

Ammonium compounds as objectionable impurities in inorganic building materials made from concrete

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The presence of ammonia compounds in inorganic building materials made from cement concrete was investigated. The emission of ammonia from the building structures in the air of the building spaces leads to undesirable health hazard. The main possible reasons of ammonia accumulation in concrete are the following: cement transportation in unpurified wagons; the presence of heightened content of grinding intensifiers that are injected during cement milling; the presence of ammonia in fly ashes that are used as mineral admixture in cements and concretes; chemical modifying additive agents that are injected in concrete mixture. The aim of this work was to study the possibility of determination of free ammonia in water solutions of the chemical modifying additive agents used in inorganic building concrete materials as of the main source of ammonia in concrete. The process of preparation of the solutions for potentiometric method and its applicability was analyzed. Since the range of sensitivity of ion-selective electrodes for ammonia analysis requires very diluted solutions and they do not work in any organic solutions, optimal dilutions and conditions have been determined. The Table contains the results of determination of free ammonia in pure water solutions of concrete admixtures. It was shown, the working solutions of chemical modifying additive agents had to be diluted for 100 times, their operating pH was applicable for potentiometric determination. As contrasted to pure admixtures, the water extracts from concrete dust containing different types of chemical modifying additive agents are not always applicable for potentiometric determination and in most cases require the decrease in pH values.

Table – Potentiometric determination of free ammonia in the solutions of chemical modifying additive agents

Chemical modifying additive agent	pH	Temperature, °C	Concentration, mol/dm ³	pC
Sample 1	7,22	20,2	$1,462 \cdot 10^{-4}$	3,835
Sample 2	6,77	19,8	Not found	Not found
Sample 3	6,97	19,9	Not found	Not found
Sample 4	7,13	19,8	Not found	Not found

As it was mentioned above concrete dust from inorganic building materials was also investigated. It was determined that ammonia content in inorganic cement concrete building materials strongly depends on the content of a cement including the quantity and the type of admixture and conditions of hardening of concrete as a final product. It was determined that thermomoiest treatment of hardening concrete in most cases provokes the decrease in water-soluble ammoniac compounds content.