The results of the experiments carried out as mentioned in chapter-III using TTCNS and TAINS to remove Cr(VI) from its aqueous solutions and industrial effluent are discussed in this chapter.

6.1 SEM and EDAX Analysis

The SEM and EDAX spectra of TTCNS and TAINS before and after Cr(VI) adsorption are depicted in figures 6.1-6.4 respectively. It was observed from the SEM figures that the surface of both the adsorbents is found to be not so random but rough in such a way to adhere the solute species on to the surface of the adsorbent. Therefore the adsorptive characteristics of TTCNS and TAINS are expected to be effective on Cr(VI) adsorption. EDAX shows the presence of peaks for chromium which substantiate the adsorption of Cr(VI) by the employed adsorbents.

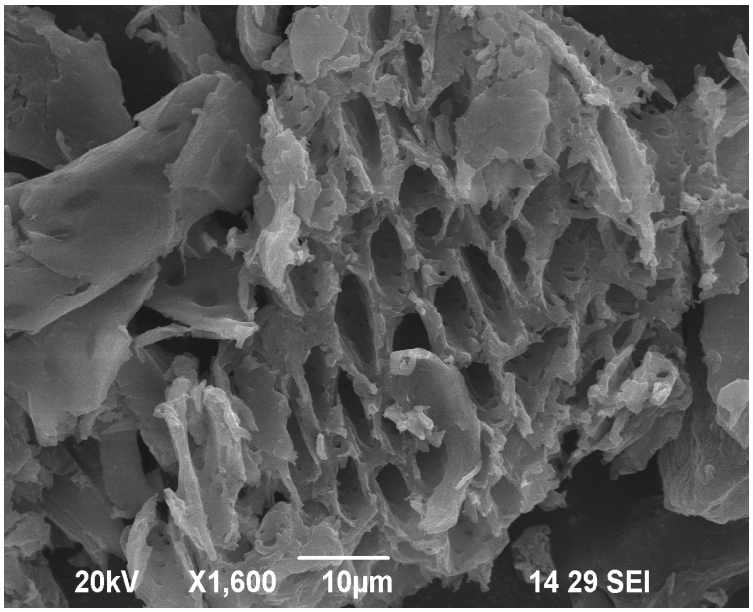

Figure 6.1 SEM of TTCNS (0.18mm)

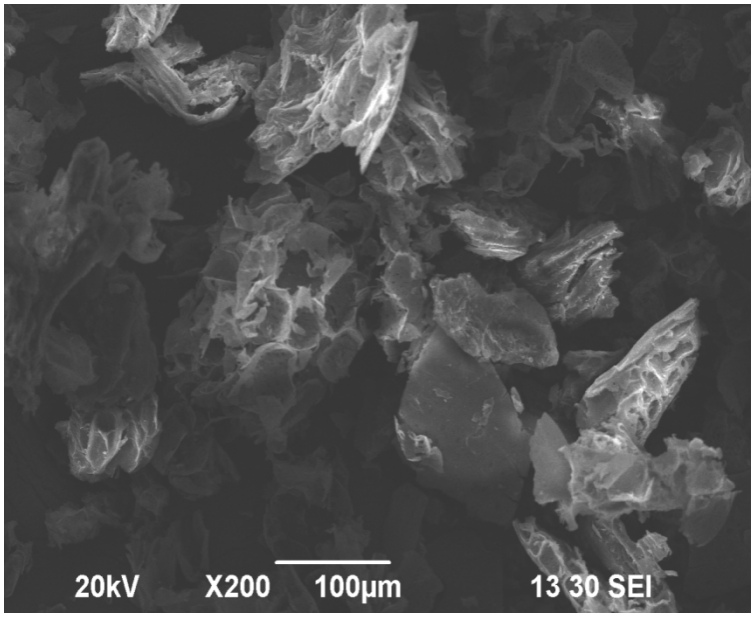

Figure 6.2 SEM of Cr(VI) loaded TTCNS

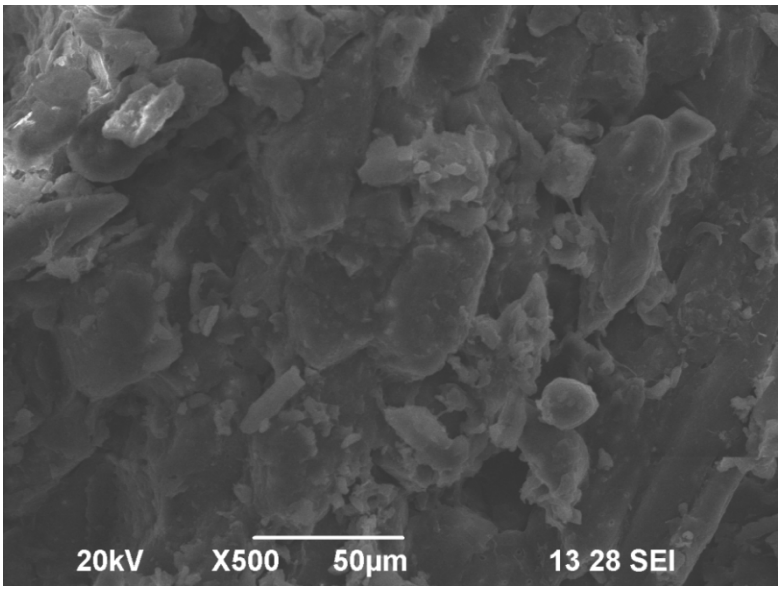

Figure 6.3 SEM of TAINS (0.42mm)

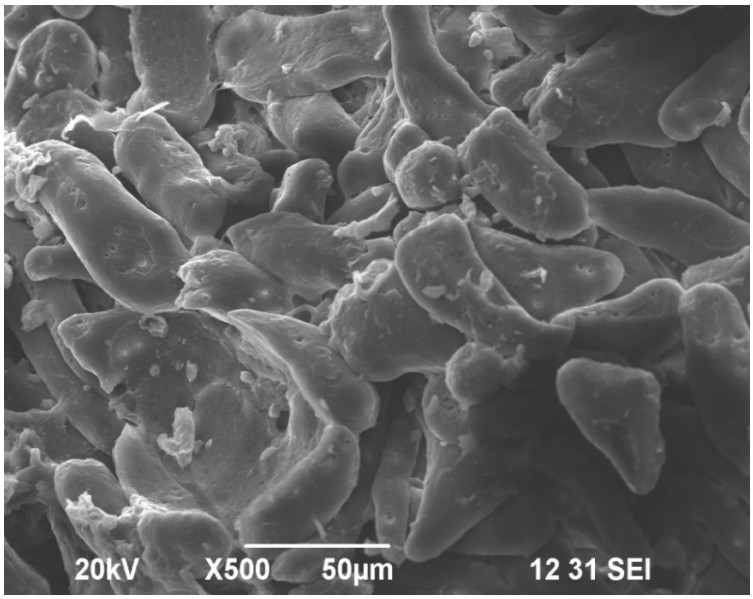

Figure 6.4 SEM of Cr(VI) loaded TAINS

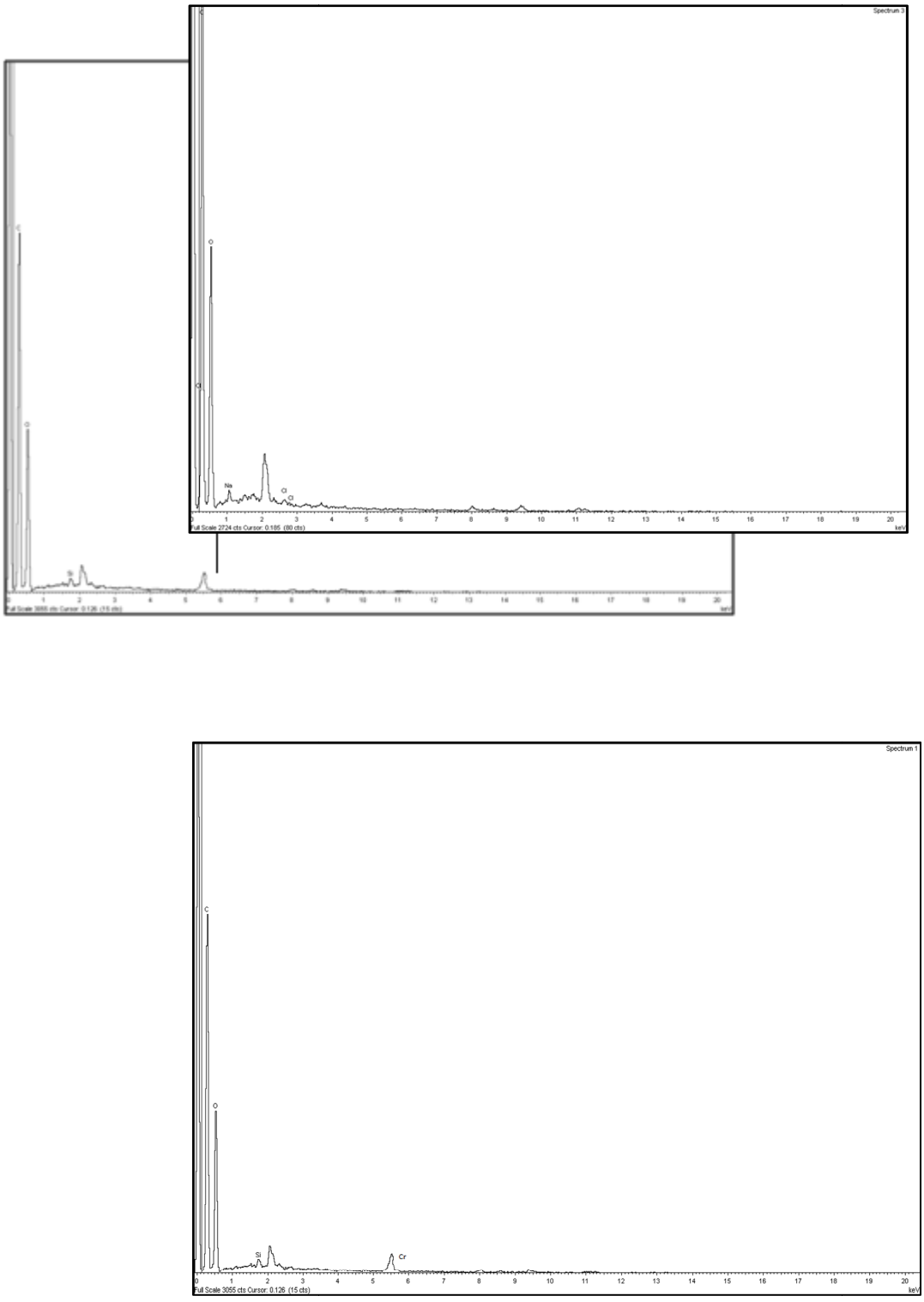

Figure 6.6 EDAX spectrum of Cr(VI) loaded TTCNS

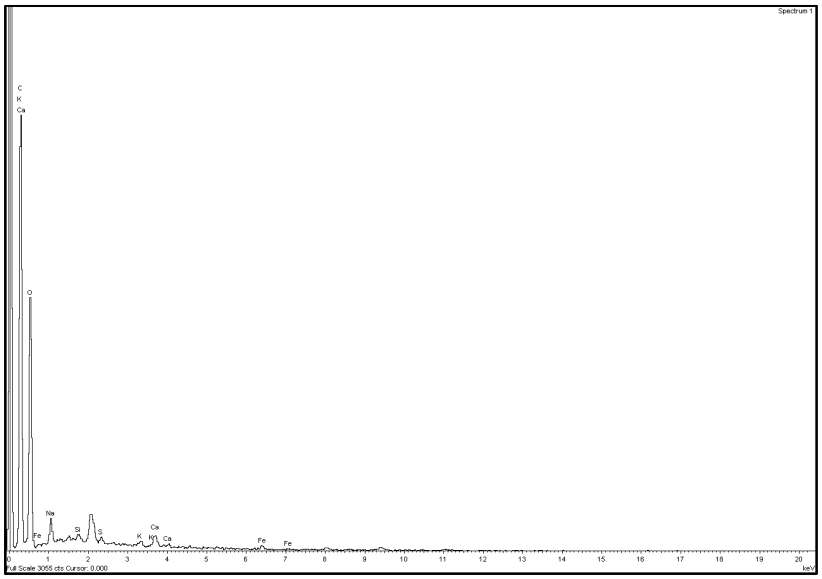

Figure 6.7 EDAX spectrum of TAINS

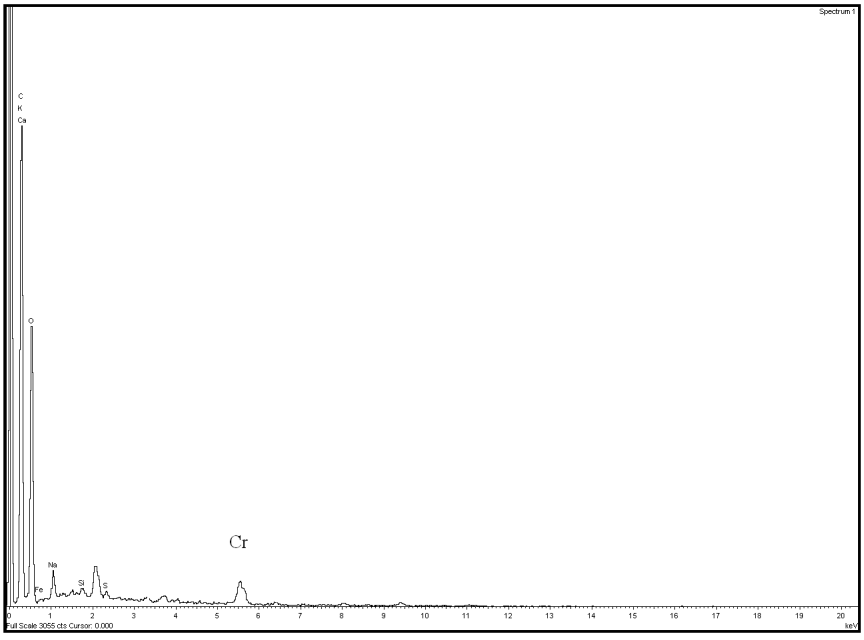

Figure 6.8 EDAX spectrum of Cr(VI) loaded TAINS

6.2 FT-IR Spectral Analysis

The FT-IR spectra of TTCNS and TAINS before and after Cr(VI) sorption (Figures 6.9 and 6.10) display few absorption peaks indicating the nature of the material examined.

Examination of the spectra of TTCNS after Cr(VI) adsorption (figure 6.9) show a shift in absorption of the –OH stretching frequency from 3386.48 $cm^{-1}$to 3369.33cm^{-1} corresponding to unloaded spectra (figure 4.17). This can be interpreted as that O-H stretching is associated with metal adsorption. The –CH stretching at around 2923.09 cm^{-1} is also slightly shifted in the Cr(VI) loaded spectra. The peak at 1423.37 cm^{-1} characteristic of–COO stretching is also finding a small shift to 1425.10 cm^{-1} in the corresponding metal loaded spectra, indicating the participation of these groups in metal binding.

Comparison of spectrum of unloaded and Cr(VI) loaded TAINS (figure 6.10) indicated clear shift in wave number of 3411.97 cm^{-1}(unloaded TAINS) to 3374.78 cm^{-1} (loaded TAINS) which indicate that surface –OH group is one of the functional group responsible for metal adsorption. Aliphatic C-H stretching[165] may also be responsible for adsorption,as the corresponding wave number shifts from 2921.50 cm^{-1} to 2920.71cm^{-1}, S=O stretching was slightly shifted by Cr(VI) adsorption from 1031.34cm^{-1} to 1032.40cm^{-1}, implying that sulphonic acid group may also be available for sorption.

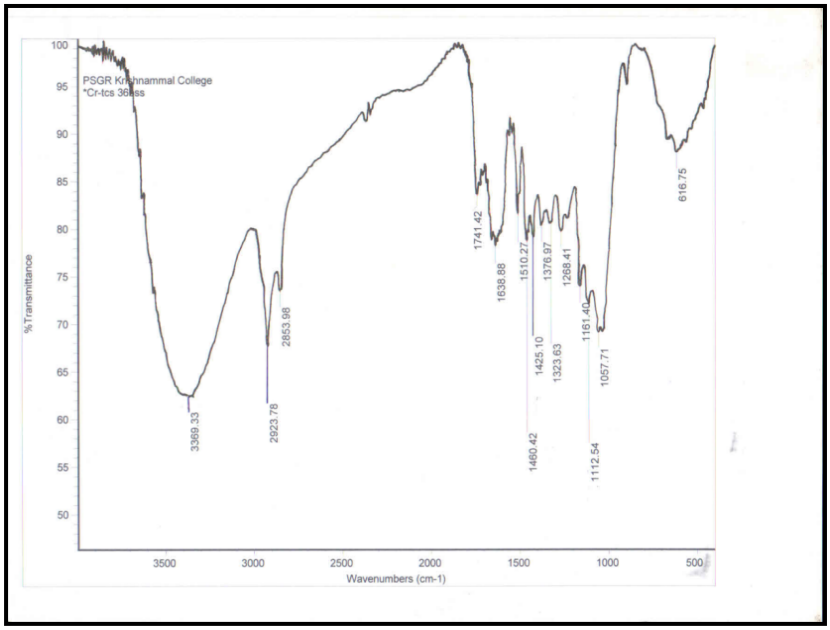

Figure 6.9 FT-IR spectrum of Cr(VI) loaded TTCNS

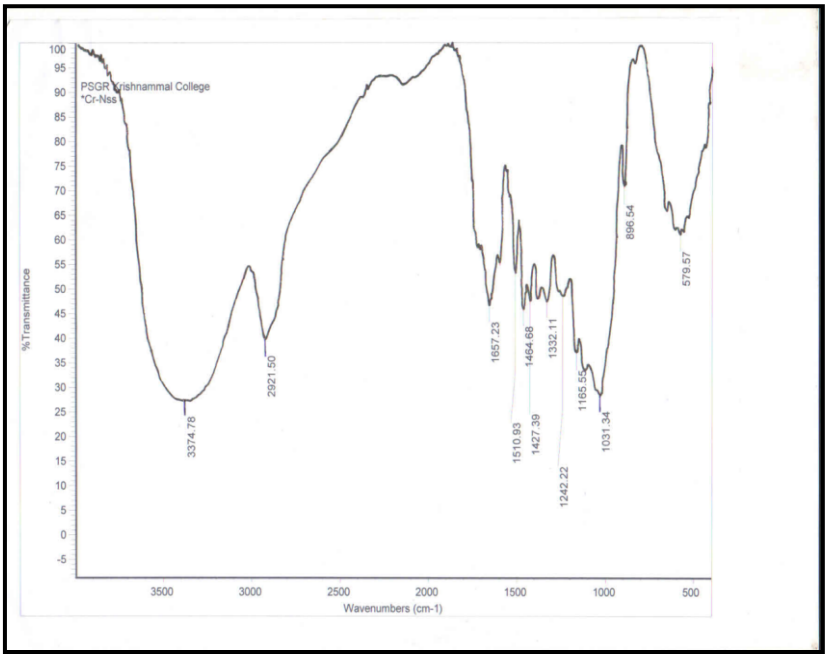

Figure 6.10 FT-IR spectrum of Cr(VI) loaded TAINS