IRENEUSZ PLIŚ[1], PAULINA MOŁDOCH[2], WALDEMAR PROKOP[1], ROMAN PETRUS[3], JOLANTA WARCHOŁ[2]

ACETONE AND BUTYL ACETATE SORPTION ONTO NATURAL MINERALS

[1]OTTO Engineering Polska Sp. z o.o., ul. Połonińska 15, 35-082 Rzeszów, Poland
[2] Department of Water Purification and Protection, Rzeszow University of Technology, al. Powstańców Warszawy 12, 35-959 Rzeszów, Poland
[3] Department of Chemical and Process Engineering, Rzeszow University of Technology, al. Powstańców Warszawy 12, 35-959 Rzeszów, Poland

Acetone and butyl acetate are organic solvents widely used in industry. They represent volatile organic compounds (VOC) which are often noxious or carcinogenic, having adverse effects on human health and globalenvironment. VOCs are common air pollutants emitted by the chemical, petrochemical and allied industries.

The aim of the present work was to compare adsorption of gaseous acetone, butyl acetate and mixture of both contaminants onto natural mineral adsorbents. Materials used in the research includedglauconite,diatomite, vermiculite and clinoptilolitereceived from BioDrain, denoted as GL, DI, VE and ZE respectively. Mineral compositions of sorbents are as follows:

GL: Illite and smectite 73%, Quartz 21%, K-feldspar 3%, Fluorapatite 2%, Other 1%;
DI: Opal A 94,5%, Cristobalite 2%, Mordenite 2%, Other1,5%;
VE: Vermiculite and Biotite 60%, Illite and Smectite 24%, K-feldspar 5%, Calcite 3,5%, Plagioclase 3%, Fluorapatite 2%, Other 2,5%;
ZE: Clinoptilolite 74%, Opal C 11%, Plagioclase 6%, Illite and Smectite 4%, Opal CT 3%, Other 2%;

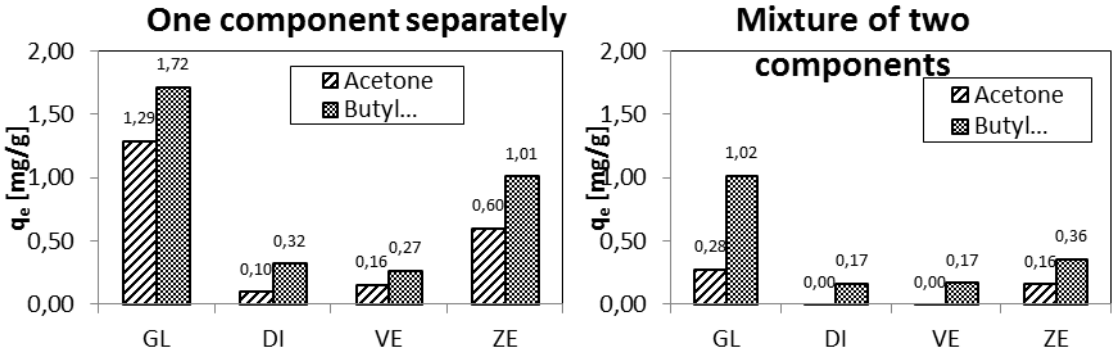

Figure 1. Sorption of acetone, butyl acetate and their mixture by raw natural sorbents: GL, DI, VE and ZE

Adsorption of acetone, butyl acetate and their mixture was carried outindynamic conditions in a home-made systemat constant temperature of 25°C and atmospheric pressure. The testing apparatus consists of bottle with gas mixtures of specific concentrations (200 ppm or each of 100 ppm in mixture), fixed-bed column, flowmeter and concentration analyzer.A concentration of contaminants on column outlet was monitored on-line with a gas chromatograph (Thermo Scientific TRACE 1300 GC with column TR-5).

The amounts adsorbed by examined materials were calculated with integral method on the basis of obtained breakthrough curve.The outcomesrevealed higher affinity of sorbents for butyl acetatethan acetone. It results from lower polarity (dipole moment) and greater molecular massof butyl acetate.