High-resolution synchrotron X-ray powder diffraction study of Korean bentonite for radioactive waste disposal

Tae-Jin Park[1*], **Surin Seo**[2] **and Donghoon Seoung**[2*]

[1]Radwaste Disposal Research Division, Korea Atomic Energy Research Institute, Daejeon, Republic of Korea
[2]Department of Earth Systems and Environmental Sciences, Chonnam National University, Gwangju, Republic of Korea
[3]Department of Radiological Science, Daegu Catholic University, Gyeongsan, Republic of Korea
[*]E-mail: etjpark@kaeri.re.kr; dseoung@jnu.ac.kr

Keywords: High-resolution synchrotron X-ray powder diffraction (HRPD), Korean bentonite, Radioactive waste disposal

Bentonites are considered to be used as buffer materials in a geological repository designed to host spent nuclear fuel and high-level radioactive waste (SNF/HLW). Under SNF/HLW repository environment, the buffer will face several geological condition changes with time. The SNF/HLW generate decay heats for a very long time (e.g., over tens of thousand years). The groundwater will wet and saturate the buffer. Thus, the buffer will be exposed to dry, then to the groundwater-saturated conditions. For the safety of the disposal repository, the buffer must maintain its required functions as designed initially. To evaluate the longevity for the buffer, identifying the mineralogical characteristics of the bentonite is a prerequisite. However, the existing study of the mineralogical characteristics of Korean bentonite (*a.k.a* KJ-ii) is not conclusive. To provide reliable mineralogy for the Korean bentonite, we performed high-resolution synchrotron X-ray powder diffraction at beamline at Pohang light source and compared the result of KJ-ii with that of well-studied MX80.
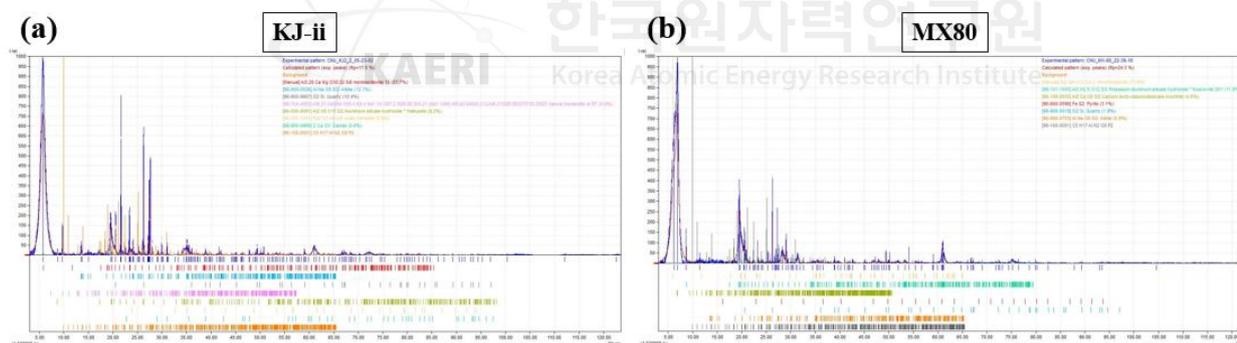

Fig. 1. High-resolution synchrotron X-ray powder diffraction patterns of (a) Korean bentonite and (b) MX80 bentonite.