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Black carbon measurements using a revised benzene polycarboxylic acid (BPCA) method

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Black carbon (BC) is the product of incomplete combustion, whose sources and turnover times are not well known. Even quantification of BC presents major challenges, because not all methods quantify the same types of BC and some methods destroy or otherwise alter the BC during analysis. The benzene polycarboxylic acid (BPCA) method, developed by Glaser et al (1998) and modified by Brodowski et al (2005), supplies information about the chemical structure, and therefore source material of the BC material. Charred material, such as burned biomass, yields a high percentage of fewer substituted BPCAs, while soot BC, such as urban aerosol fossil soot, yields more fully substituted BPCAs. Carbon isotope analyses (such as ^{13}C and ^{14}C) of the individual BPCAs could provide valuable information about the processing and turnovertime(s) of BC in the environment. We have revised the method of Brodowski et al. (2005) that involves derivatization of BPCAs to methylated compounds (rather than silylating), thereby reducing the number of additional carbons added to the BPCAs. Using this revised method, distributions of BPCAs obtained from standard reference materials will be presented. The ultimate goal of this work is to measure the stable and radio-carbon isotope ratios of individual BPCAs produced from samples of marine organic matter, with the long term goal of determining the BC content of marine dissolved organic matter.