Synthesis of POSS derivatives containing different functional groups and their effect of hydrosilylation process

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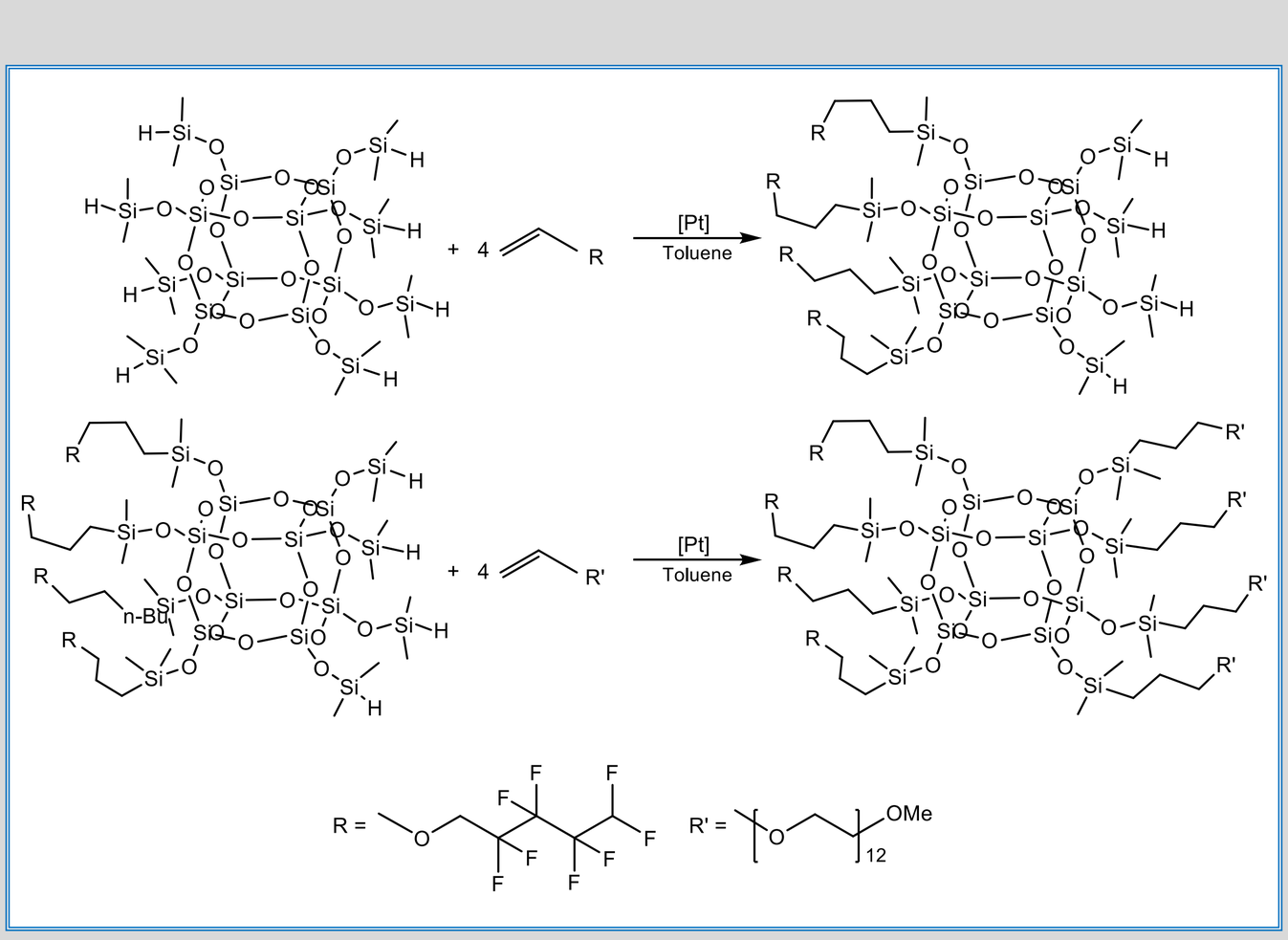
INTRODUCTION

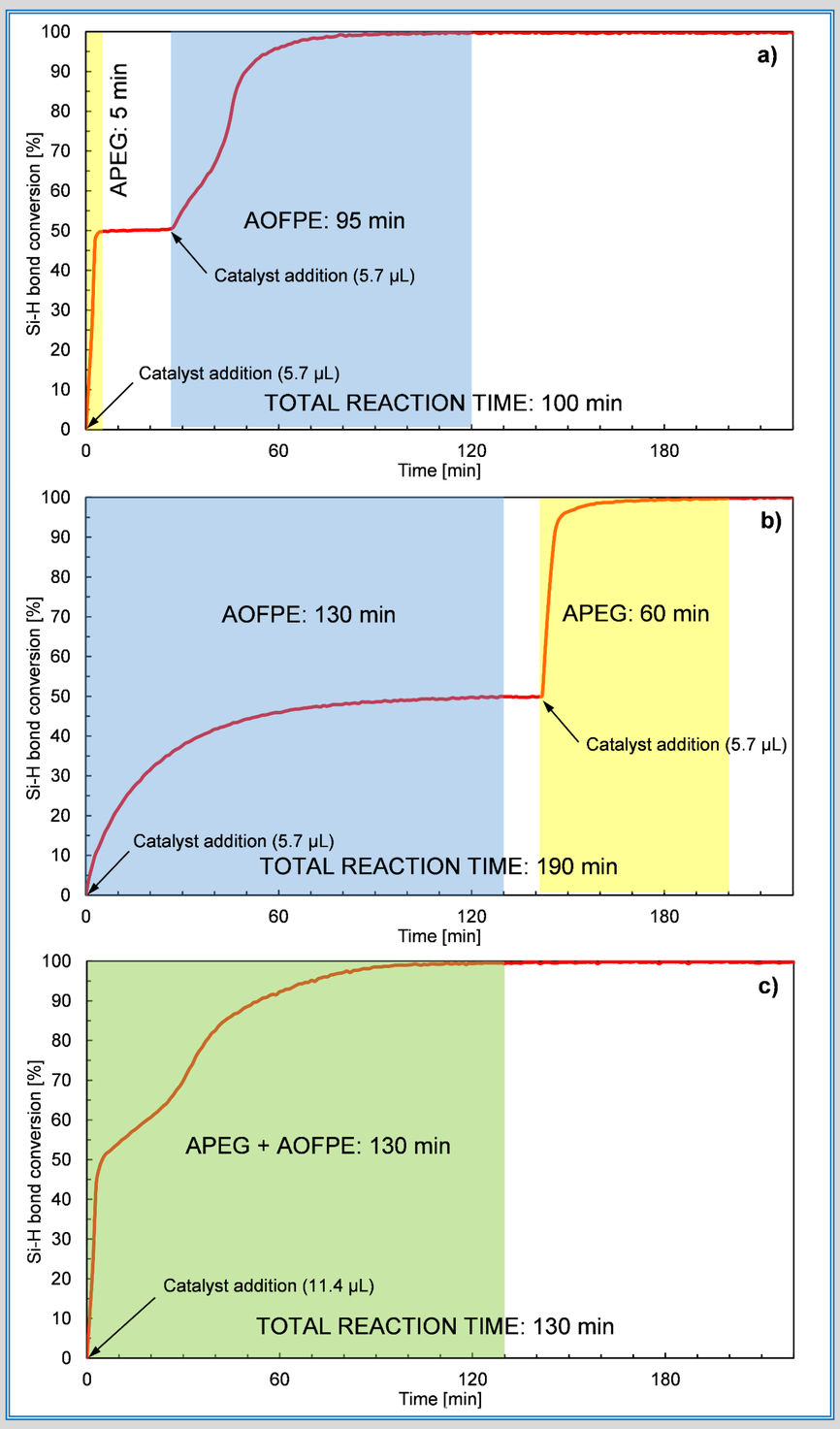
The presence in polyhedral oligomeric silsesquioxanes (POSS) of organofunctional substituents makes it possible to form covalent bonds with compounds. This is why they are applied to create diverse new nanocomposite materials and as modifiers for surfaces and polymer systems. Functionalized silsesquioxanes can be obtained by hydrolysis followed by condensation, or by attachment of functional groups to the closed vertices in catalytic processes. However, the hydrosilylation process is most often reported in literature as allowing introduction of two different substituents to silsesquioxanes.

EXPERIMENTAL

SYNTHESIS



CONVERSION OF Si-H BOND IN REAL TIME



PRODUCT CHARACTERIZATION

^{1}H NMR ($CDCl_3$, 298K, 300MHz) δ (ppm) = 0.05 (48H, $Si(CH_3)_2$); 0.51 (16H, $SiCH_2$); 1.55 (16H, CH_2); 3.27 (12H, OCH_3); 3.45 (16H, OCH_2); 3.55 (192H, CH_2OCH_2 polyether); 3.81 (8H, CH_2O); 6.0 (4H, CF_2H).
^{13}C NMR ($CDCl_3$, 298K, 75.5 MHz) δ (ppm)= -0.75 ($Si(CH_3)_2$); 13.21 ($SiCH_2$); 22.86 (CH_2); 58.81 (OCH_3); 70.45 (CH_2OCH_2 polyether); 71.80 (OCH_2); 75.40 (CH_2O); 105.07 (CF_2); 107.59 (CF_2); 110.11 (CF_2H); 115.43 (CF_2).
^{29}Si NMR ($CDCl_3$, 298K, 59.6 MHz) δ (ppm)= 13.65 ($Si(CH_3)_2$); -109.35 (SiOSi).

CONCLUSIONS

- *The effect of the sequence of introducing substituents on the process of hydrosilylation was determined.*
- *The effect of substituents reactivity on the process of hydrosilylation was determined.*
- *The method of synthesis of bifunctional silsesquioxanes was optimized.*
- *The influence of the time of catalyst introduction on the hydrosilylation activity was checked.*

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