EXPERIMENTAL STUDY OF PURIFICATION DEVICE BASED ON FILTRATION COMBUSTION

Yu.M. DMITRENKO, V.V GAVRILYUK, V G. MINKINA, S I. SHABUNYA

Heat and Mass Transfer Institute Academy of Sciences of the Republic of Belarus.

Characteristics of the device for air purification from organic aromatic pollutions were studied. Device operation principle is based on flameless oxidation of organic admixtures in porous body Polluted air supplied to the reactor is mixed with combustible gas (propane- butane mixture). During combustion of obtained mixture in porous body, oxidation of organic mixtures (benzene, toluene, phenol) takes place to form ecologically pure reaction products. The advantage of this method consists in its economical efficiency and small amount of nitrogen oxides being formed, since mixture combustion is ensured at low temperatures and higher coefficients of excess air, compared to combustion in the form of a usual flare

Elimination of combustion front instability due to which incomplete combustion of hazardous admixtures took place was the main problem to solve during purification reactor development.

Two variants of reactor design were studied: direct-flow one and design with combustion product U-turn. The latter allowed to stabilize combustion front location and achieve high air purification degree. During the tests air and gas flow rates, temperature fields in reactor's working zone were monitored. Organic admixture concentrations at the inlet and outlet of the purification device were measured by using chromatograph

As an outcome, we found working parameter range in which reactor operated stably (from 1.5 to 12 m^3/hr) and assured hazardous admixture concentration reduction minimum 40 times Typical operation modes were characterized by front temperature within 900 - 1,200°C and excess air coefficient of 1.7-3.7.

Comparative analysis of experimental data with the results of theoretical and numerical is made