

# MiniFlex300/600

## Variable knife edge features

### Introduction

Powder X-ray diffractometers are used in many fields of industry and research, for substances ranging from inorganic materials such as ceramics and minerals, to pharmaceuticals and other organic materials. The MiniFlex Series is a line of benchtop instruments - with 1/20 the volume, and 1/10 the weight, of stand-alone powder X-ray diffractometers - that can operate with power from an AC 100 V outlet. The current models in the MiniFlex Series include a high-power model type with a maximum rated output of 600 W (MiniFlex600), and a reduced-utility model, which requires no water facilities and only generates 300 W of output power (MiniFlex300).

### Measurements and results

The MiniFlex300/600 can be equipped with the D/teX Ultra high-speed 1-dimensional detector to obtain greater intensity. This detector has a broad detection surface and can efficiently count diffraction X-rays from a sample. As a result, it is possible to obtain intensities from a few tens to roughly 100 times greater than a scintillation counter. Background can also be reduced using the fluorescent X-ray reduction mode, or knife edge etc. Fig. 1 shows the X-ray diffraction patterns obtained when a knife edge is installed versus no knife edge. By using a knife edge, it is possible to achieve an extreme reduction in scattering on the low-angle side. Also, the knife edge moves in a way which is dependent on the diffraction angle  $2\theta$ , and thus there is no blind spot (intensity attenuation) on the high-angle side, and measurement can be done from the low-angle side to the high-angle side.

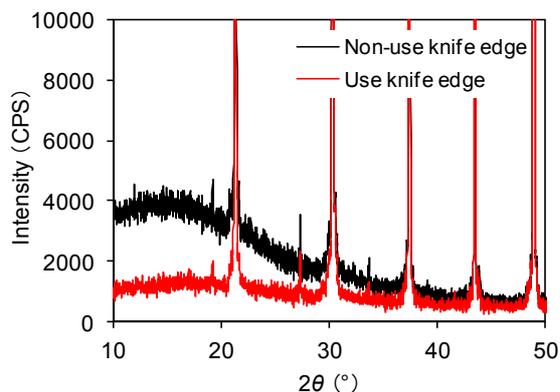


Fig. 1: X-ray diffraction patterns (enlarged) of zeolite, measured when a knife edge is installed versus no knife edge.

Fig. 2 shows the X-ray diffraction patterns for milk chocolate and bitter chocolate, measured using a knife edge. The background on the low-angle side is suppressed to a low level, and it is evident that the diffraction peaks on the low-angle side of the cacao butter (POS: a structure combining palmitic acid, oleic acid and stearic acid) contained in the chocolate are clearly observed. Without using a knife edge it would have been harder to observe the low angle peaks, especially for the minor component.

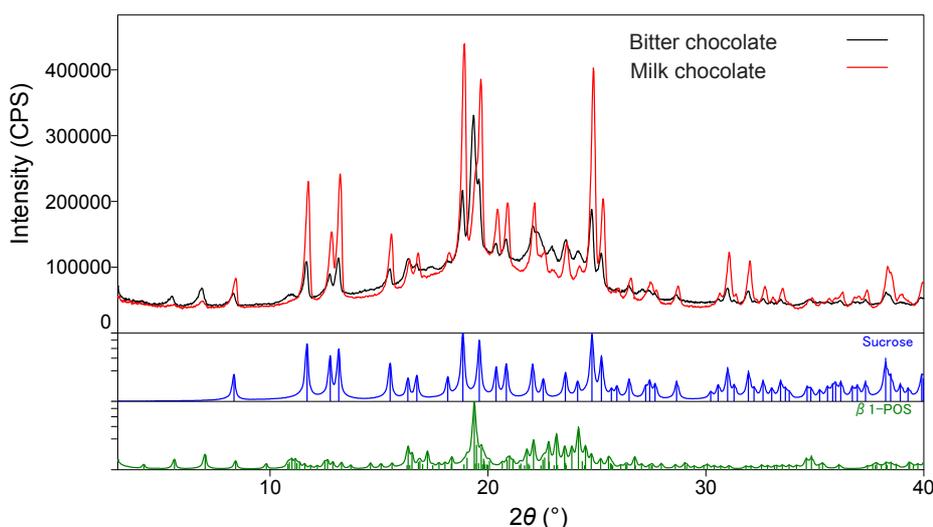


Fig. 2: Qualitative analysis results for milk chocolate and bitter chocolate

### Apparatus and Measurement conditions

Apparatus conditions: MiniFlex600 (F.F tube 40 kV, 15mA), Detector: D/teX Ultra, Slit conditions: DS = 0.625°, SS = 8 mm, RS = 13mm, Incident side and receiving side Soller slit: 5°, Incident height limiting slit = 10 mm

Measurement conditions: Scan range:  $2\theta = 3 \sim 40^\circ$ , Step width: 0.02°, Scan speed: 20° / min. (about 2 min.)