



e-learning

Powder X-ray diffraction measurements (qualitative analysis)

XRD course name

Part number

JHDE002

Required time

approx. 4.5 hr

Powder XRD can readily measure powder and bulk samples when sample preparation and measurement conditions setup are properly made. Analytical chemistry consists of quantitative analysis and qualitative analysis, which focus on identifying component and elements and finding a phase status in sample. In this training course, you will learn powder XRD for the measurement conditions and the qualitative analysis.

Learning point and Required time*1

(Required time: approx. 4.5 hr)

X-ray tube selection (35 min.)	Before moving on the main topics in this series, you will learn the definition of good quality data and good configuration of X-ray diffractometer in this chapter. Then, you will learn some typical X-ray tube types and the key points to consider when you select X-ray tube.
Monochromatization of X-rays and Background Reduction (35 min.)	You will learn how to select characteristic x-ray and reduce background by two physical and one electrical methods of monochromatization. One is the K beta filter method and the other is the monochromator method. And you will learn the PHA (pulse height analyzer) as electric method.
Auto-alignment and Preparation of Samples*2 (20 min.)	This is the chapter on the auto-alignment and sample preparation. You will learn outlines of the auto-alignment and what information we can get from the result. And then You will learn how to prepare various kinds of samples.
Conditions of the Standard Measurement Program*2 (45 min.)	You will learn the scan axis, method, counting unit, start and stop angles, sampling or step widths, scan speed or counting time per step, tube voltage/current, and slit conditions.
From X-ray Tube Selection to Conditions for The Standard Measurement Program*2 (25 min.)	You will learn the measurement conditions for the parallel beam method.
Principles and Features of Qualitative Analysis (25 min.)	This is the first chapter of four series about qualitative analysis of X-ray powder diffraction. You will learn principles and features in this chapter1.
Databases for X-ray Powder Diffraction (25 min.)	You will learn general databases to identify components in sample in chapter2.
Hanawalt Method (25 min.)	You will learn the Hanawalt method in chapter3, which is good alternative way to drill manual identification and a good reference to understand qualitative analysis.
Problems to be considered for Identification (40 min.)	You will learn various problems you may encounter when you compare and verify information between an unknown sample and the ICDD database for identification in chapter4.

Appendix [XRD] X-ray detectors (Required time: approx. 0.5 hr)

X-ray detectors (35 min.)	<p>To detect X-rays, X-rays need to be converted into a quantifiable signal by using interactions between X-rays and selected materials. In this chapter, after reviewing various detectors that have been used up to now, You will learn the features of semiconductor detectors that have become common in recent years.</p> <ul style="list-style-type: none"> •X-ray detectors (0D, 1D, and 2D detector) •2D Hybrid Pixel Array Detector "HyPix-3000"
-------------------------------------	---

*1: Please note: required time is estimated as minimum period by taking consecutive programs from the beginning to the end of the chapters without any repetition.

*2: Please note: training contents are based on D/MAX, Ultima and TTR XRD instruments. Please be aware of the difference if you are using other XRD instruments.