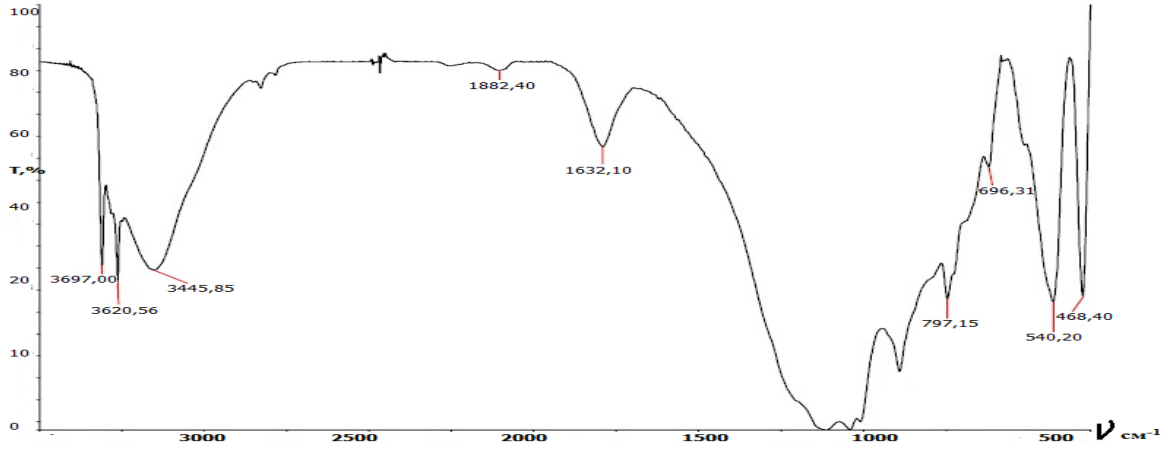

Figure 3 – IR spectrum of ChC

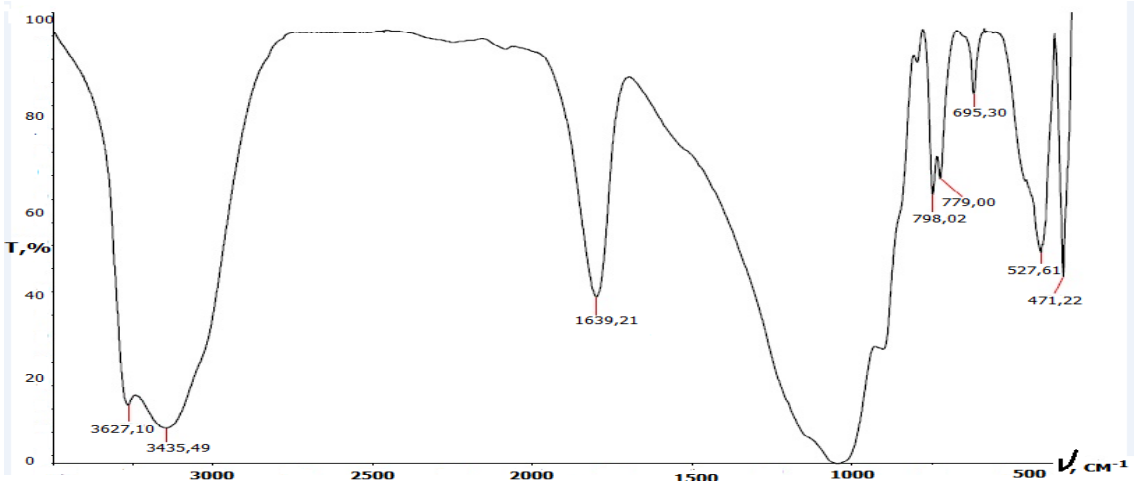

Figure 4 – IR spectrum of ChC + PVP

The IR spectrum of modified clay has absorption bands with wave numbers corresponding to stretching vibrations of $–CH_2–$ and C-N bonds due to the possible formation of a complex compound of PVP and clay. The stretching vibrations of the $–CH_2–$ group are located in the range of 1480–1440 cm^{-1}, and the C-N bonds are between the absorption bands of 2260–2240 cm^{-1}, which characterize PVP [21]. This indicates the presence of PVP or its complex compounds in the sorbent. It was found that the band at 1027 cm^{-1}, which is responsible for the stretching vibrations of Si – O bonds, remains unchanged; therefore, the modification does not affect the silicon content in the samples [22].

The research results presented in Figure 5 show that the extraction of lead ions by the initial clay reaches (97 ± 7.2) %, and the degree of extraction of cadmium from the aqueous solution reaches only (67 ± 6.0) %. Therefore, the activation of ChC by PVP is effective, since the degree of extraction of cadmium ions by modified sorbent reaches (86 ± 6.4) %. Also it was found during the experiment that the degree of extraction of lead and cadmium ions at the beginning sharply increases and then reaches equilibrium within 30 minutes. The adsorption ability of sorbents towards identically charged metal ions depends on the radius of the ion and charge density [23]. Between two ions of the same charge, ions with a large radius exhibit higher sorption ability, because they are less prone to the formation of a hydration shell, which reduces the forces of electrostatic attraction. Since lead has a larger ionic radius (0.112 nm) compared to cadmium ions (0.099 nm), it should be sorbed better, which corresponds the results of the study. The highest degree of recovery is (97 ± 7.2) % for lead ions and (86 ± 6.4) % for cadmium ions.