



Figure 2 – Fragments of SEM images of Chamotte clay and its modified form (at zoom 20000x)

Figure 2 shows microphotographs of the initial and modified with polyvinylpyrrolidone ChC obtained by scanning electron microscopy (SEM). As it is known, SEM is widely used to study the microstructure of various objects [18]. From figure 2a it follows that the sample of secondary raw materials has a dense structure, represented by hydroaluminosilicates of various shapes and sizes. As a result of the modification of ChC by the PVP polymer, the surface structure of clay changes (2b). As it can be seen from Figure 2b, the ChC sample becomes more uniform after modification, the sizes of hydroaluminosilicates are enlarged, which leads to an increase in its porosity and hence, sorption activity increases. It can be

observed that the addition of the PVP polymer affects the porosity of the hydroaluminosilicates in ChC structure.

Table 2 presents the results of elemental analysis of chamotte clay obtained by energy dispersive spectroscopy (EDS). The qualitative and quantitative composition of ChC was established. As can be seen from Table 2, the main components of ChC are oxygen, aluminum and silicon, since the clay is an aluminosilicate material. Also it contains significant doses of carbon, (which is part of the clay in the form of magnesium and calcium carbonates) and such metals as potassium, sodium and magnesium. The last contribute to the formation of fusibility and are found in the form of soluble salts.

Table 2 – Data of elemental analysis of chamotte clay

Raw materials	The content of the element, wt. %						
	O	Si	Al	C	K	Mg	Na
Chamotte clay	43.22	26.62	22.40	6.71	0.86	0.50	0.44

To confirm the presence of a modifier in the sample, the initial and modified chamotte clay was studied by FTIR spectroscopy. The results of the analysis are presented in figures 3-4. Narrow absorption bands of weak intensity are observed in ChC spectra. The IR spectrum of the sample shows a weak band at 1027 cm^{-1} , corresponding to stretching vibrations of Si – O – Si tetrahedra of the silicon-oxygen skeleton, which are clearly manifested in the spectrum of chamotte clay [19]. The observed intense absorp-

tion bands at 468.40 cm^{-1} , 540.20 cm^{-1} and 519 cm^{-1} can be attributed to deformation vibrations of Me-O type groups related to alkaline-earth metals. Absorption bands in the region of 695 cm^{-1} and 1448 cm^{-1} indicate that calcite impurities are present in the composition. The band 797.15 cm^{-1} is due to the Si – O – Mg bond in the octahedral positions of kaolinite. The intense absorption band of the deformation vibrations of water molecules bound by OH groups is in the range of $1832\text{--}3697\text{ cm}^{-1}$ [20].