THE INFLUENCE OF RESIDUE SODIUM IONS AND DIFFERENT ANIONS IN MIXED OXIDES ON TRANSESTERIFICATION OF VEGETABLE OILS

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The Mg-Al mixed oxides are attractive acid-base catalysts with various activity published even for the same reaction under similar conditions. The differences can be caused by impurities remaining after synthesis. The mixed oxides were prepared by the thermal heating of hydrotalcites, which were synthesized by the coprecipitation method. Different anions were used for preparation of hydrotalcites (NO_3^-, SO_4^{2-}, Cl^-, CH3COO$^-$, HCO3$^-$ and C2O4^{2-}). Hydrotalcites were then washed with different amount of water (different amount of sodium was removed). Some mixed oxides were rehydrated to form hydrotalcites, which were then washed out with water, calcined and formed mixed oxides again. The influence of sodium impurities on properties of mixed oxides and transesterification was studied. The results of various characterisation methods such as ICP-OES, XRD, TPD, N2-physisorption, FTIR were statistically evaluated, including transesterification results. The sodium was bonded predominantly in the form of sodium nitrates (nitrates were used for hydrotalcite synthesis) for all types of anions and the rehydration (i) rapidly decreased the sodium content and (ii) caused more similarity of mixed oxides with each other regardless of anion type. Sodium nitrate was partially transformed to sodium oxide through calcination. It then reacted with water (present in methanol and oil) and formed sodium hydroxide, which then served as a homogeneous catalyst, increasing ester content.