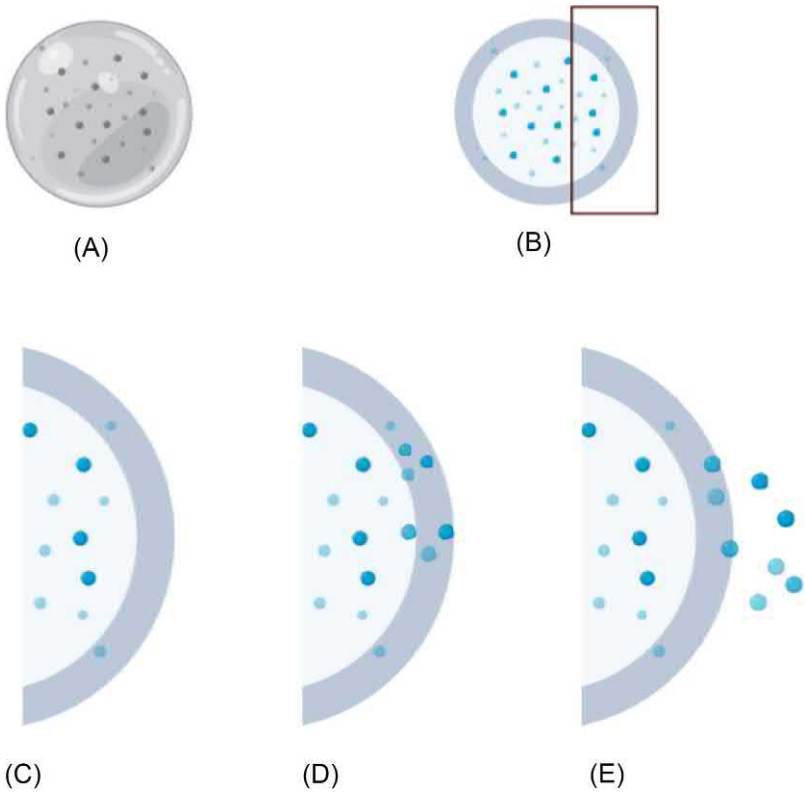

FIG. 2 Reservoir-type diffusion-controlled system. (A) whole reservoir, (B) cross-section of reservoir system, (C) zoomed cross-section view, (D) drug partitioning into the polymer membrane, and (E) diffusion of the drug into the surroundings.

on drug solubility and membrane thickness. For these systems, the slow-dissolving materials such as cellulose, polymethacrylates, PEGs, and waxes are ideal [55].

5.2.2. Matrix-type dissolution-controlled systems

In this system, drug emerges into the hydrophobic matrix. For dissolution-controlled systems, hydrogenated oils and waxes were investigated as the ideal matrices. The drug can be dispersed uniformly in the molten wax that can then be solidified and granulated using appropriate methods. These materials control the release by controlling the rate of penetration of fluid into the system, altering the porosity of the tablets, dissolving slowly, or by altering the wettability of the system [56].

5.3. Dissolution-diffusion-controlled systems or hybrid systems

An example of one such system that combines the principle of diffusion and dissolution is a bio-erodible matrix system. In these systems, not only the matrix dissolves to release the drug but also the drug diffuses out of the dosage form. Such a system is complex, given the fact that the diffusional path length is continuously decreasing along with a decrease in the drug load in the core (moving boundary diffusion systems). Hence, a zero-order release can be achieved if surface erosion occurs in such a way that the surface area does not change.

Another such system is a swelling-controlled system. Unlike the previous system, this system does not erode, but the coating undergoes swelling immediately after coming in contact with the GI fluids. Also, the water enters the matrix core and dissolves the drug. The dissolved drug then diffuses through the swollen membrane. The release rate is dependent on drug solubility and polymer swelling rate. These systems pose fewer chances of burst release. Furthermore, such coating can have pores using soluble pore-forming ingredients. These agents solubilize immediately, form pores on the membrane, and influence the drug release [45,57–59].