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DEALKALIZATION OF SHEET GLASS WITH GASEOUS REAGENTS IN THE ELECTRIC FIELD

Vasile Sharagov & Galina Curicheru

"Alecu Russo" Balti State University, Faculty of Real, Economical and Environmental Sciences,
Pushkin Str. 38, 3100, Balti, Republic of Moldova

Corresponding author: Vasile Sharagov, vsharagov@gmail.com

Abstract: The influence of gaseous reagents on industrial glasses leads to their dealkalization, reaction products occurred on the glass surface as a bloom. The changes in structure and composition of surface layer accompany the increase of glass chemical durability by tens of times, rise of mechanical strength from 20 to 30 %, improvement of thermal stability from 5 to 10 %. The main disadvantage of thermochemical treatment is the low depth of dealkalization layer (in case of industrial glasses - about 1 μm). Taking into account this fact, the dealkalized layer is rapidly destroyed and as a consequence there is a strong degradation. Hence, the main direction of wide use of the method lies in the increasing the thickness of dealkalization layer. The aim of the presented work is to study the possibility of glass surfaces dealkalization intensification using electric field. The objects of investigation were sheet glass samples. Sulfur oxide, hydrogen fluoride and chloride, difluorodichloromethane, difluorochloromethane and mixtures of these gaseous reagents were used for the thermochemical treatment of glassware. The main regimes of thermochemical treatment of sheet glass with gaseous reagents are the following: temperature – between 300 and 600 ˚C, duration – between 5 and 30 min, quantity of gas reagent feeded into the camera between 0.01 and 1.00 mol. The intensity of glass dealkalization by gaseous reagents was estimated using the extraction rate of alkaline cations. In experiments the influence of temperature, chemical composition of gaseous reagents, quantity of gaseous reagent feeded into the camera, duration of treatment and electric field on dealkalization rate of alkaline cations was studied. It has been established that with elevation of temperature, quantity of gaseous reagent feeded into the camera and duration of treatment of value dealkalization rate of alkaline cations of sheet glass grows up. The use of electric field results in the rise of dealkalization rate of sheet glass by gaseous reagents in several times. It was found in the experiments that dimension of electrodes as well as gap width influence on the extraction rate of alkaline cations. The mechanism of interaction of sheet glass with gaseous reagents in the electric field is discussed.

Key words: sheet glass, electric field, thermochemical treatment, gaseous reagent, regime, dealkalization.