Solvothermal alcoholysis method for recycling high-consistency silicone rubber waste.

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Streszczenie

In this work, we investigated the potential use of high-consistency silicone rubber (SR), which is a synthetic solid material used in numerous industrial applications, to produce a range of liquid alkoxysiloxane derivatives $R(OSiMe_2)_xOR$, with x = 1 (**P_1**), 2 (**P_2**), 3 (**P_3**), and 4 (**P_4**). We describe a simple and convenient solvothermal alcoholysis method for the chemical recycling of post-consumer SR in the presence of fatty alcohols under catalyst-free or catalytic conditions. This process proceeds easily both without and with a catalyst. Alkali-metal aryloxides supported by a methylsalicylato ligand (MesalO) gave the highest conversions of SR to products **P_1**–**P_4**. Magnesium and zinc aryloxides enabled efficient conversions of products **P_2**–**P_4** to **P_1**. Binary metal catalysts of general formula $[M_2M'_2(MesalO)_6]$ (M = Mg or Zn; M′ = Li, Na, or K), which had a combination of the catalytic properties shown by alkali-metal aryloxides and magnesium/zinc aryloxides, were produced and used to synthesize **P_1**–**P_4**. The results show that magnesium–sodium/potassium aryloxides had the best catalytic activities. Their use led to the formation of two dominant products, namely, **P_1** and **P_2**, with conversion yields of 79 and 17%, respectively. Particular emphasis is placed on the operating conditions and high activity of the catalyst used. Key factors that affect the catalytic activity and reaction mechanism are also highlighted.

Słowa kluczowe

Liquids, Reaction products, Metals, Catalysts, Silicones

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