

# Modern methods of studying the phase composition of clay raw material at kiln process

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## Abstract

© Published under licence by IOP Publishing Ltd. It was developed methods for study of change clay rocks mineral phase composition at kiln process. The object of study was clay feed which is used to produce of ceramic materials. The main method of investigation was X-ray diffraction analysis. An additional method was synchronous thermal analysis (STA). At work was used X-ray diffractometer Shimadzu XRD-7000S (Japan) with a high-temperature furnace. Such equipment allows carrying out research of samples composition from 25°C to 1200°C. Experimentally established optimal temperatures of research: 20, 100, 200, 300, 400, 500, 600, 700, 750, 800, 850, 900, 950, 1000, 1050, 1100, 1150 and 1200°C. Data at these temperatures were processed in the DIFFRAC.EVA software. The result was quantitative information and graphs of the change in clay phase mineral composition during (burning?) firing process. At the same time was a studied quantitative change of the amorphous phase at different temperatures. The STA was used as an additional method of investigation. Sample analysis was carried on Netzsch STA 449 F3 Jupiter device (Germany), which allowing measurements of mass changes and thermal effects at temperatures up to 1200°C. We fixed changes using thermogravimetric measurements (TG) and curves of differential thermal analysis (DTA). The integration of methods allowed to obtain obtaining important information about the qualitative and quantitative changes of clays samples composition during firing process. Also results of our study showed reactions of minerals transformation due exothermic and endothermic processes. The overall result is a diagram of phase and quantitative transformations of minerals at temperatures from 20 to 1200°C including amorphous phase.

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