SUMMARY

Carbonaceous particles in atmosphere are significant components of emissions from various combustion processes of fossil fuels. Due to their proportions, large specific surface area and capability to adsorb heavy metals and polycyclic aromatic hydrocarbons, these particles can have a negative impact on the humans's health and can affect various environmental processes. Many questions about atmospheric carbonaceous particles morphology, structure, chemical composition are still unresolved. Main goal of this work is to describe more precisely the structure of several types of atmospheric carbonaceous particles.

Transmission electron microscopy (TEM) and Raman microspectrometry were used for the characterization of structural aspects of carbonaceous particles separated from peat bog cores from highland parts of the Brdy Mts. (Central Bohemia), as well as from samples of atmospheric aerosols obtained by the impactor operated at the Institute of Chemical Process Fundamentals of the ASCR Prague 6 (Suchdol). For the identification of morphology and chemical composition of carbonaceous particles, the scanning electron microscopy equipped with energy dispersive spectrometer was also used.

Various structural types of carbonaceous matter were identified in studied peat. In the peat layer from the depth of 24-18 cm (roughly from 1894-1933) two types of carbonaceous particles with different structural arrangement were identified, which indicate the utilization of the biomass in combustion processes, on the other hand probably reduced burning of fossil fuels in the time of peat sedimentation. Amorphous carbonaceous particles, corresponding to charcoal, were found. Particles of black carbon which can originate from burning of biomass and fossil fuels were detected as well. Raman spectra of those particles correspond to amorphous form of carbon. In the more recent peat layer (from about 1959-1987) from the depth of 18-10 cm, higher amount of carbonaceous particles was detected, as well as more structural types. Amorphous carbonaceous particles, black carbon, particles without concentrically ordered layers and partly graphitized carbonaceous particles were present in the layer. Except amorphous carbonaceous particles, all other types originate from the high temperature burning of coal and combustion of petroleum in the diesel engines. Higher degree of structural arrangement in some of these particles are corroborated by Raman spectra.

Carbonaceous material of the atmospheric aerosols sampled directly using impactors contained several structural types of carbonaceous particles. Carbonaceous particles with subgraphitic structure were found in the sample of particles collected in the class 164-249 nm diameter. Higher aerodynamic diameter class (436-858 nm) contained more structural types including amorphous particles and black carbon, which could originate from petroleum combustion. Particles with subgraphitic layer ordering and catalytic carbonaceous particles were found as well.

This thesis illustrates the advantage of the use of TEM and Raman microspectrometry to study atmospheric carbonaceous particles obtained by impactors or isolated from natural sedimentary record, namely peat bogs.