

3.2-P16. Noble gas adsorption on silver doped zeolite: a major breakthrough for noble gas processing

IMS noble gas stations require to purify and to concentrate Xe by using compact and cost-effective processes. Noble gas separation is also of crucial importance regarding the xenon mitigation to prevent strong releases from nuclear facilities. CEA has been working for a few years on the development of a new adsorbent material to purify and concentrate Xe: silver exchanged zeolite (MFI), Ag@ZSM5. This adsorbent exhibits two order of magnitude higher retention capacities than activated charcoal. We showed that this material presents two different adsorption sites. The strong adsorption site is observed into the 0.087-100 ppm range that makes it efficient to treat Xe from the air or other low concentration samples. Experimental and simulation data have been then coupled to attribute the strong adsorption site to the presence of silver nanoparticles into the zeolite network. The strong capabilities have been illustrated by using Ag@ZSM5 into the SPALAX leading to reduce the column sizes by about a factor 15. Moreover, we showed also the outstanding performances of this new material to separate Xe and Kr that open promising prospects in other crucial applications such as industrial Xe production, nuclear waste management or xenon mitigation.

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