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EMISSION OF GAS SUBSTANCES OF THE BTEX GROUP FROM MOULDING SANDS
WITH THE BioCo2 BINDER

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Abstract

The aim of the research was to determine the level of emission substances (benzene, toluene, ethylbenzene and xylenes - BTEX) in moulding sands with the BioCo2 new polymer binder: in a form of a water solution of the two - component polymer composition of a poly (acrylic acid) / dextrin [1,2].

Research of gas emission were performed according to the method developed at the Faculty of Foundry AGH [3]. The method allowed the measurement of greenhouse gas sampling BTEX compounds adsorbed on activated carbon to the qualitative and quantitative analysis using gas chromatography (GC-FID). Based on the survey, it was found that during the process of pouring with liquid metal forms BTEX emissions from the test weight polymer binder was tied low emissions compared to resin-bonded sand Kaltharz U404. (Table 1).

Table. 1 Summary of the results of air emissions from the BTEX group bonded BioCo2 binder and resin Kaltharz U404 [4]

Sample of the moulding sand	Composition [parts by weight]	Volume of gass [dm ³ /kg sand moulding]	Gasses emission [mg/kg moulding sand]				Maximum velocity of emission, dV/dt [cm ³ /g·s]
			B*	T*	E*	X*	
Moulding sand with BioCo2 binder	Binder - 3 Sand - 100	15,27	133,1	2,88	0,02	0,04	0,12
Moulding sand with Kaltharz U404 [2]	Binder – 1 Hardener - 0,5 Sand - 100	33	384	56,95	0,3	2,64	0,27

* - B-benzen, T-toluen, E-etylobenzen, X-ksyleny

The main component from the BTEX group was benzene. In addition, the presence of small amounts of detected toluene, ethylbenzene and o-, m- and p-xylenes. The measurements of gas emission have shown that the volume of gas emitted from the samples bonded BioCo2 bond are small and amount to approximately 15 dm³ per 1 kg sands moulding.

Based on the analysis of the kinetics curve of release gas, it was found that the polymer binder BioCo2 in moulding sands extensively decomposed in several stages (three characteristic maxima velocity). The largest amount of greenhouse gas emitted was within 100 seconds (Fig 1). This was a time period in which the main gaseous products resulting from the destruction of the binder. Perhaps the course and the intensity of the degradation was related to the release of solvent water, more constitutional and degradation of the polymeric binder and the formation of low molecular weight gaseous products.

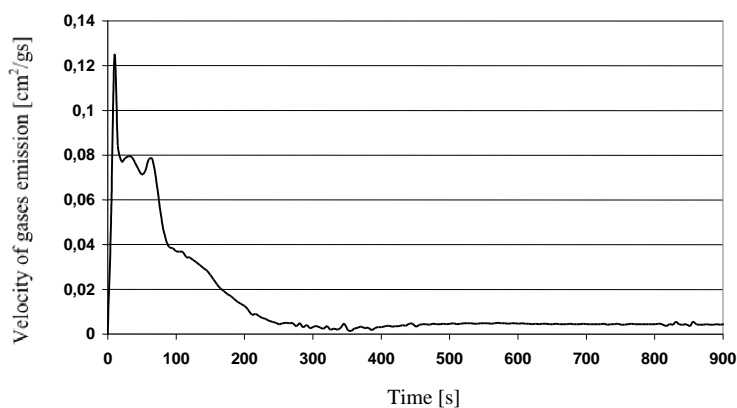


Fig. 1 Kinetics of gases emission from moulding sands with the BioCo2 polymer binder

In summary it can be stated that the binder mass BioCo2 placed in an aqueous solution (60% H₂O) containing in its composition only atoms of carbon, oxygen and hydrogen, characterized by low emissions of gases from BTEX group during the process of casting mold with liquid metal.

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