

Biogas production, input substrates and its resulting digestate mineral composition

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In the Czech Republic the biogas is produced from maize silage, grass silage, beef and pig manure and slurry, sewage sludge, organic wastes from food industries, organic household waste. As the main result the digestate (anaerobic digestion residues) is manufactured. The digestate is used as fertilizer and/or fuel. The mineral composition was described on 12 samples from 6 agricultural biogas plants, and 20 samples from university testing biogas reactor with. Five standardly used input substrates (maize silage, beef and pig manure and slurry, organic wastes from food industries) were examined. The amount of the produced gas, its composition, conductivity, pH, Eh were continuously measured on laboratory biogas reactors. The amount of the total organic carbon, calorific value, fat content, fibrous material content, element composition (XRF). The mineral composition was determined on x-ray diffraction (Bruker D8 Advance) with internal standard ZnO, sw. Topas ver. 4.2, evaluated according to Rietveld methods (Bish, Post 1989). Anaerobic digestion residues were in detail studied with electron microscope in microprobe (FEI Quanta 650).

The main components in the digested samples are present in amorphous c. (77.5-98.74 wt%), Sylvite (1.2-4.1 wt%), Calcite (1.05-3.9 wt%), and opal-CT (1.26-12.1 wt%). The opal-CT in the studied samples is most probably result of the SiO₂ crystallization in technology. These can be the main reason for engine damage. There were also identified: Quartz 0.22-11.94 wt%, Albite 2.15-2.92 wt%, Orthoclase 0.86-2.31 wt%, Muscovite max. 3.60 wt%, Hornblende max. 0.12 wt% that originate from agricultural soils.

[1] Bish, D.L., Post, J.E., (Eds.), (1989), Modern Powder Diffraction. *Reviews in Mineralogy*, Vol. 20, 369 p. Mineralogical Society of America.