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Abstract

The chemical stability of repository compounds is affected by various environmental conditions during long-term storage. Studies were carried out to evaluate the effects of the following potential causes of instability of compounds in DMSO at a 10-mM concentration: water, oxygen, freeze/thaw cycles, and storage container material. A set of compounds was selected for the study based on structural diversity and functional group representation. Compound concentration was determined with liquid chromatography/ultraviolet spectroscopy/mass spectrometry (LC/UV/MS) analysis relative to an internal standard added to each sample. An accelerated study was conducted, and results demonstrate that most compounds are stable for 15 weeks at 40 °C. Water is more important in causing compound loss than oxygen. The freeze/thaw cycle study was done with freezing at -15 °C and thawing under nitrogen atmosphere at 25 °C. Two methods were used to redissolve compounds after thawing: agitation and repeated aspiration/dispense. The results indicate no significant compound loss after 11 freeze/thaw cycles. Compound recovery was also measured from glass and polypropylene containers for 5 months at room temperature, and no significant difference was found for these 2 types of containers.