



Volatile organic compounds of charcoal combustion smoke

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The unique aroma of charcoal-grilled pork or chicken makes them so popular among Thais, even though there are many warnings that the charcoal-grilled meat contaminated with carcinogenic PAHs compounds. As chicken cook over a fire, fat drips from the cooking meat onto the completely burnt charcoal and burns, creating the smoke. Besides, the smoke particles adsorb on the meat that is being cooked. Thus, this research focused on the comparison between volatile organic compounds in the smoke from the pre-heating charcoal and the smoke from the fat dripped from the cooking meat. The smoke was directly collected in 600 mL beaker, sealed it using low density polyethylene plastic film and the volatile organic compounds were adsorbed by solid phase microextraction (SPME) fiber prior to identify by gas chromatograph-mass spectrometer (GC-MS). The result revealed different characteristic between two types of smoke. There were 252 compounds found in pre-heated smoke, including phenol derivatives (70 compounds, 36.45%), aromatic hydrocarbons (36 compounds, 19.24%), furans (31 compounds, 18.35%), ketones (28 compounds, 8.07%), nitrogen containing compounds (30 compounds, 5.09%), aliphatic hydrocarbons (23 compounds, 3.62%) and other compounds (40 compounds, 9.18%) e.g. aldehyde, acid, ester and unknown, respectively. While 127 compounds were found in the fat combustion smoke comprised of aliphatic hydrocarbons (56 compounds, 48.67%) and 42 of 56 compounds are alkene, diene and triene and 10 compounds of aldehydes such as pentanal, hexanal, heptanal, octanal, nonanal, decanal, pentadecanal, hexadecenal, 2,4-decadienal and glutaraldehyde which do not found in pre-heated smoke. These compounds are lipid oxidation products and they made the charcoal-grilled foods having favorable aroma. On the other hand, many compounds in the smoke are hazardous pollutants such as phenol, benzene, naphthalene, biphenyl and their derivative. Moreover, fluorene and phenanthrene are also found.

Keywords: Volatile organic compounds; Charcoal combustion smoke; Fat combustion smoke; SPME; GC-MS