Electronic Supplementary Material (ESI) for Journal of Materials Chemistry

Supplementary Material

A) Surface area and pore structure parameters of the MSS samples

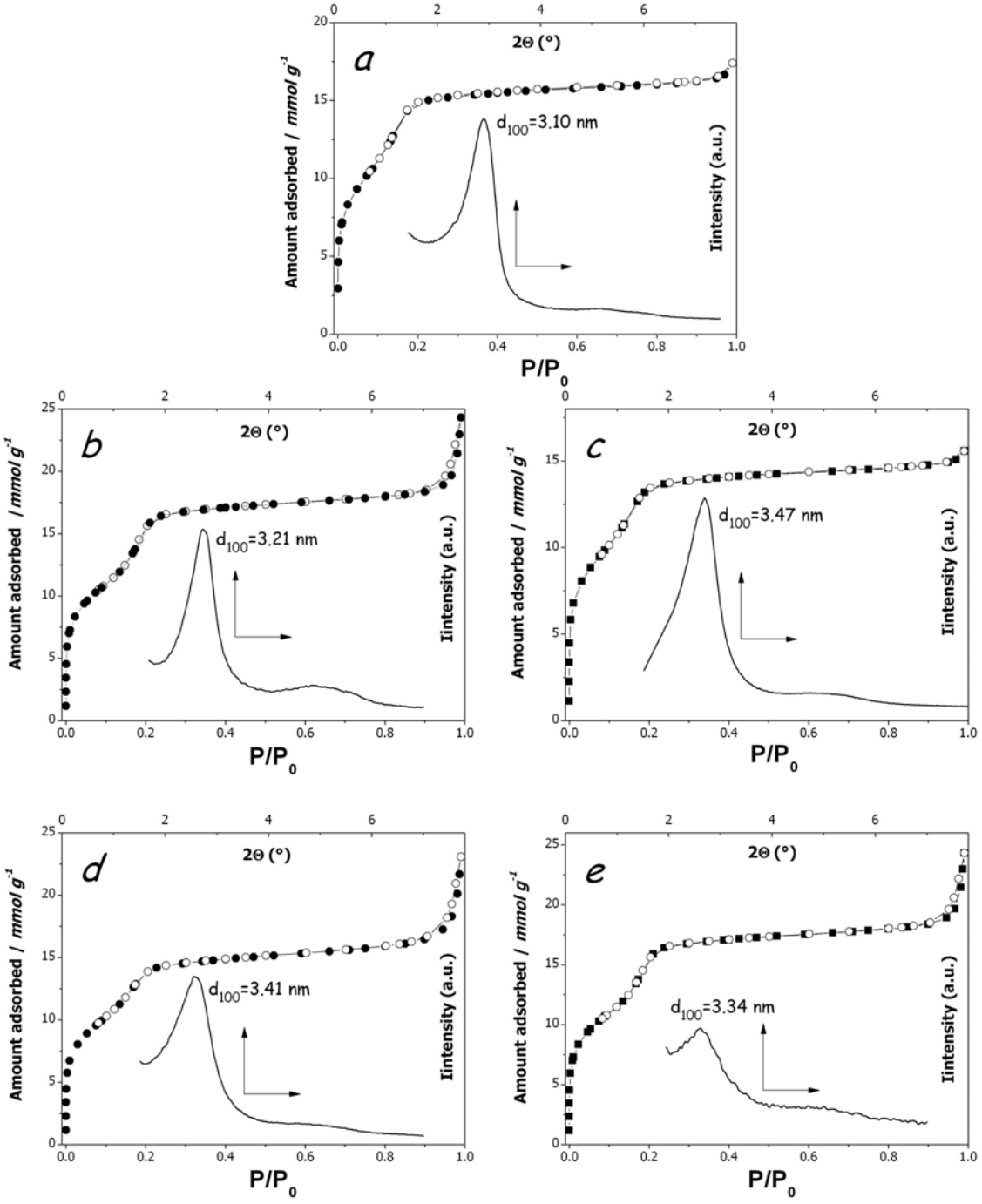


Figure I. Nitrogen adsorption (●) and desorption (○) isotherms at 77 K for the MSS type materials studied: a) purely siliceous MSS, b) Al-MSS-44, c) Al-MSS-22, d) Al-MSS-11, e) Al-MSS-7. The insets show the XRD patterns for the five samples.

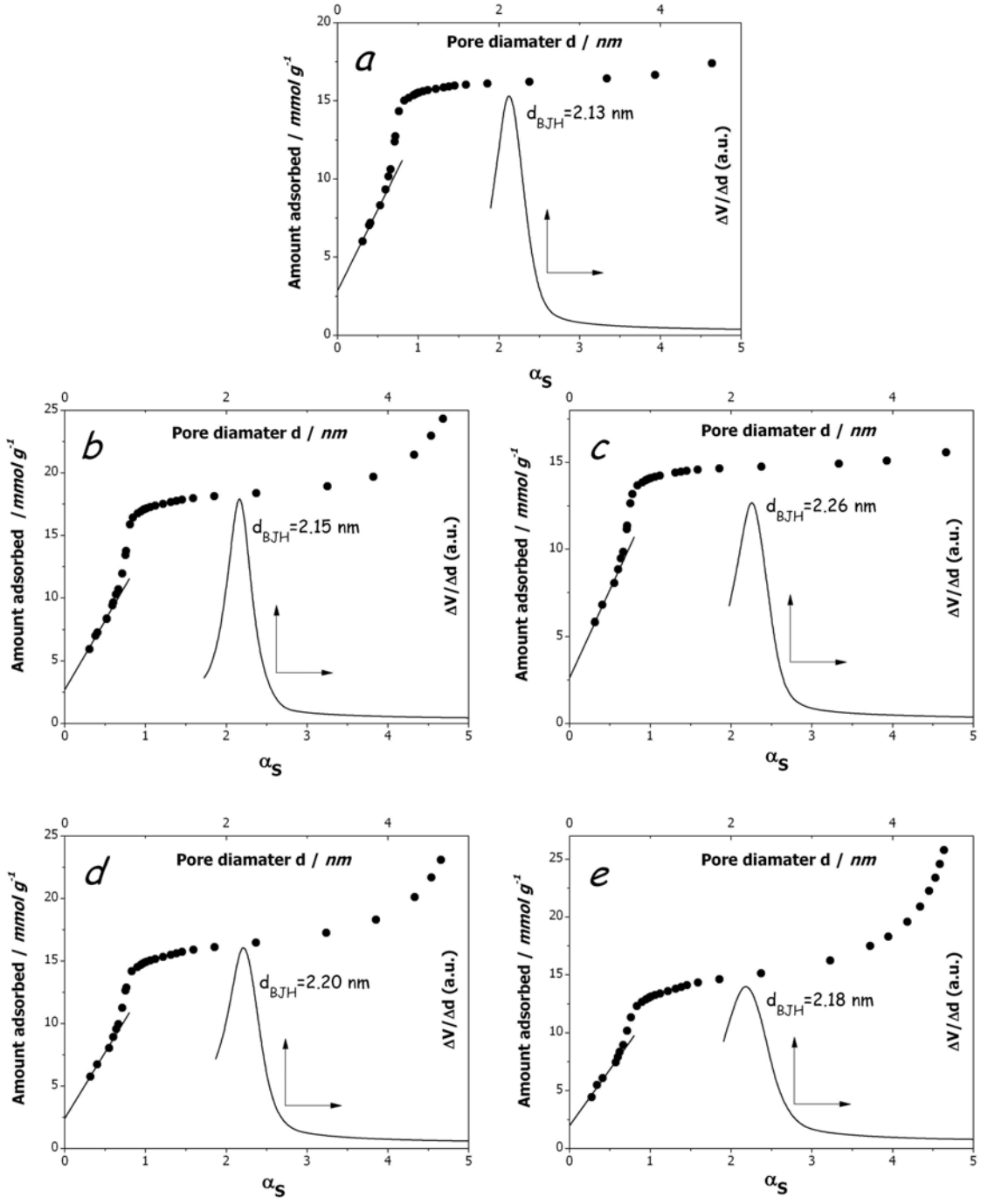


Figure II. α_S-plots obtained from N_2 adsorption isotherms for the MSS type materials studied: a) purely siliceous MSS, b) Al-MSS-44, c) Al-MSS-22, d) Al-MSS-11, e) Al-MSS-7. For each plot, the first linear segment does not pass through the origin indicating some microporosity in the material. According to this analysis, all materials of the MSS type achieved for the purpose of the present study are predominantly mesoporous but they also possess micropores. The insets show the BJH pore size distributions calculated based on the desorption branch of N_2 adsorption isotherms in the mesopore size range for the five MSS samples.

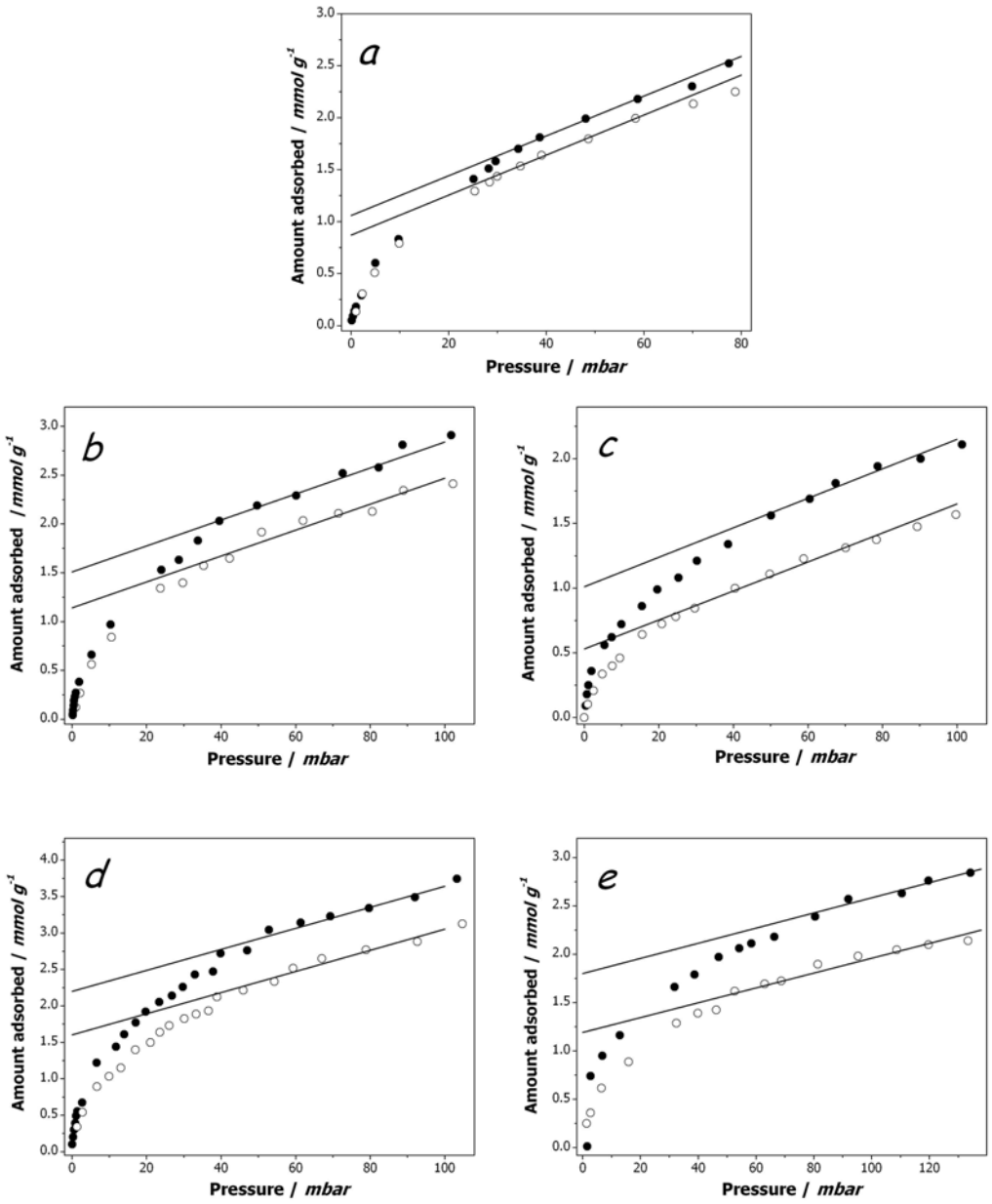
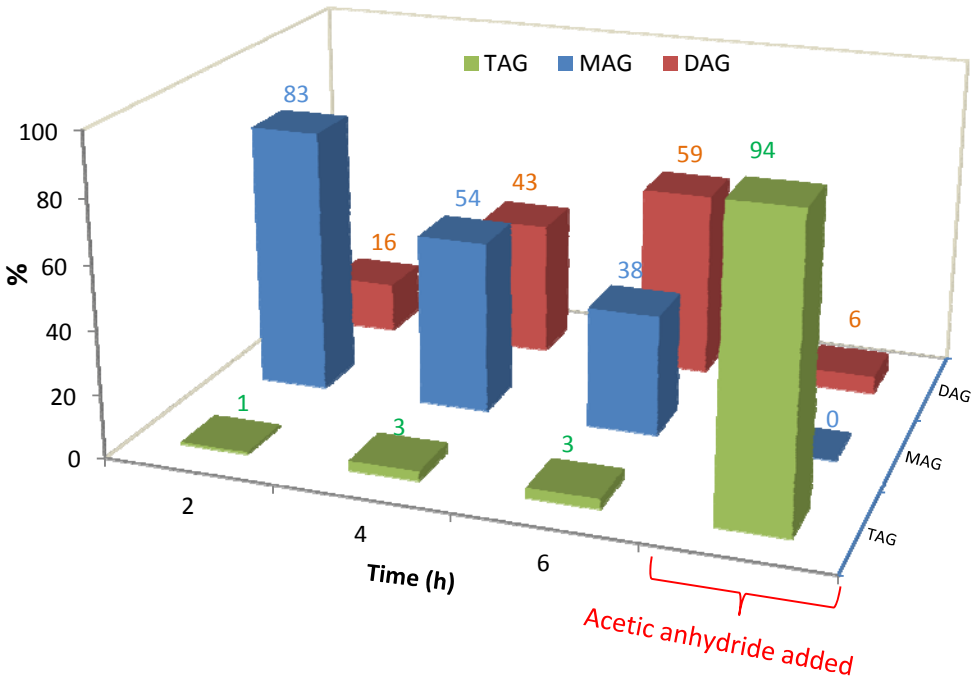


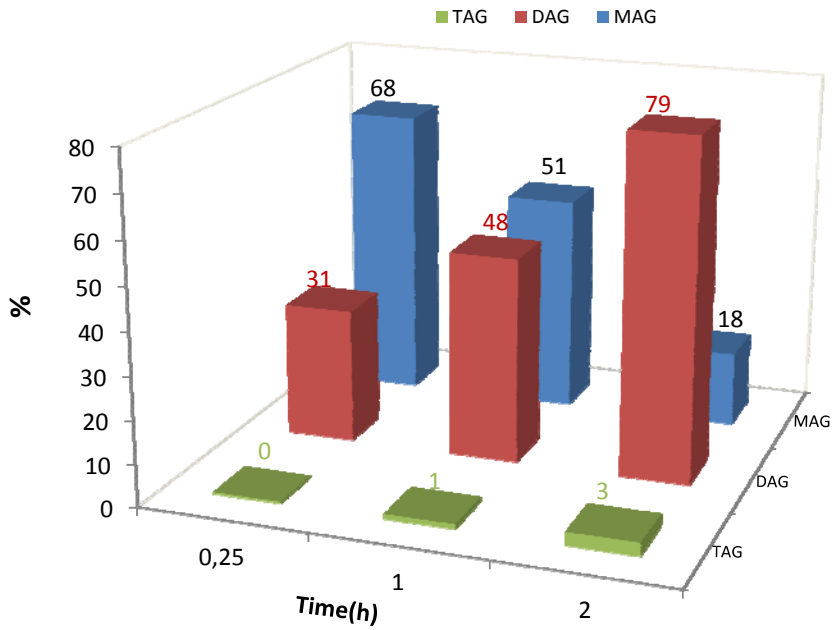
Figure III. First-cycle (●) and second-cycle (○) adsorption isotherms for gaseous ammonia onto five MSS samples at 373 K: a) purely siliceous MSS, b) Al-MSS-44, c) Al-MSS-22, d) Al-MSS-11, e) Al-MSS-7. For each sample, linear adsorption portions can be distinguished in both types of isotherms at higher equilibrium pressures, their slopes being almost identical. It is usually assumed that the linearity of an adsorption isotherm may be ascribed to physical adsorption on non reactive surface sites. Therefore, the two straight lines are suitably extrapolated to zero pressure. The difference in the amount adsorbed for points at which the curves reach zero pressure is ascribed to the irreversible chemisorption of basic NH_3 at the solid-gas interface and thereby taken as providing estimate of the total number of acid sites at the solid surface per unit mass of the adsorbent.

B) Selectivity vs time of catalytic tests

B.1. Esterification reaction of glycerol with acetic acid



B.2. Acetylation reaction of glycerol with acetic anhydride



B.3. Esterification reaction of ethylene glycol with acetic acid