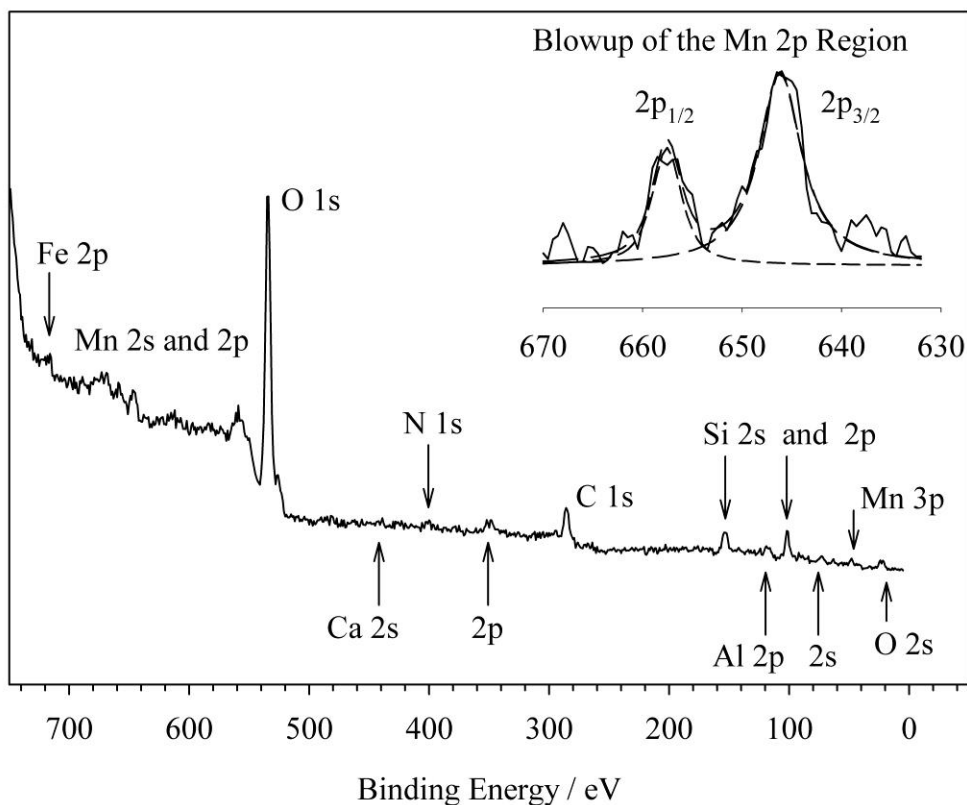
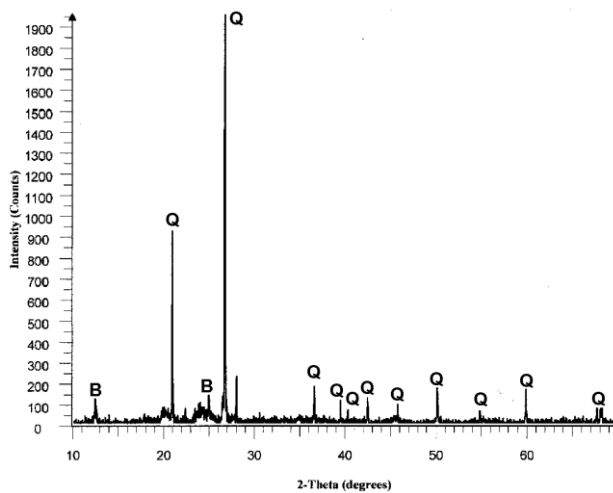
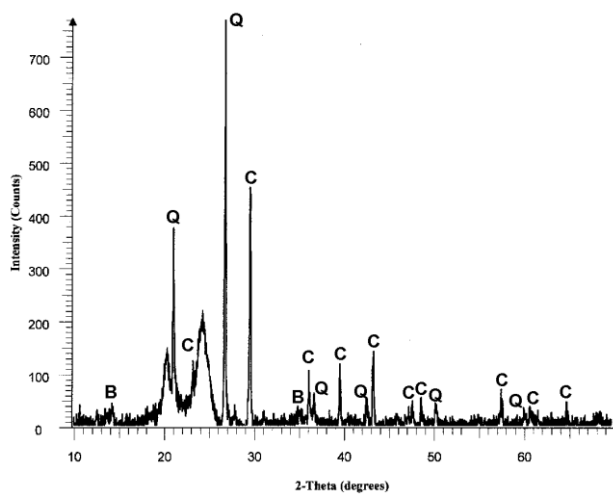
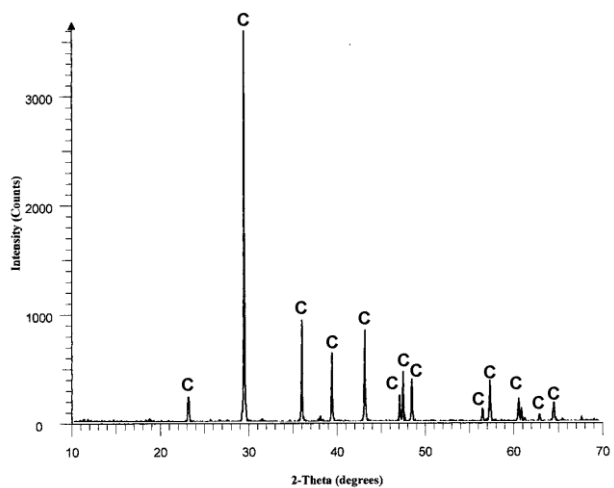


Supplementary Material



Supplementary Figure 1: XPS spectrum of solids obtained from the KMnO_4 treated well TC3-7. With the exception of the Mn peaks, the spectrum from solids obtained from the other wells sites are similar. The insert shows a high-resolution scan of the Mn 2p region. The dashed lines represents curve fits to the spectra with a fixed 2:1 area ratio due to the spin-orbit splitting.



Supplementary Figure 2: XRD scan of solids obtained from Wells TC1-11 (Top), TC3-1B (middle) and TC3-4 (bottom), Peak labels: B=birnessite, Q=quartz, and C= calcite