Alkaline wet oxidation and steam explosion pretreatments of sugarcane bagasse were compared with regard to biomass fractionation, formation of by-products, and enzymatic convertibility of the pretreated material. Wet oxidation led to the solubilisation of 82% of xylan and 50% of lignin, and to a two-fold increase of cellulose content in the pretreated solids, while steam explosion solubilised only 60% of xylan and 35% of lignin and increased cellulose content in the solid material by one third. Wet oxidation formed more aliphatic acids and phenolics, and less furan aldehydes in the liquid fraction than steam explosion did. A better enzymatic convertibility of cellulose was achieved for the wet-oxidised material (57.4 %) than for the steam-exploded material (48.9 %). Cellulose convertibility was lower for the whole slurry than for the washed solids in both pretreatments, but more significantly in steam explosion. This investigation demonstrates the potential of wet oxidation as a promising pretreatment method for enzyme-based bagasse-to-ethanol processes.