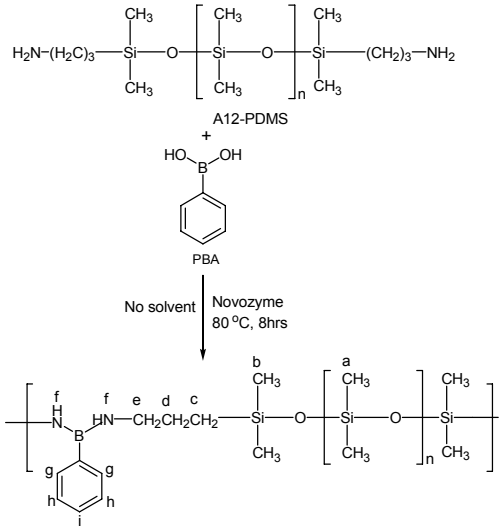
Supplementary Material (ESI) for Green Chemistry

Supplementary Information

Simple Green Synthesis of Polyborosiloxanes as Environmentally-safe Non-Halogenated Flame Retardant Materials

-Mosurkal *et al.*

Synthesis os PS-PBA-E:

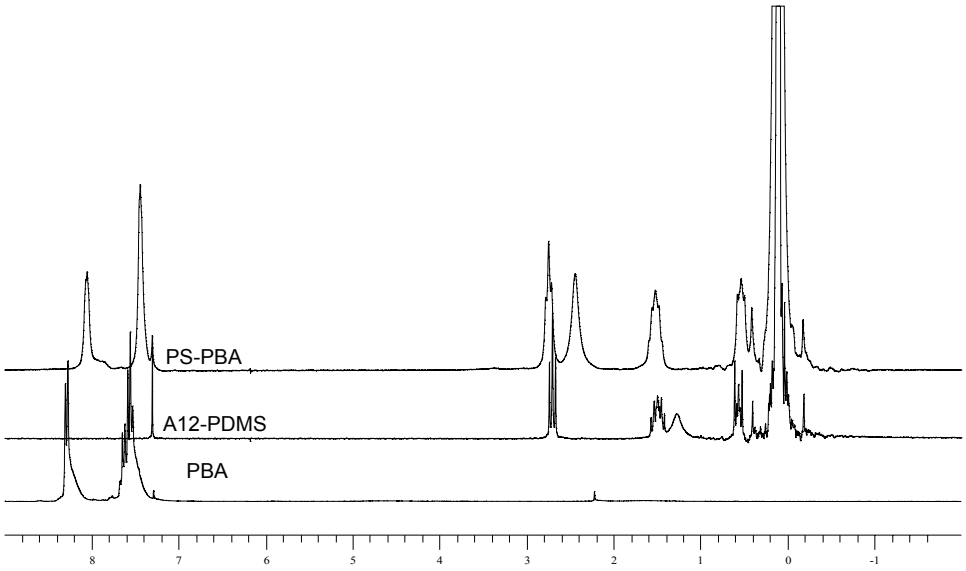


^{1}H NMR spectrum of PS-PBA-E

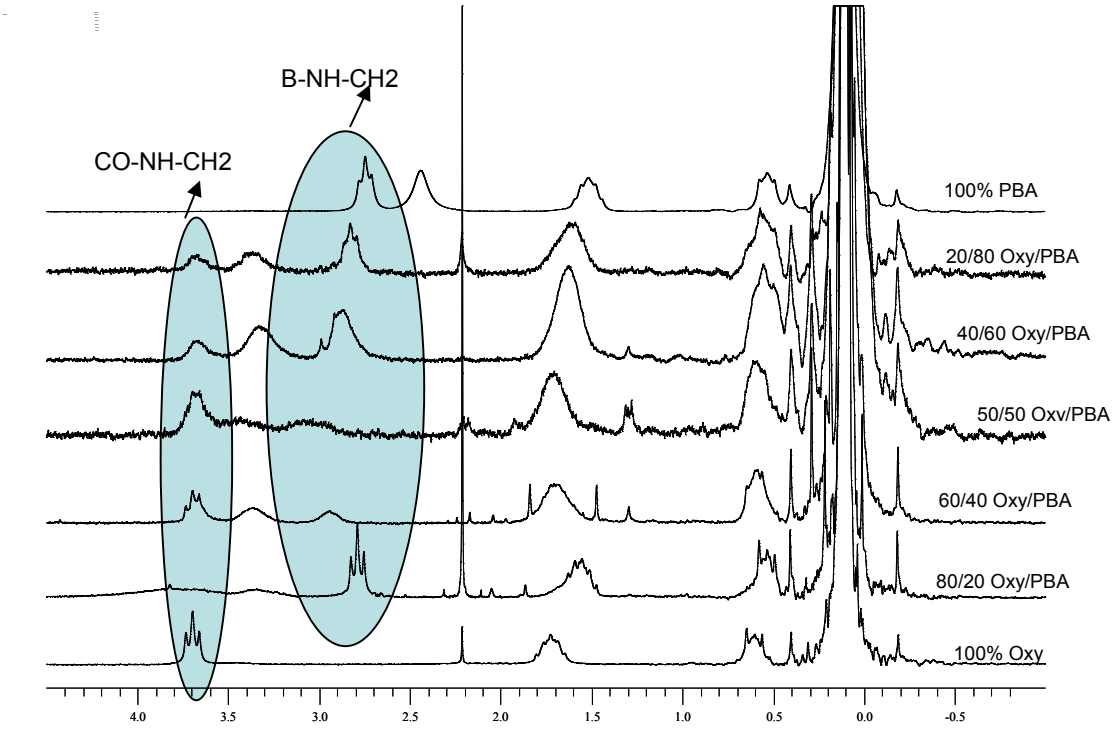
Scheme 1. Lipase catalyzed synthesis of a polyborosiloxane copolymer, PS-PBA-E

In a simple procedure (Scheme 1), equimolar amounts of PBA and A12-PDMS were combined in a three-neck round bottom flask. Under nitrogen atmosphere, 10% by weight of the enzyme with respect to the weight of the monomers was added. The resulting reaction mixture was stirred at 80^{o}C under vacuum. After 8 hrs, the reaction mixture became a light yellow viscous liquid. The reaction was quenched by adding acetone and then filtered to remove the enzyme. The solvent was then removed using rotavap under vacuum to isolate the polyborosiloxane copolymer, PS-PBA-E.

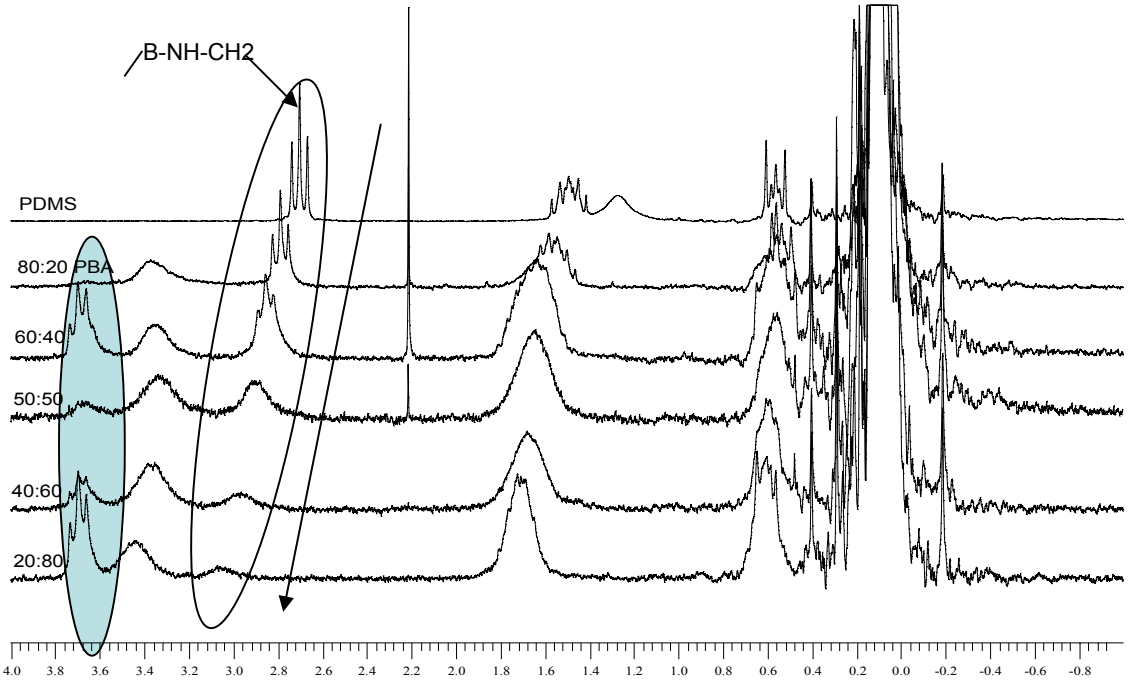
PS-PBA-E: ^{1}H NMR (CDCl3): δ= 0.12 (bs, methyl protons of dimethyl siloxane main chain, C-a), 0.41 (bs, methyl protons of dimethyl siloxane end segment, C-b), 0.53 (t, 2H, C-c), 1.52 (t, 2H, C-d), 2.44 (bs, 2H, NH-f), 2.71 (t, 2H, C-e), 7.44 (dd, 2H, C-g), 8.07 (m, 3H, C-h,i) See Scheme 1 for identification.
FTIR (ATR): 1444 cm^{-1} (BN stretch), absence of peaks corresponding to OH and BO stretching from PBA monomer.



^{1}H NMR spectrum of PBS-Oxy-E series (Aliphatic region)



^{1}H NMR spectrum of PBS-Oxy (NE series) (Aliphatic region)



B-NH-CH2 proton shifted from 3.07 to 2.74 ppm as the PBA% increased

^{1}H NMR spectrum of PBS-DAH (NE series) (Aliphatic region)