ABSTRACT

In flight particulate matter particularly emissions generated by incomplete combustion processes has become a subject of global concern due to the health problems and environmental impacts associated with them. This has compelled most countries to set standards for coarse and fine particles due to their conspicuous impacts on environment and public health. This contribution therefore explores forest fire emissions and how its particulates affects air quality, damage to vegetation, water bodies and biological functions as architects for lung diseases and other degenerative illnesses such as oxidative stress and aging. Soot was collected from simulated forest fire using a clean glass surface and carefully transferred into amber vials for analysis. Volatile components of soot were collected over 10 mL dichloromethane and analyzed using a QTOF Premier-Water Corp Liquid Chromatography hyphenated to a mass selective detector (MSD), and Gas Chromatograph coupled to a mass spectrometer (GC-MS). To characterize the size and surface morphology of soot, a scanning electron microscope (SEM) was used. The characterization of molecular volatiles from simulated forest fire emissions revealed long chain compounds including octadec-9-enoic acid, octadec-6-enoic acid, cyclotetracosane, cyclotetradecane, and a few aromatic hydrocarbons (benzene and naphthalene). Special classes of organics (dibenzo-p-dioxin and 2H-benzopyran) were also detected as minor products. Dibenzo-p-dioxin for instance in chlorinated form is one of the deadliest environmental organic toxins. The average particulate size of emissions using SEM was found to be 11.51±4.91 mm. This study has shown that most of the emissions from simulated forest fire fall within PM10 particulate size. The molecular by-products of forest fire and particulate emissions may be toxic to both human and natural ecosystems, and are possible precursors for various respiratory ailments and cancers. The burning of a forest by natural disasters or man-made fires results in the destruction of natural habitats and serious air pollution.