HIGH-PRECISION PARALLEL-BEAM X-RAY DIFFRACTION SYSTEM FOR PHARMACEUTICALS ANALYSIS

Tomikatsu Kubo
Application Laboratory, Rigaku Corporation
14-8 Akaoji-cho, Takatsuki-shi, Osaka 569-1146, Japan

Mostly organic powder specimens such as pharmaceuticals have as crystal shape is fiber or plate, therefore X-ray diffraction pattern often don’t reappear. These phenomenon effects the confirmation of phase or polymorphism, and analytical curve linearity will be bad for quantitative analysis. Quality control is very important for pharmaceutical product since long ago. Especially polymorphism administration is very important for polymorphous organic specimens under the guidance of Food and Drug Administration (FDA) in the last a few years.

The Bragg-Brentano para-focusing method (Brentano, 1946) has been used extensively in conventional powder diffractometry. But this para-focusing method is that it can have large systematic errors in diffraction peak positions, widths and intensities. The systematic errors especially those caused by specimen displacement or absorption effect. Organic specimen is composed of light chemical elements, therefore the systematic errors are larger than inorganic specimen cases. On the other hand it need oscillation for no orientation effect that X-ray powder diffraction pattern reappear. The systematic errors are larger by this oscillation, so that the Bragg-Brentano para-focusing method is no good for organic powder specimens such as pharmaceuticals.

A recently developed Rigaku parallel-beam X-ray diffraction system equipped with a parabolic graded-multilayer mirror in the incident beam and a parallel-slits analyzer in the diffracted beam was used for pharmaceuticals analysis. With a parallel incident X-ray beam, diffraction peaks are free from systematic errors caused by sample displacement, transparency and flat specimen, therefore this X-ray diffraction system is very good for polymorphous organic specimens such as pharmaceuticals.

We introduce Rigaku parallel-beam X-ray diffraction system and application measurement for polymorphous organic specimens such as pharmaceuticals.