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J. Leglise^a; J. Van Gestel^a; J. C. Duchet^a

^a UA CNRS 414, Catalyse et Spectrochimie, ISMRA/Université, Caen, FRANCE

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ALKYL POLYSULFIDES AS PRESULFIDING AGENTS OF A CoMo/Al₂O₃ CATALYST : EFFECT ON CATALYTIC PROPERTIES

J. LEGLISE, J. VAN GESTEL and J.C. DUCHET

UA CNRS 414, Catalyse et Spectrochimie, ISMRA/Université 14050 Caen, FRANCE.

Abstract Presulfiding a CoMo/Al₂O₃ catalyst with *t*-nonyl or *t*-dodecyl pentasulfides improved both activities for thiophene hydrodesulfurization and cyclohexene hydrogenation.

INTRODUCTION

The sulfidation of Co and Mo oxides supported on Al₂O₃ is conventionally achieved in the reactor with a H₂S/H₂ mixture. In a novel procedure^{1,2}, the oxidic catalyst is first impregnated with an organic polysulfide R-S_n-R, then treated at 130°C.

CATALYTIC ACTIVITIES

Figure 1 shows typical product distributions versus space time for thiophene (A) and cyclohexene (B) model reactions at 280°C and 4 MPa, together with the corresponding kinetic networks. Rate constants were used to quantify two functions of the sulfided catalyst : hydrogenation was evaluated by k_{T1} or k_C (thiolane or cyclohexane formation), and C-S bond rupture ability by k_{T2} .

Results are summarized in Table I. The conventionally sulfided catalyst appeared selective towards hydrogenation. Presulfiding with *t*-nonyl or

t-dodecyl pentasulfides improved hydrogenation by about 30 % and C-S bond breaking by about 80 %.

The improvement is ascribed to the sulfidation of the metal oxides at low temperature, which is initiated by the decomposition products of the polysulfides during the presulfiding step.

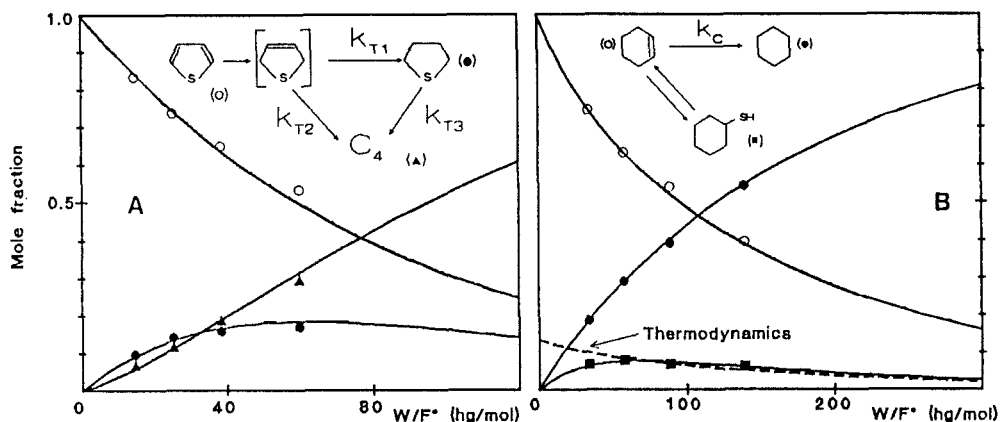


Figure 1 Product distribution and simplified reaction scheme for thiophene (A) and cyclohexene (B) at 280°C and 4 MPa.

TABLE I Rate constants (l/hg) for thiophene and cyclohexene reactions on CoMo/Al₂O₃ catalysts sulfided with H₂S/H₂.

Presulfiding agent	Thiophene		Cyclohexene
	k _{T1}	k _{T2}	k _C
none	51	15	84
<i>t</i> -C ₉ -S ₅ - <i>t</i> -C ₉	65	25	104
<i>t</i> -C ₁₂ -S ₅ - <i>t</i> -C ₁₂	60	31	114

ACKNOWLEDGEMENT

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