Effect of dilution on aqueous dispersion of drug particles

Hideo Terayama\textsuperscript{a}, Kozue Hirota\textsuperscript{b}, Tomokazu Yoshimura\textsuperscript{b}, Kunio Esumi\textsuperscript{b,*}

\textsuperscript{a} Chemical Development, International Division, Senju Pharmaceutical Co. Ltd, 2-5-8 Hiranomachi, Chuo-ku, Osaka 541-0046, Japan
\textsuperscript{b} Department of Applied Chemistry, Institute of Colloid and Interface Science, Science University of Tokyo, Kagurazaka, Shinjuku-ku, Tokyo 162-8601, Japan

Received 8 April 2002; accepted 17 May 2002

Abstract

Aqueous suspensions of 5-(3-ethoxy-4-pentyloxyphenyl)-2,4-thiazolidinedione (CT112) have been prepared by neutralization of alkaline solutions of CT112 in the presence of surfactant/polymer with HCl. Sodium dodecyl sulfate (SDS) and celluloses have been used. The effect of dilution of water on the aqueous CT112 dispersion has been studied by measuring the amount adsorbed of surfactant and polymer, \(\zeta\)-potential, particle size, and sedimentation behavior. The dispersion stability of aqueous CT112 suspension in the presence of polymer or SDS by dilution of water depends on the initial concentration of polymer or SDS. On the other hand, the dispersion stability of aqueous CT112 suspension in the presence of both polymer and SDS is stable even by dilution of water. The mechanism for the effect of dilution of water has been discussed.

\(\copyright\) 2002 Elsevier Science B.V. All rights reserved.

Keywords: Aqueous dispersion of drug particles; Dilution effect; Adsorption of polymer and surfactant; Cellulose; Sodium dodecyl sulfate

1. Introduction

Drug particles are known to be usually hydrophobic and hardly dispersed in aqueous solution. Surfactants or polymers have been often added to obtain a stable aqueous dispersion of drug particles.

Recently we have intensively studied the aqueous dispersion behavior of 5-(3-ethoxy-4-pentyloxyphenyl)-2,4-thiazolidinedione (CT112) particles, known as an enzymatic inhibitor, using surfactants and water-soluble polymers [1–4]. It has been found [3] that the aqueous dispersion stability of CT112 particles is enhanced by neutralization of CT112 alkaline solution in the presence of cellulose/sodium dodecyl sulfate (SDS) with the addition of HCl. The kinetics of neutralization for formation of CT112 particles has also been investigated [4].

Aqueous dispersions of particles are often used by diluting concentrated dispersions. Accordingly it is vital to study the effect of dilution on the dispersion stability of CT112 particles.

The objective of this study is to investigate the effect of water dilution on CT112 aqueous dispersions by measuring sedimentation rate, \(\zeta\)-potential...