SUPPORTING INFORMATION

Chemoselective synthesis of long-chain alkyl-*H*-phosphinic acids via one-pot alkylation/oxidation of red phosphorus with alkyl-PEGs as recyclable micellar catalysts

Vladimir A. Kuimov,^a Svetlana F. Malysheva,^a Natalia A. Belogorlova,^a Nina K. Gusarova,^a Boris A. Trofimov^{a*}

^aA. E. Favorsky Irkutsk Institute of Chemistry, Siberian Branch, Russian Academy of Sciences, 1 Favorsky Str., 664033 Irkutsk, Russia

Fax: (+7)-3952-41-93-49; e-mail: boris_trofimov@irioch.irk.ru

n-Butylphosphinic acid (2a)







IR spectrum (film, cm⁻¹) of *n*-butylphosphinic acid (2a)

n-Pentylphosphinic acid (2b)





¹³C NMR (CDCl₃) of *n*-pentylphosphinic acid (2b)



³¹P NMR cop (CDCl₃) of *n*-pentylphosphinic acid (2b)



IR spectrum (film, cm⁻¹) of *n*-pentylphosphinic acid (2b)



S6









IR spectrum (film, cm⁻¹) of *n*-hexylphosphinic acid (**2c**)

n-Heptylphosphinic acid (2d)









200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10 -20 -30 -40 -50 -50 -70 -80 -90 -100 ppm

³¹**P** NMR cop (CDCl₃) of *n*-heptylphosphinic acid (2d)



IR spectrum (film, cm^{-1}) of *n*-heptylphosphinic acid (**2d**)



n-Octylphosphinic acid (2e)







2e spectrum (film, cm⁻¹) of *n*-octylphosphinic acid (**2e**)

n-Nonylphosphinic acid (2f)





240 60 40 ppm -120 -140 220 200 180 160 140 120 100 80 20 0 -20 -40 -60 -80 -100



IR spectrum (film, cm⁻¹) of *n*-nonylphosphinic acid (2f)



³¹**P** NMR cop (CDCl₃) of *n*-nonylphosphinic acid (2f)



S17



³¹P NMR cop (CDCl₃) of *n*-decylphosphinic acid (2g)



IR spectrum (film, cm⁻¹) of *n*-decylphosphinic acid (**2g**)



n-Dodecylphosphinic acid (2h)







S20



IR spectrum (KBr, cm⁻¹) of *n*-dodecylphosphinic acid (**2h**)



n-*Tetradecylphosphinic acid* (2i)







³¹P NMR dec (CDCl₃) of *n*-tetradecylphosphinic acid (2i)

IR spectrum (KBr, cm⁻¹) of *n*-tetradecylphosphinic acid (2i)



Hexadecylphosphinic acid (2j)





S24



¹³C NMR (CDCl₃) of *n*-hexadecylphosphinic acid (2j)



³¹P NMR cop (CDCl₃) of *n*-hexadecylphosphinic acid (2j)

IR spectrum (KBr, cm⁻¹) of *n*-hexadecylphosphinic acid (2j)









IR spectrum (KBr, cm⁻¹) of *n*-octadecylphosphinic acid (**2k**)



Dibutyl ether of polyethylene glycol 1000 (Bu₂PEG₁₀₀₀)

¹H NMR (CDCl₃) of (Bu₂PEG₁₀₀₀)





IR spectrum (film, cm⁻¹) of (Bu₂PEG₁₀₀₀)



S30

Dihexyl ether of polyethylene glycol (Hex₂PEG₆₀₀)







IR spectrum (film, cm⁻¹) of (Hex₂PEG₆₀₀)



Dihexyl ether of polyethylene glycol (Hex₂PEG₁₀₀₀)

¹H NMR (CDCl₃) of (Hex₂PEG₁₀₀₀)









Methyl gexyl ether of polyethylene glycol 850 (MePEG₈₅₀Hex)

NMR ¹H (CDCl₃) of (MePEG₈₅₀Hex)





IR spectrum (film, cm⁻¹) of (MePEG₈₅₀Hex)

Dioctyl ether of polyethylene glycol (Oct₂PEG₁₀₀₀)



NMR ¹H (CDCl₃) of (Oct₂PEG₁₀₀₀)

NMR ¹³C (CDCl₃) of (Oct₂PEG₁₀₀₀)



IR spectrum (film, cm⁻¹) of (Oct₂PEG₁₀₀₀)



%Transmittance





IR spectrum (film, cm⁻¹) of (Dec₂PEG₆₅₀)

Didodecyl ether of polyethylene glycol 1000 (Dodec₂PEG₁₀₀₀)



¹H NMR (CDCl₃) of (Dodec₂PEG₁₀₀₀)



IR spectrum (film, cm⁻¹) of (Dodec₂PEG₁₀₀₀)



Methyl dodecyl ether of polyethylene glycol 850 (MePEG₈₅₀Dodec)





IR spectrum (film, cm^{-1}) of (MePEG₈₅₀Dodec)