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Stability of Pharmaceuticals, Personal-Care Products and Hormones in Aqueous Samples, POTW Effluents and Biosolids

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Abstract:

The presence of pharmaceuticals and hormones in the environment is an area of growing concern, with analytical monitoring studies appearing more frequently in the literature and new compounds being detected in POTW effluents and other environmental samples. There is not yet a consensus on which PPCPs and hormones should be analyzed in these samples. As the understanding of their occurrence, persistence and toxicity increases, the target lists will get refined, both by elimination of some compounds that are not commonly found and by the addition of others that become of concern.

This presentation reports the results of a sample storage study conducted to determine the effect of various sample handling protocols on the stability of 89 compounds (pharmaceuticals, personal-care products and hormones) in reagent water, POTW effluent, and biosolid samples. Glass, silanized glass, and HDPE bottles were evaluated for sample collection and storage, while the effects of both cold (4° C) and frozen (-20° C) storage were assessed. Sample storage times of up to 28 days were investigated. The effects of added chlorine, treatment with either ascorbic acid or sodium thiosulfate, and preservation by acidification were also studied. The stability of the target compounds in sample extract solutions stored for up to 180 days also is reported.

All samples were analyzed by LC/MS/MS using EPA Method 1694 for pharmaceuticals and personal-care products and a modified Method 1694 for hormones. Statistical analysis of results using ANOVA and Dunnett's test was used to identify storage and preservation conditions that resulted in significant changes in the concentrations of individual target

compounds. The results for individual target compounds were then grouped to produce conclusions for the various classifications of compounds.

The conclusions from this study may lead to guidelines on sampling, storage and holding times for samples analyzed for a range of pharmaceutical and hormone compounds. No set of conditions was found to be ideal for all target compounds. Therefore, the selection of the most appropriate storage and preservation protocol should be based on the specific study objectives and focus.