

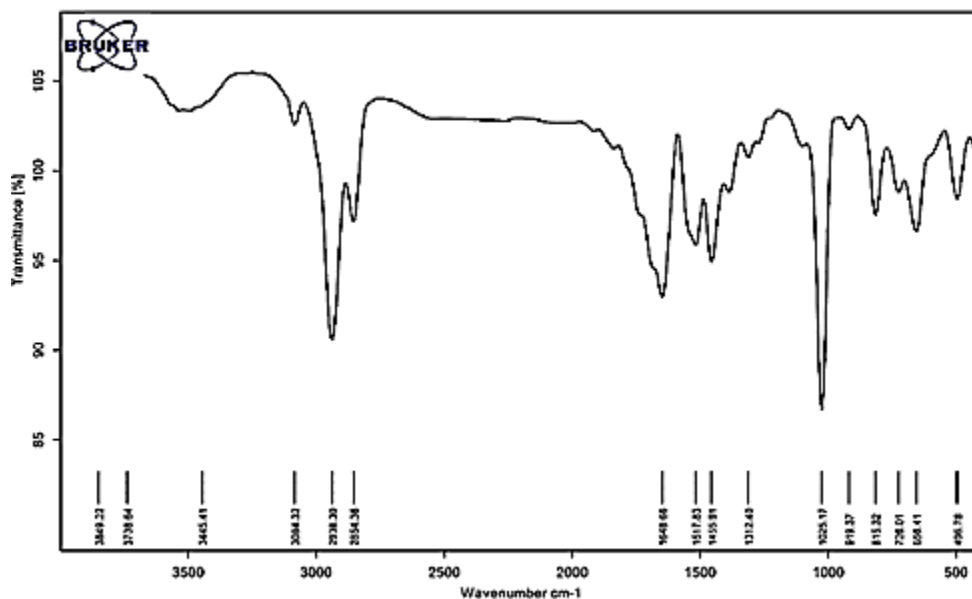
**Synthesis, Characterization and Properties Investigation of [4-(Dimethylsilyl)-
butyl]alkylferrocene Grafted HTPB as Novel Ferrocene Based Burning Rate Accelerator
Catalysts for Composite Gas Generators**

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Abedinpour, Sadegh Soleimani

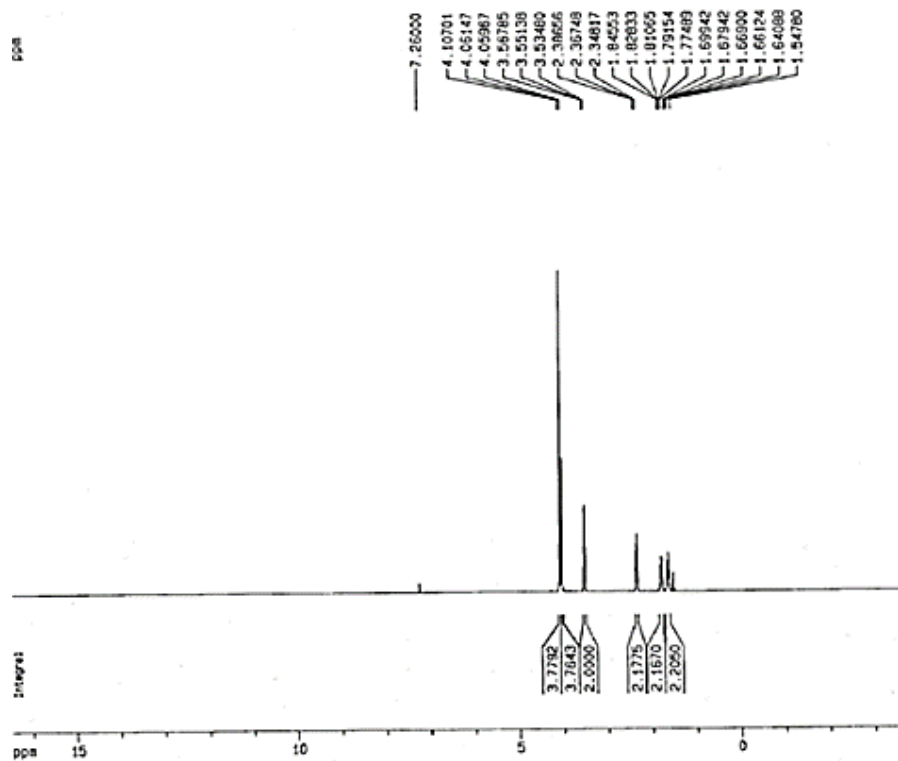
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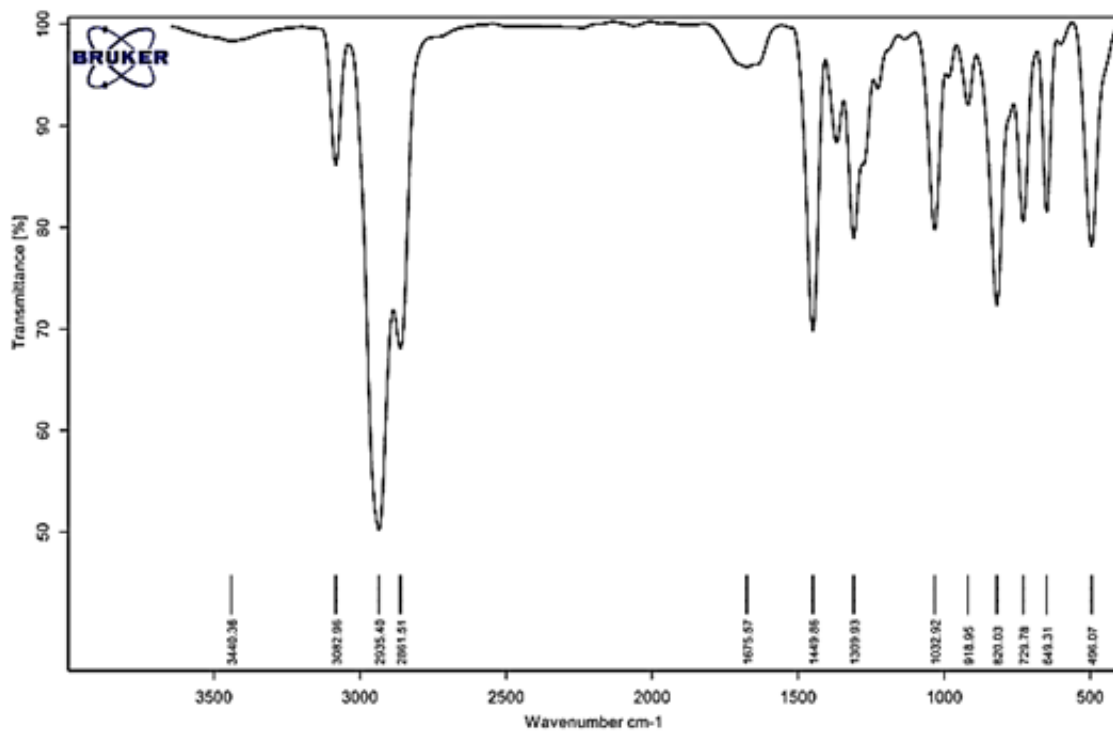
FT-IR spectra of (4-Chlorobutyl)ferrocene (3a)



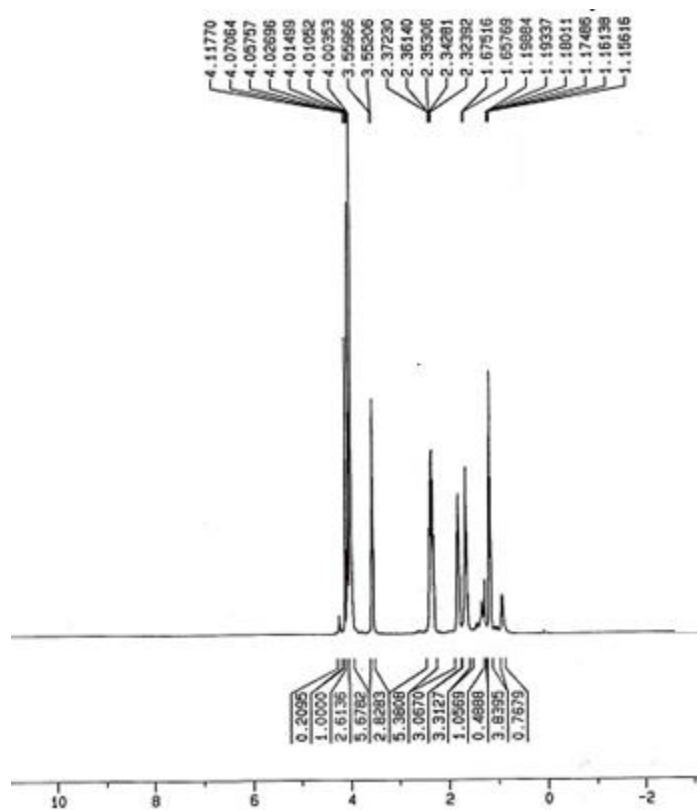
¹H NMR spectra of (4-Chlorobutyl)ferrocene (3a)



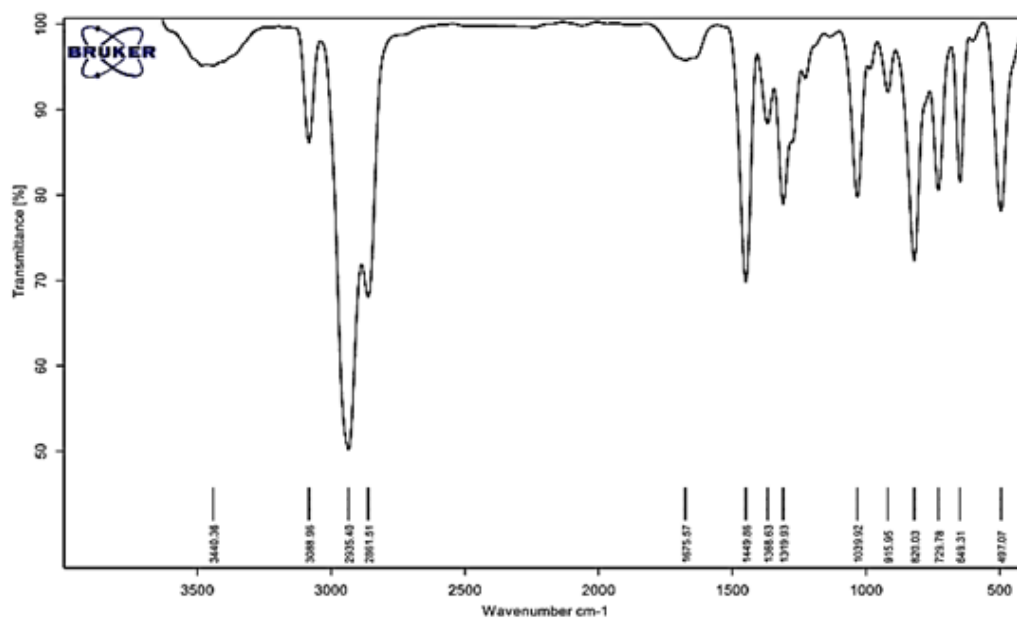
FT-IR spectra of (4-Chlorobutyl)ethylferrocene (3b)



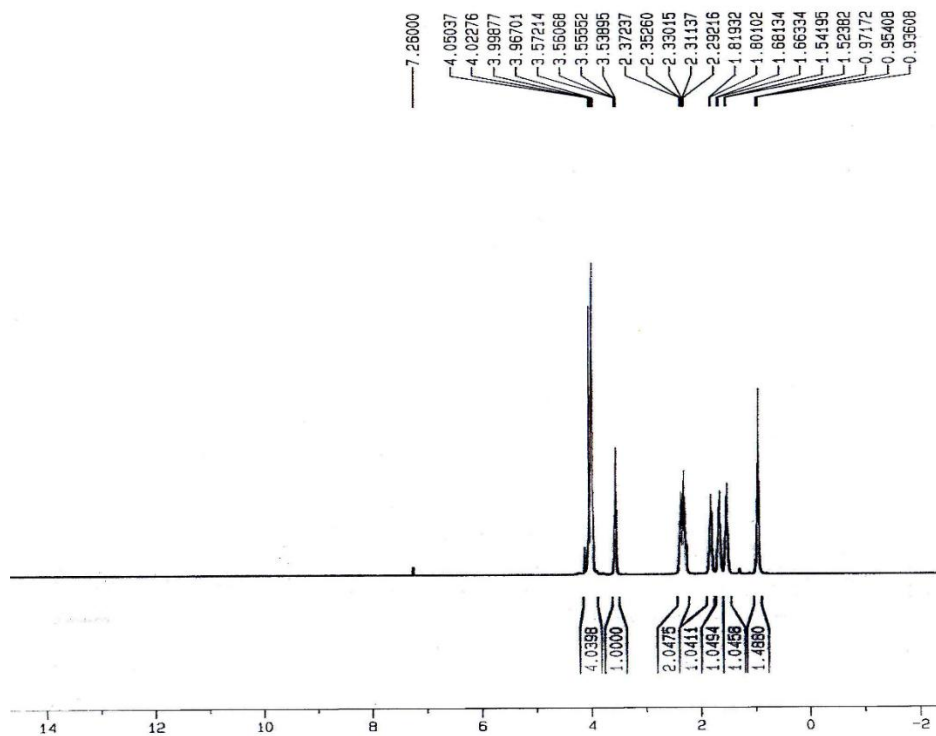
^1H NMR spectra of (4-Chlorobutyl)ethylferrocene (3b)



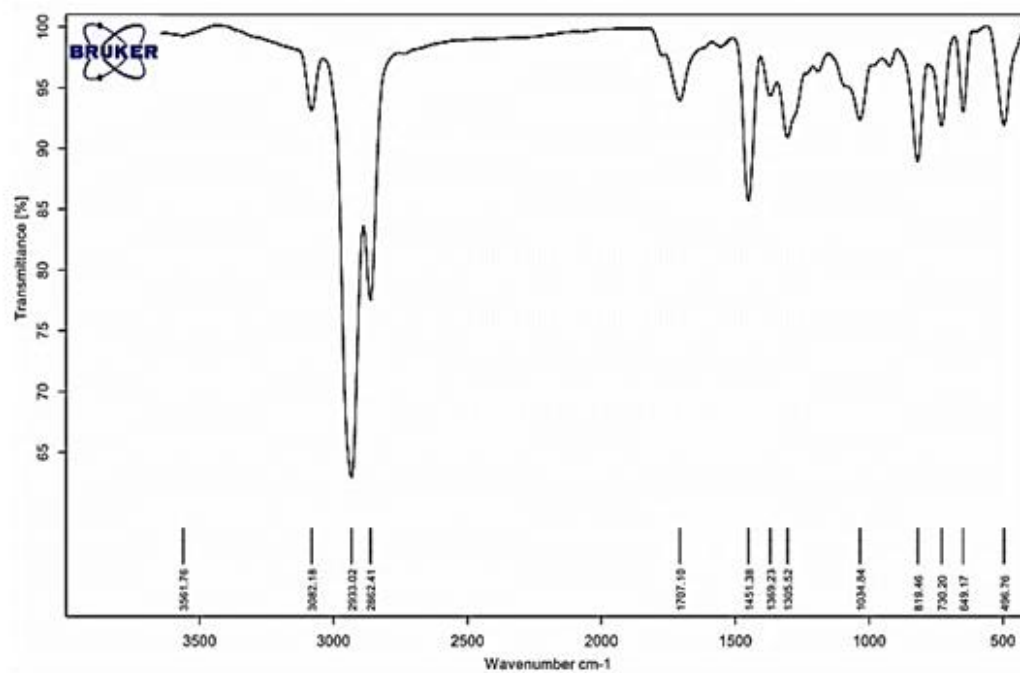
FT-IR spectra of (4-Chlorobutyl)propylferrocene (3c)



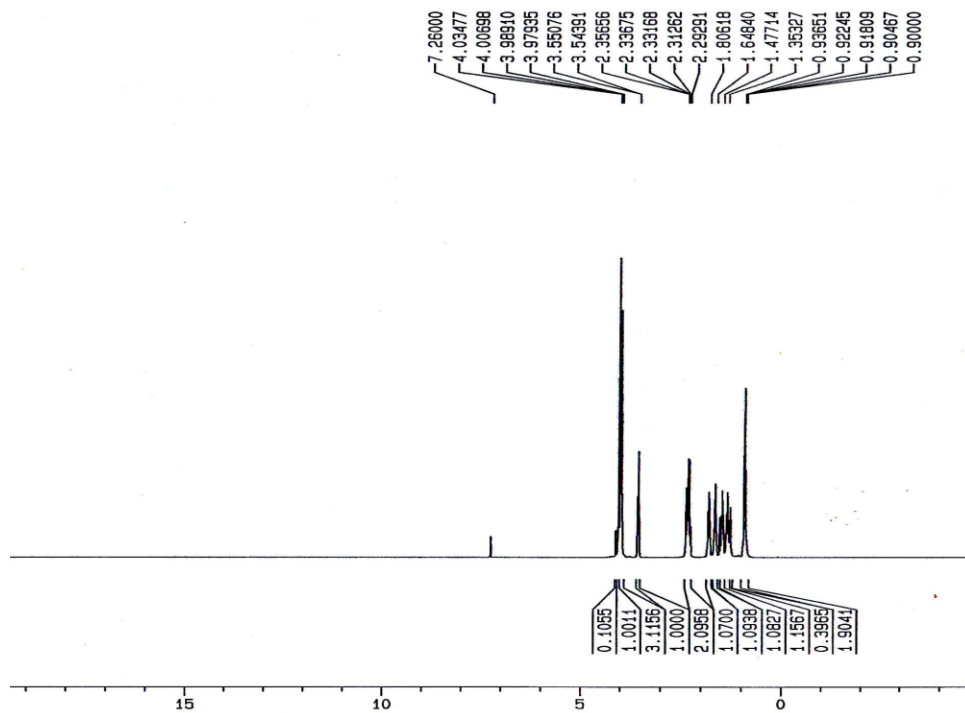
^1H NMR spectra of (4-Chlorobutyl)propylferrocene (3c)



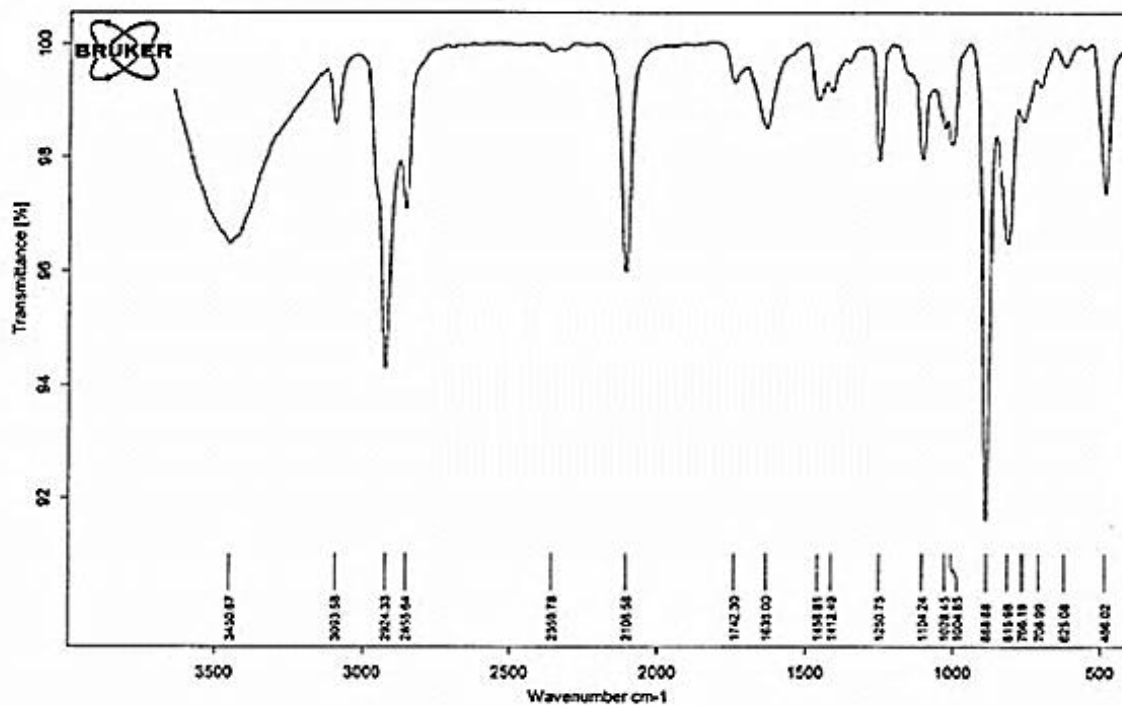
FT-IR spectra of (4-Chlorobutyl)butylferrocene (3d)



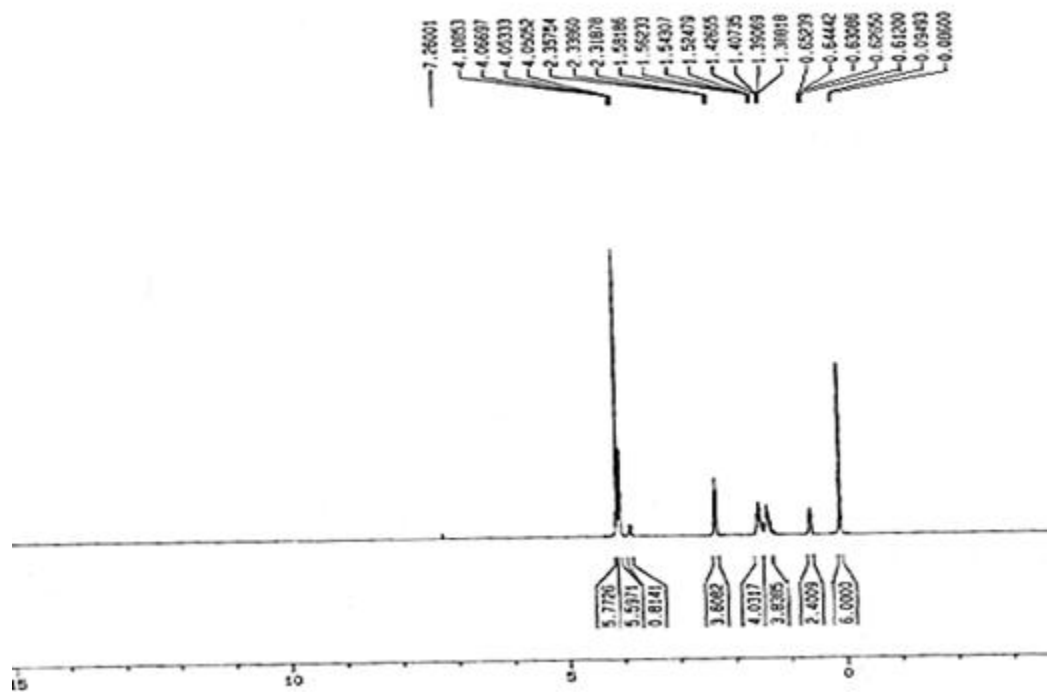
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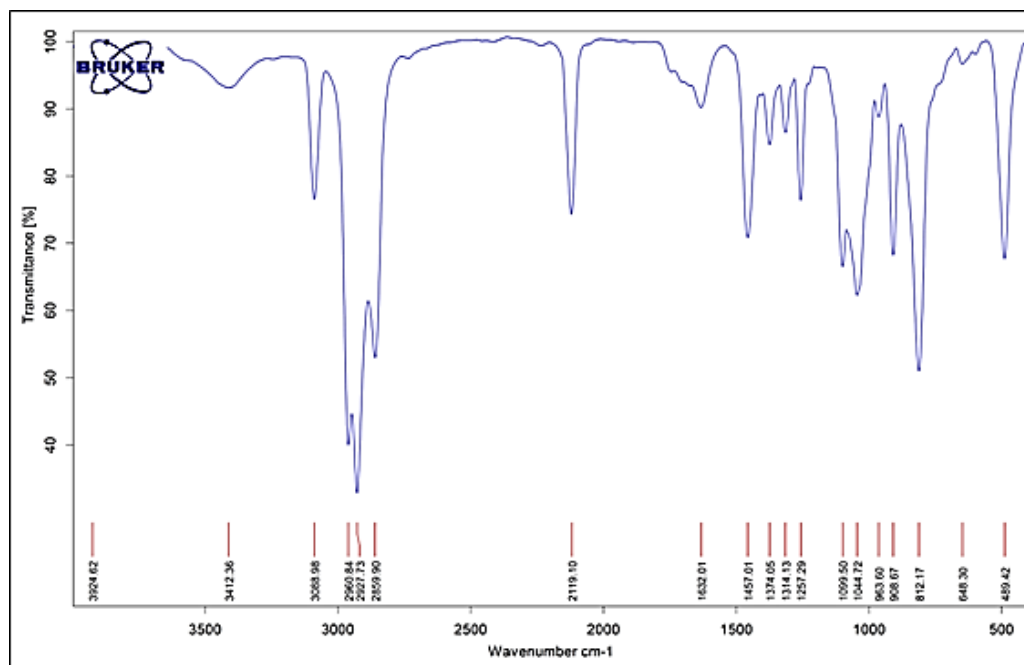
FT-IR spectra of [4-(Dimethylsilyl)butyl]ferrocene (4a)



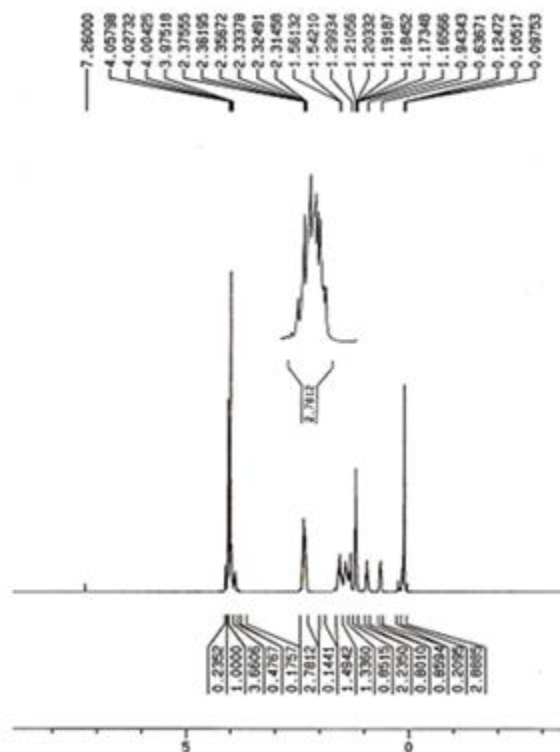
^1H NMR spectra of [4-(Dimethylsilyl)butyl]ferrocene (4a)



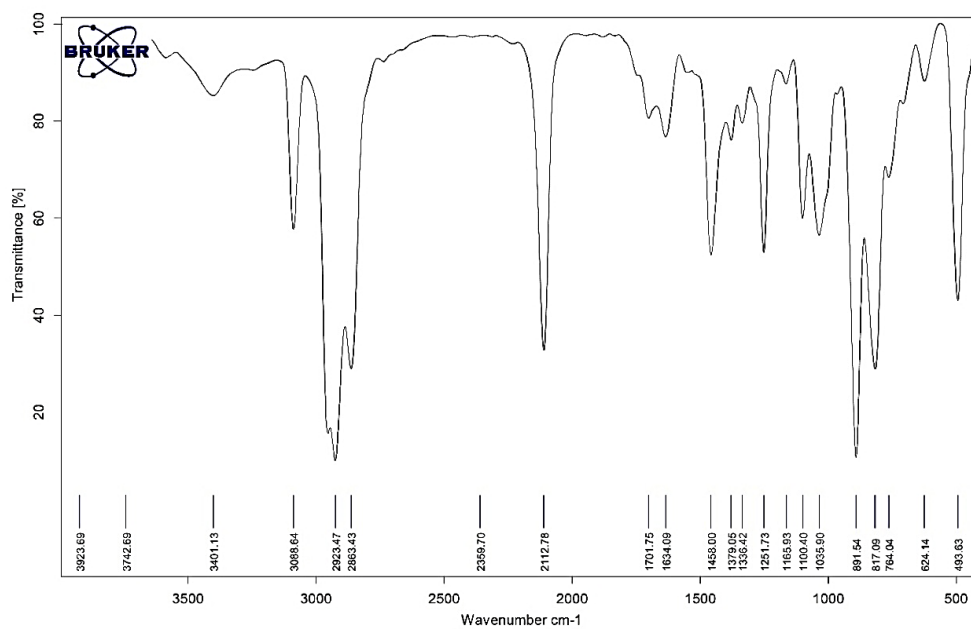
FT-IR spectra of [4-(Dimethylsilyl)butyl]ethylferrocene (4b)



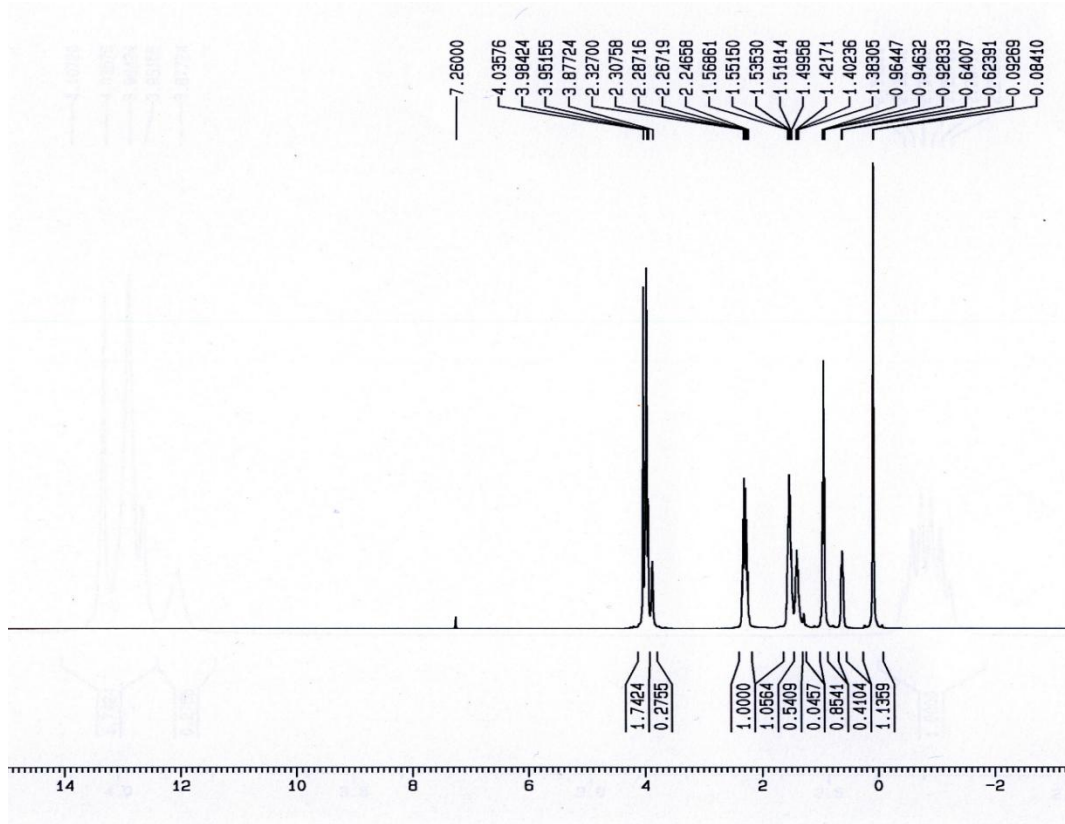
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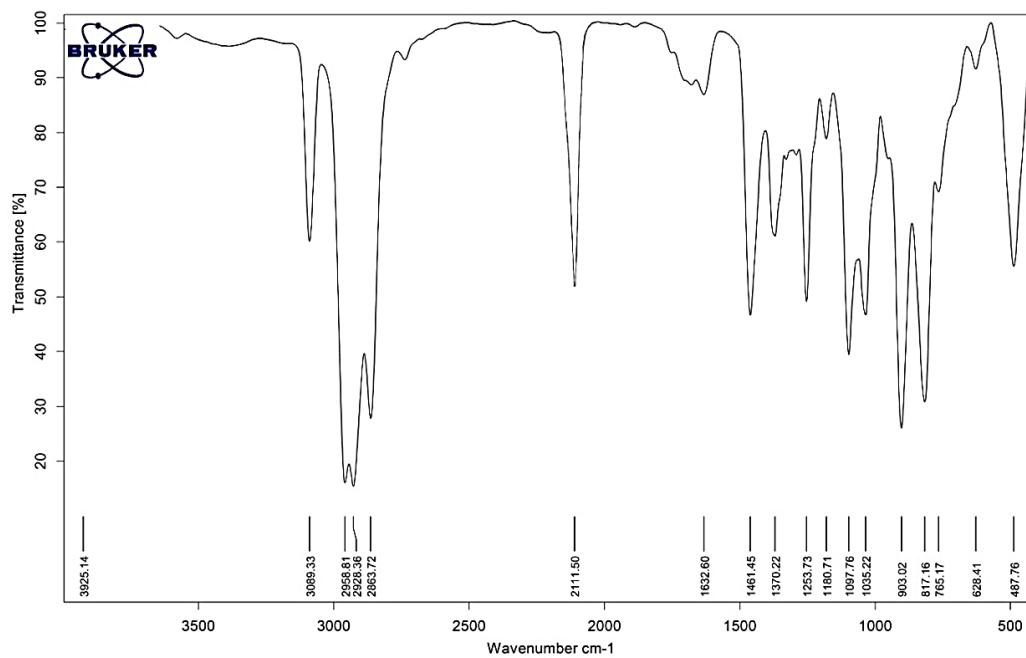
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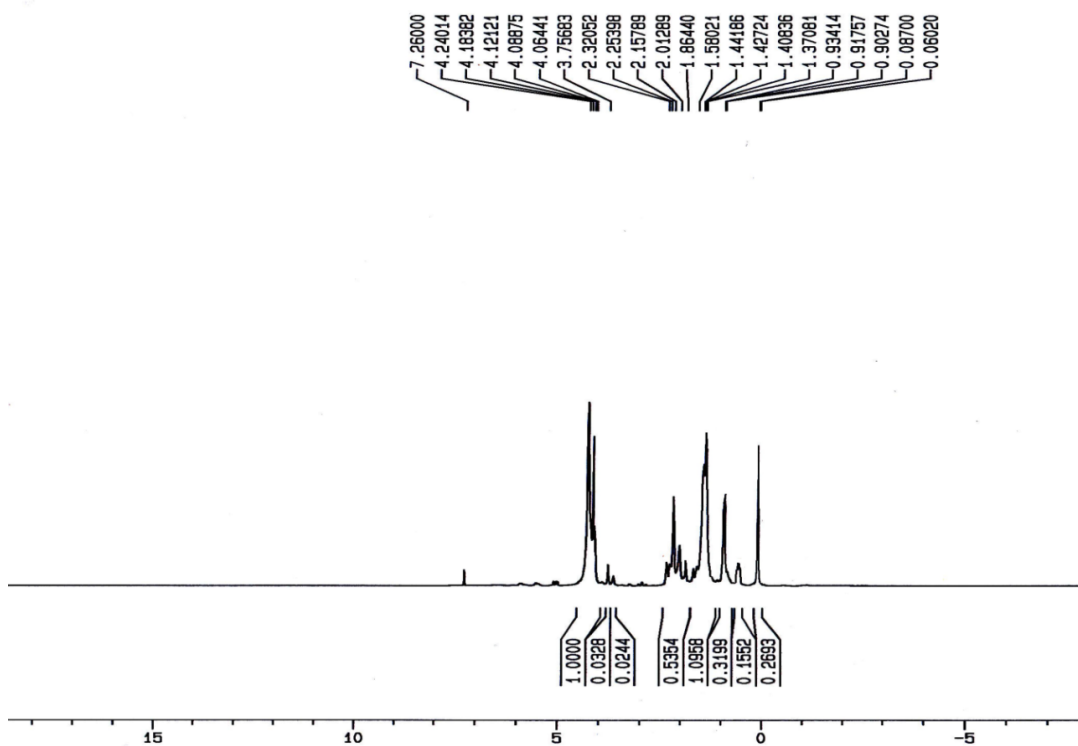
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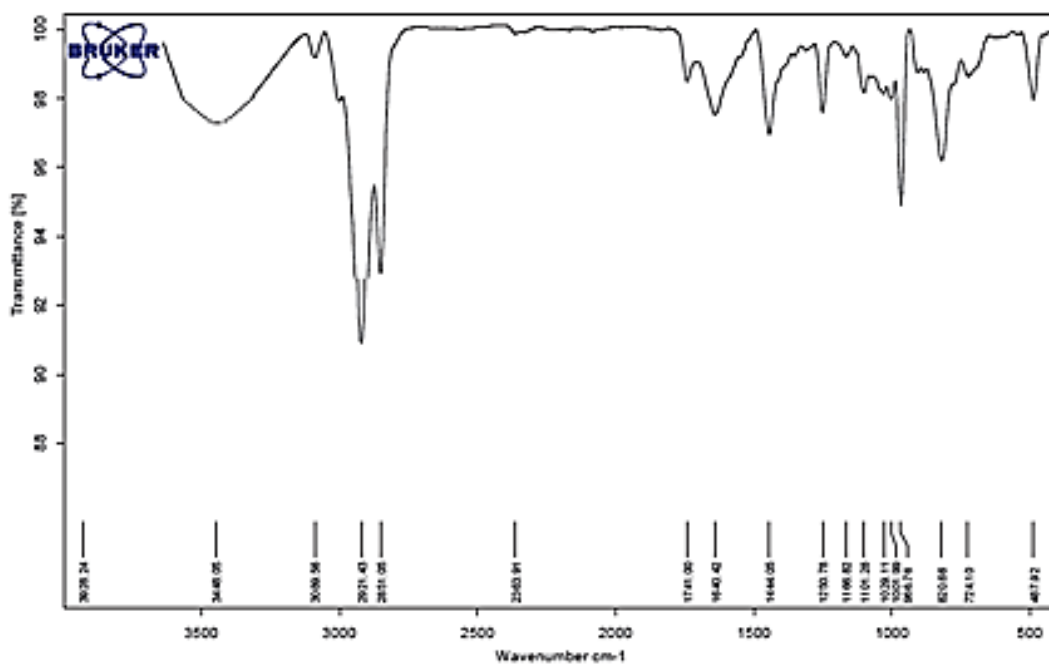
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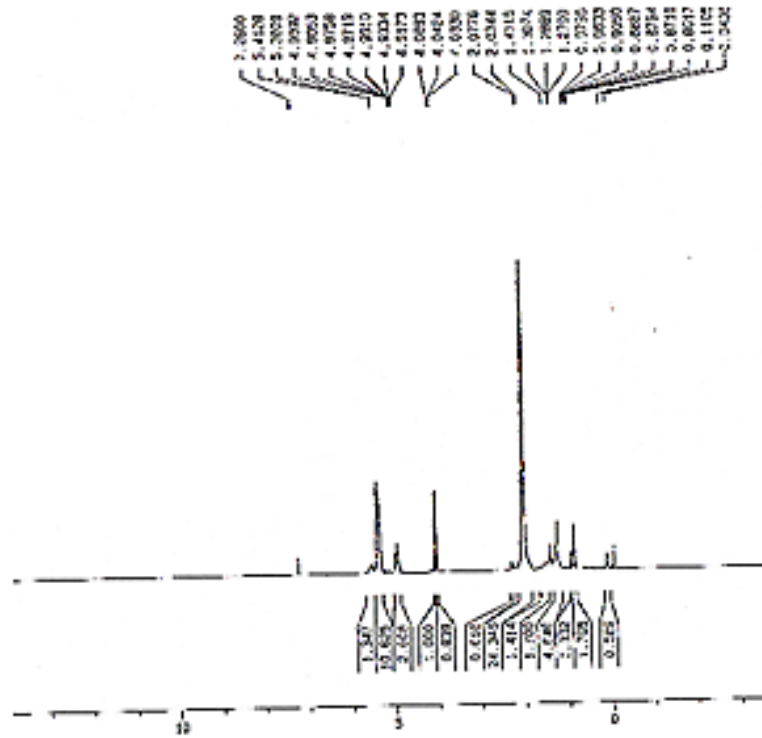
¹H NMR spectra of [4-(Dimethylsilyl)butyl]butylferrocene (4d)



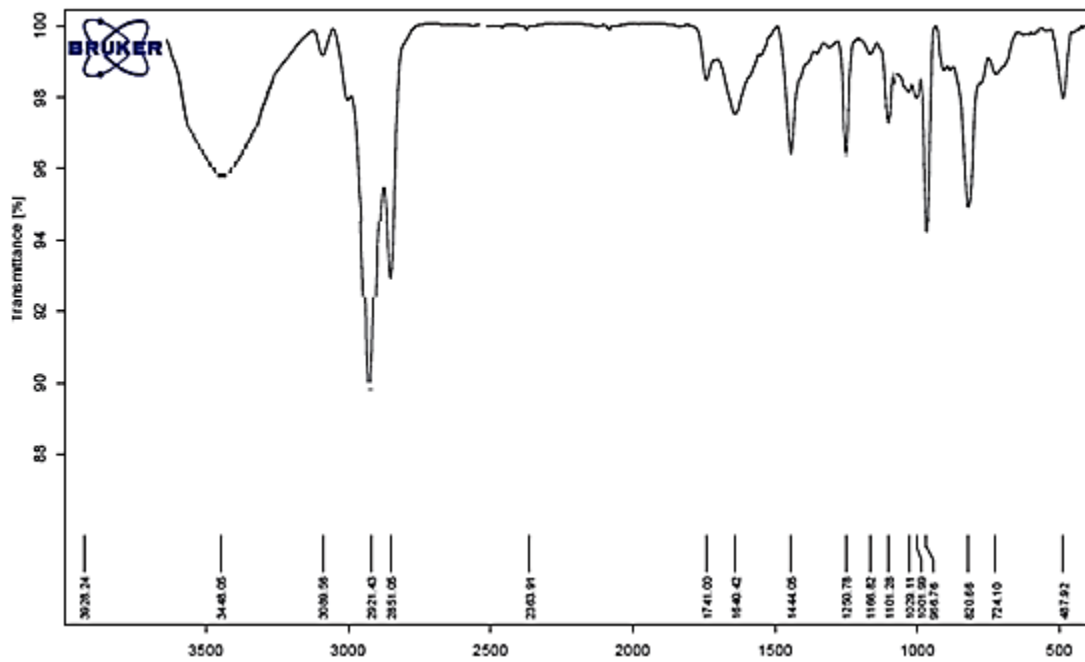
FT-IR spectra of [4-(Dimethylsilyl)butyl]ferrocene Grafted HTPB with 3% iron (5a)



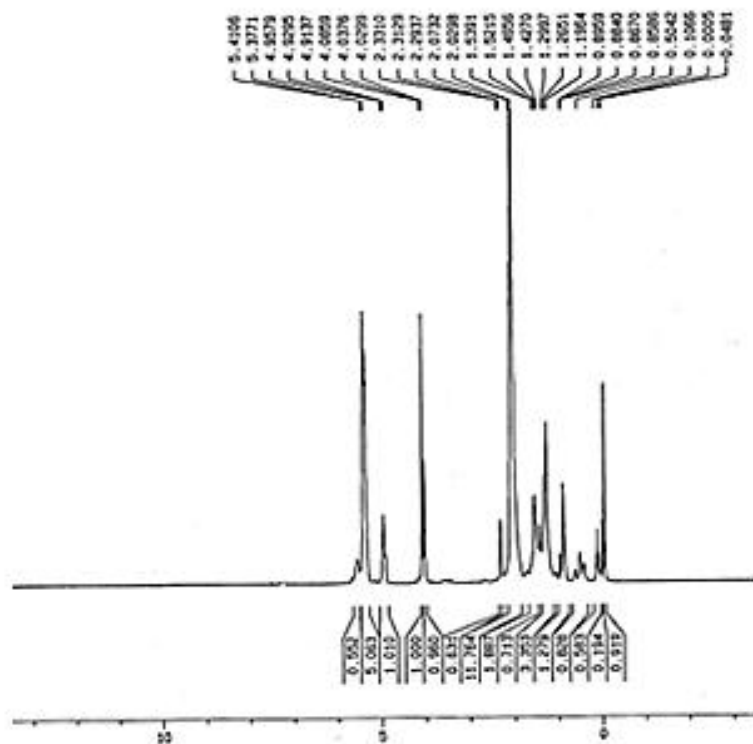
¹H NMR spectra of [4-(Dimethylsilyl)butyl]ferrocene Grafted HTPB with 3% iron (5a)



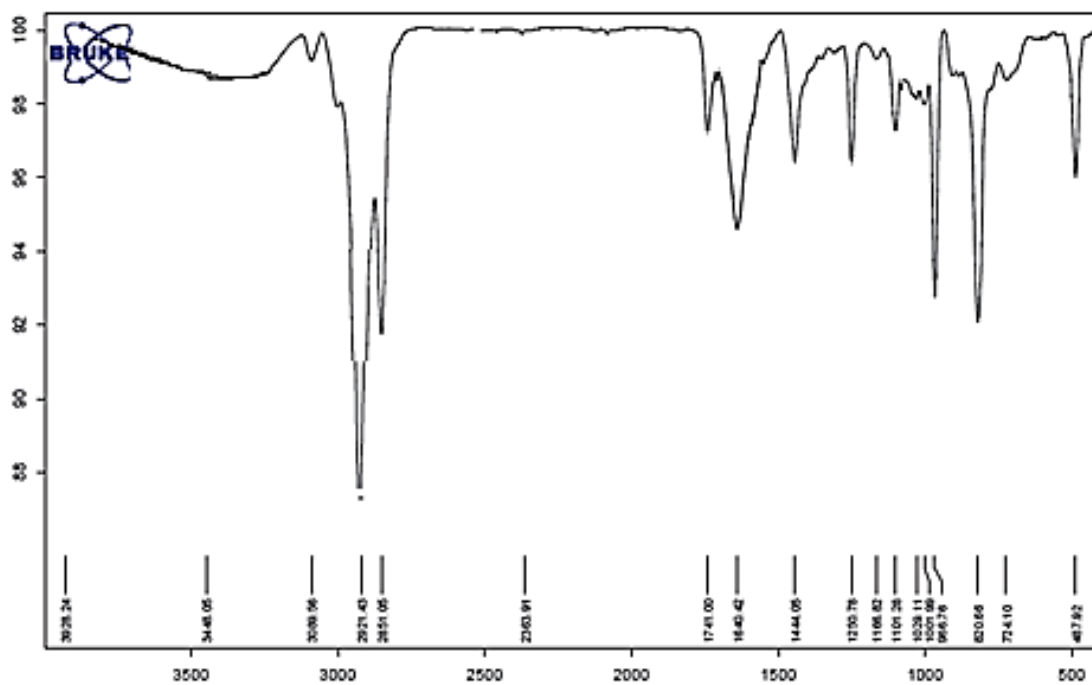
FT-IR spectra of [4-(Dimethylsilyl)butyl]ferrocene Grafted HTPB with 6% iron (5b)



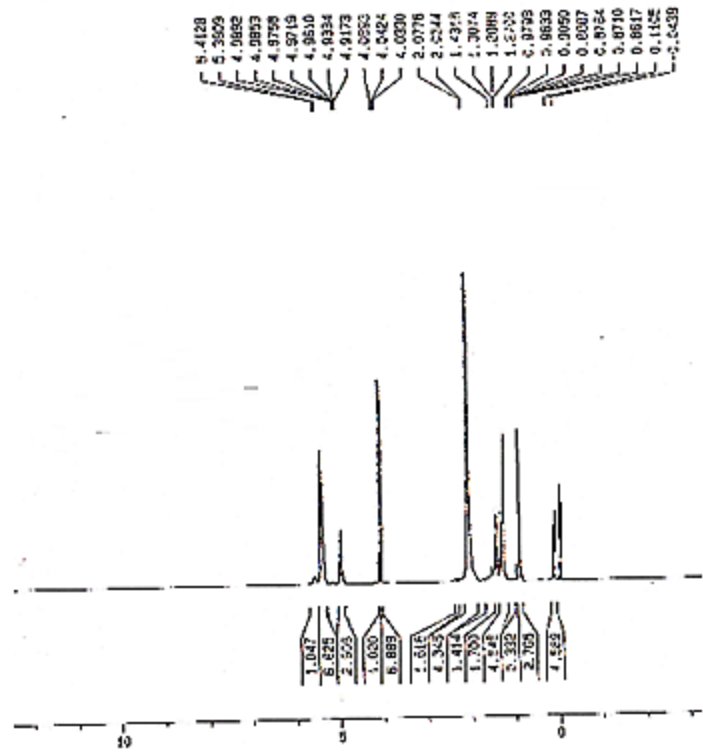
¹H NMR spectra of [4-(Dimethylsilyl)butyl]ferrocene Grafted HTPB with 6% iron (5b)



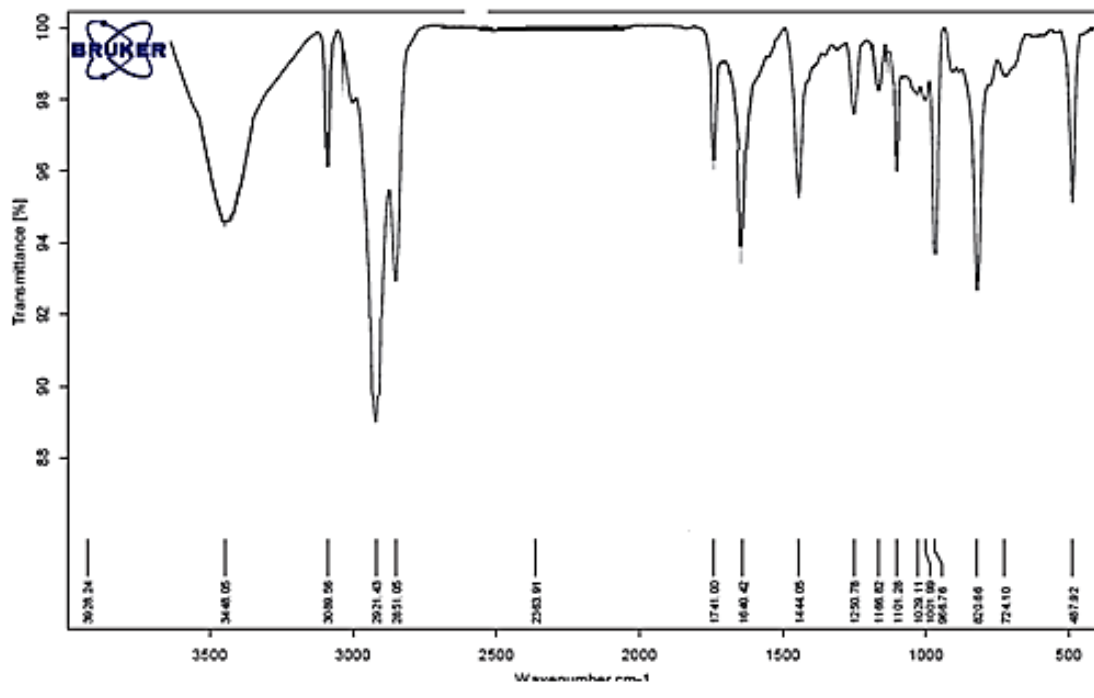
FT-IR spectra of [4-(Dimethylsilyl)butyl]ferrocene Grafted HTPB with 9% iron (5c)



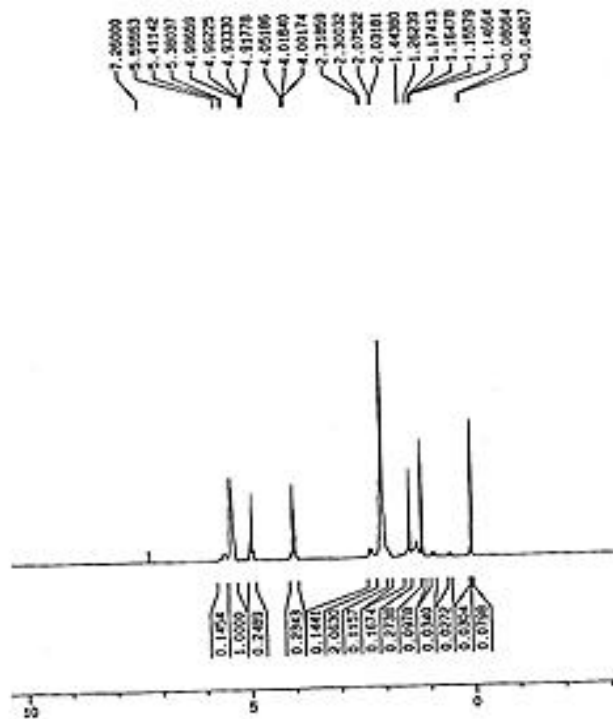
¹H NMR spectra of [4-(Dimethylsilyl)butyl]ferrocene Grafted HTPB with 9% iron (5c)



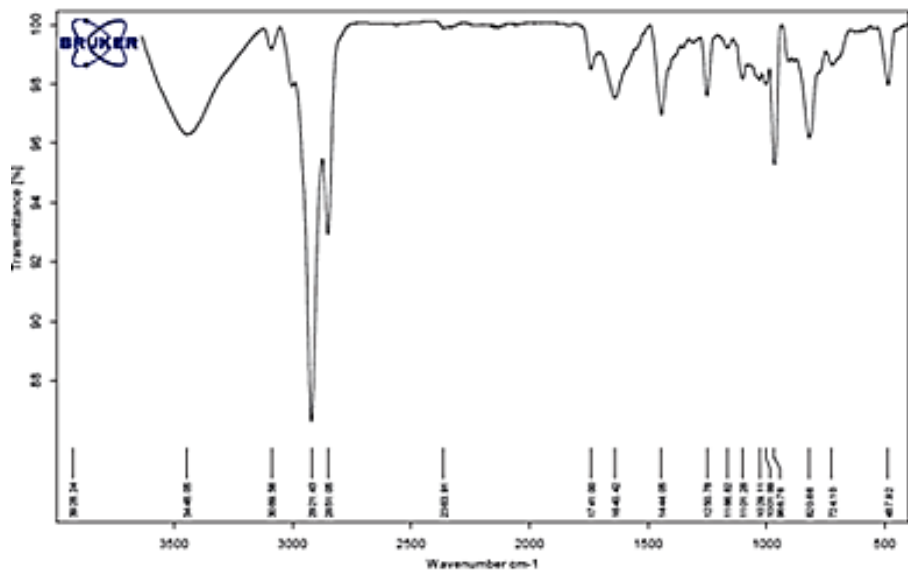
FT-IR spectra of [4-(Dimethylsilyl)butyl]ethylferrocene Grafted HTPB with 3% iron (5d)



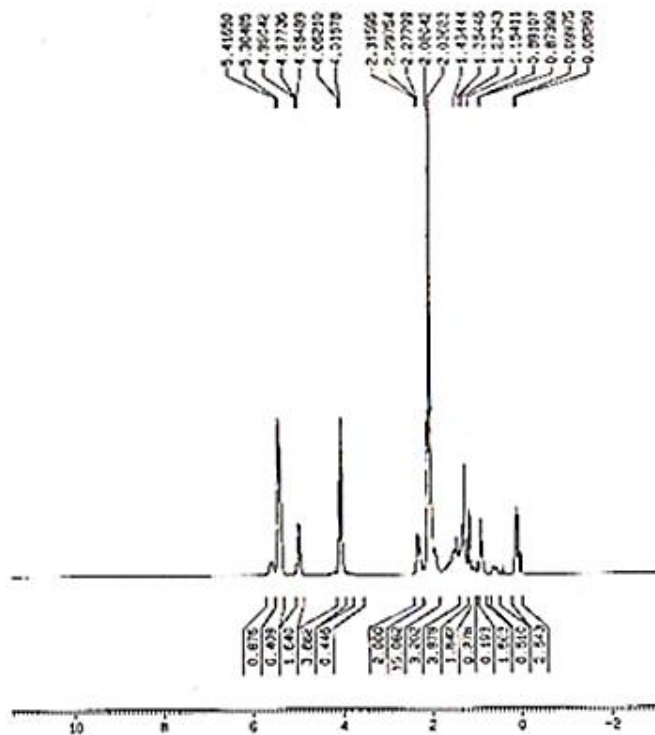
¹H NMR spectra of [4-(Dimethylsilyl)butyl]ethylferrocene Grafted HTPB with 3% iron (5d)



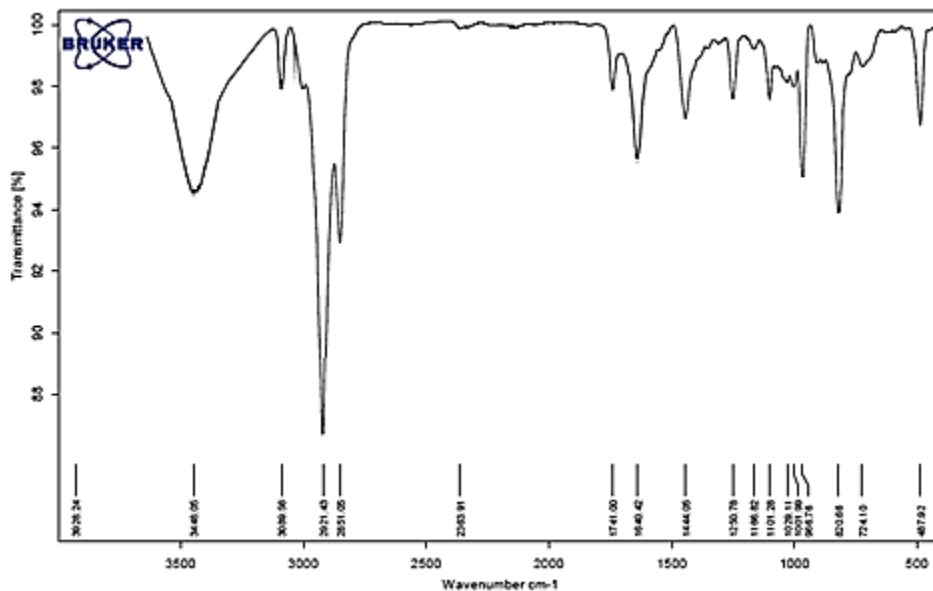
FT-IR spectra of [4-(Dimethylsilyl)butyl]ethylferrocene Grafted HTPB with 6% iron (5e)



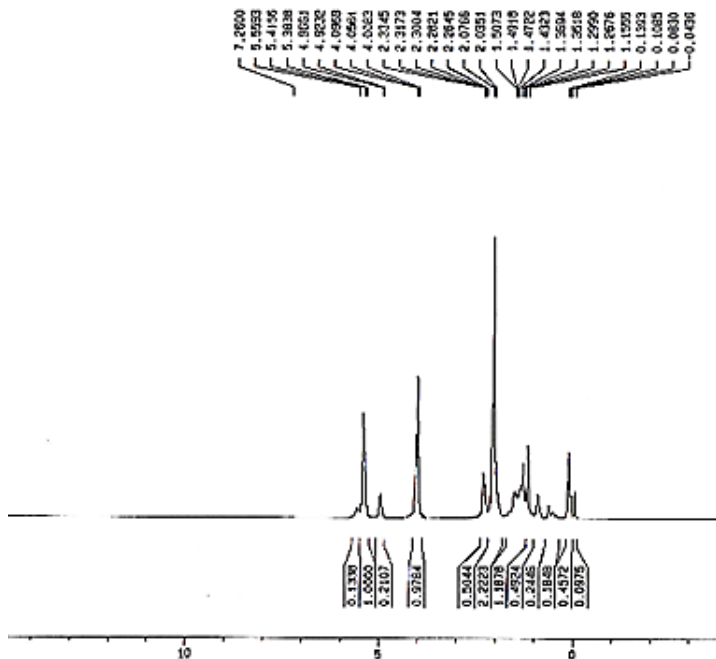
^1H NMR spectra of [4-(Dimethylsilyl)butyl]ethylferrocene Grafted HTPB with 6% iron (5e)



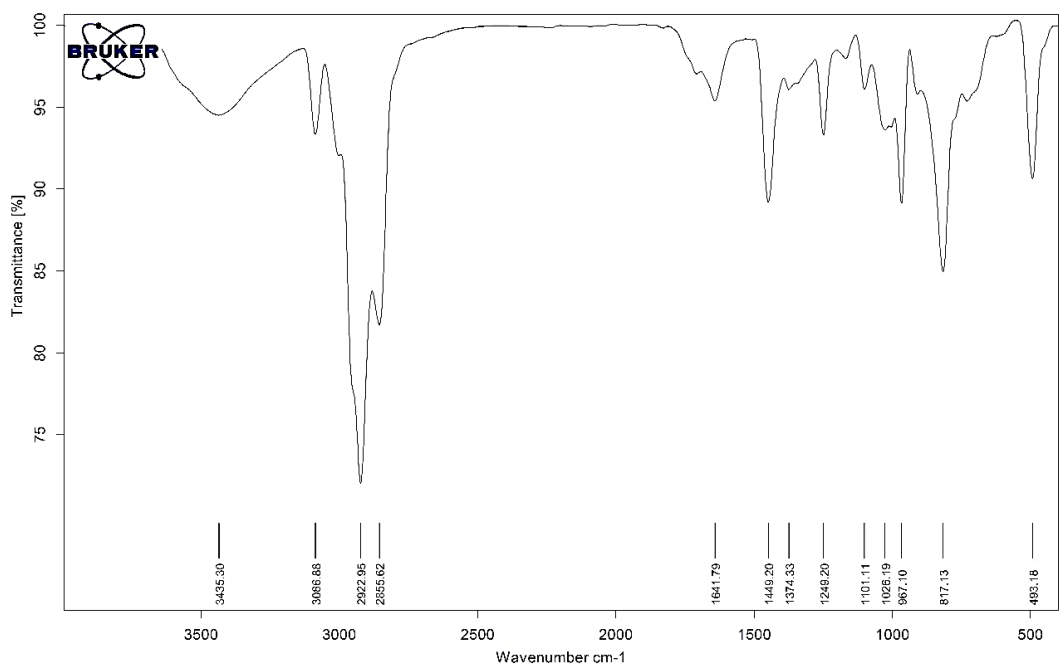
FT-IR spectra of [4-(Dimethylsilyl)butyl]ethylferrocene Grafted HTPB with 9% iron (5f)



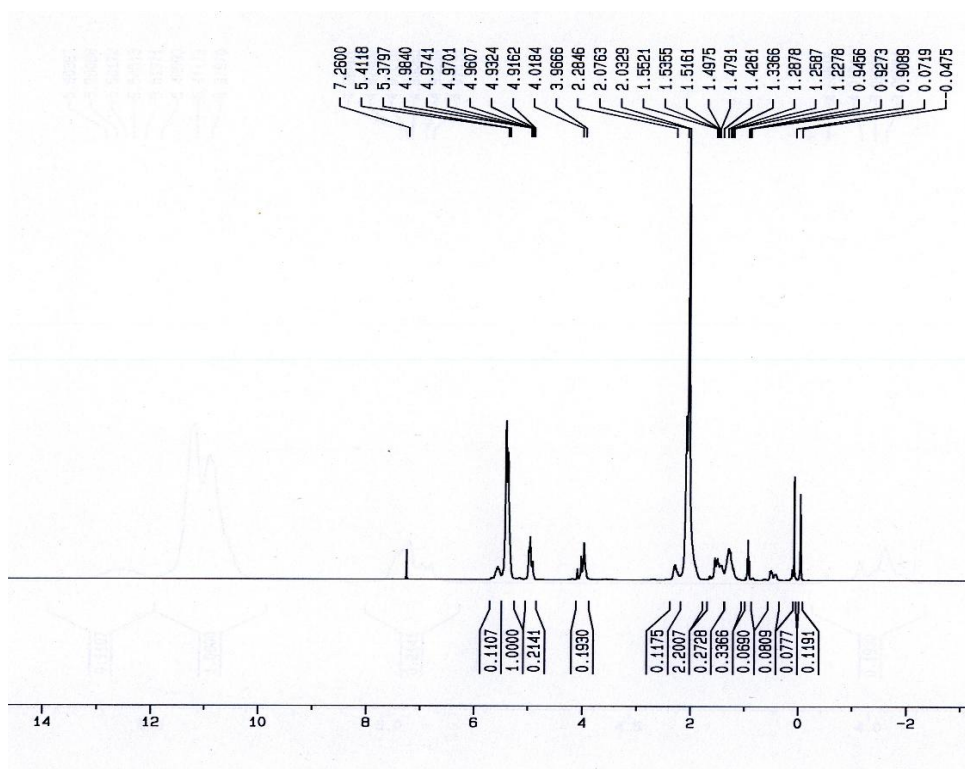
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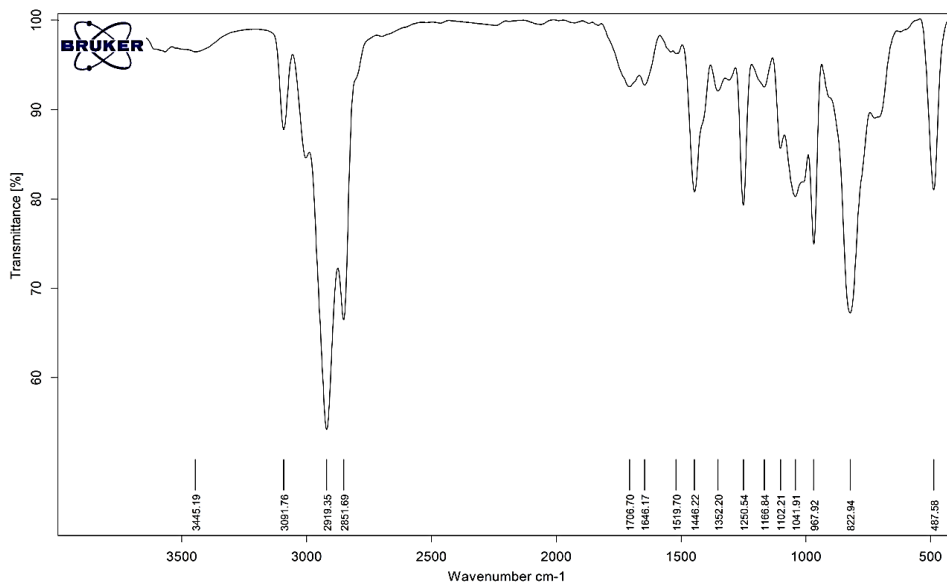
FT-IR spectra of [4-(Dimethylsilyl)butyl]propylferrocene Grafted HTPB with 3% iron (5g)



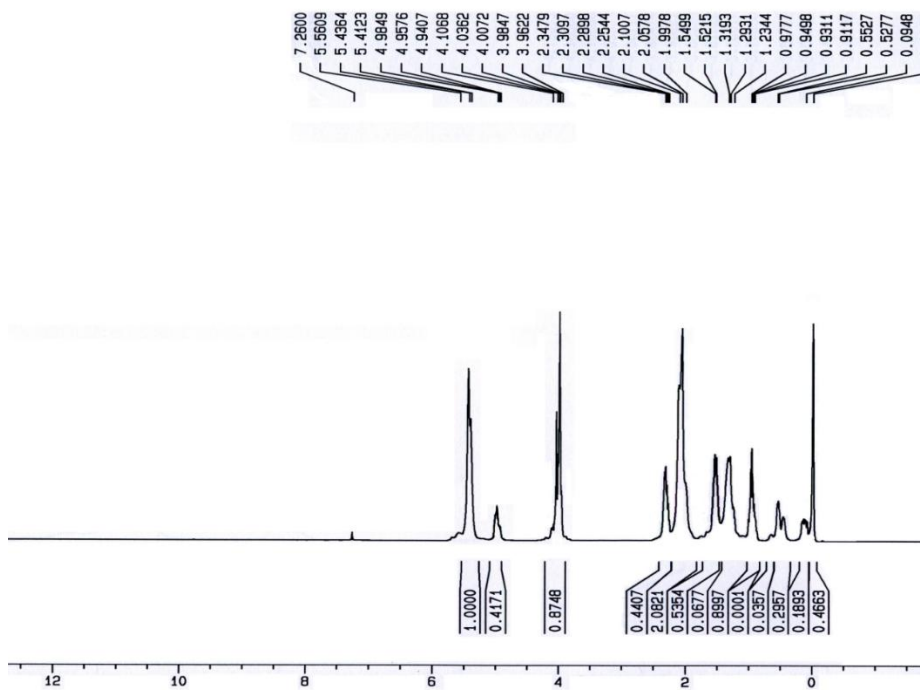
¹H NMR spectra of [4-(Dimethylsilyl)butyl]propylferrocene Grafted HTPB with 3% iron (5g)



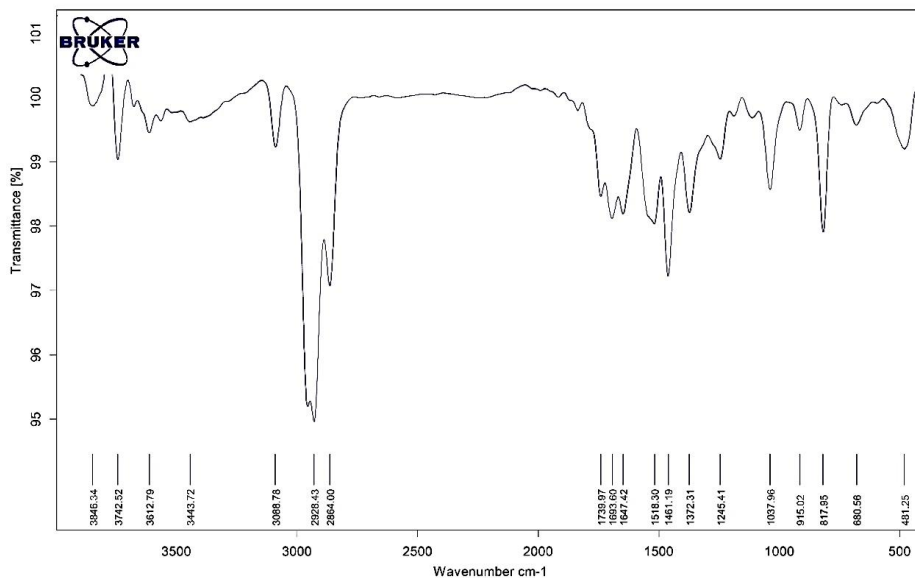
FT-IR spectra of [4-(Dimethylsilyl)butyl]propylferrocene Grafted HTPB with 6% iron (5h)



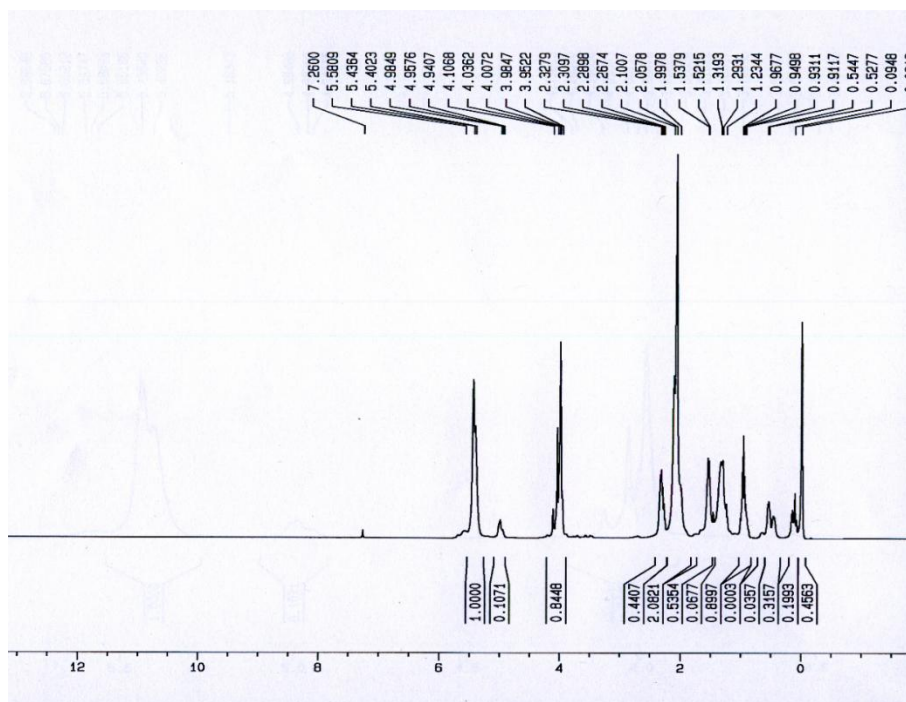
¹H NMR spectra of [4-(Dimethylsilyl)butyl]propylferrocene Grafted HTPB with 6% iron (5h)



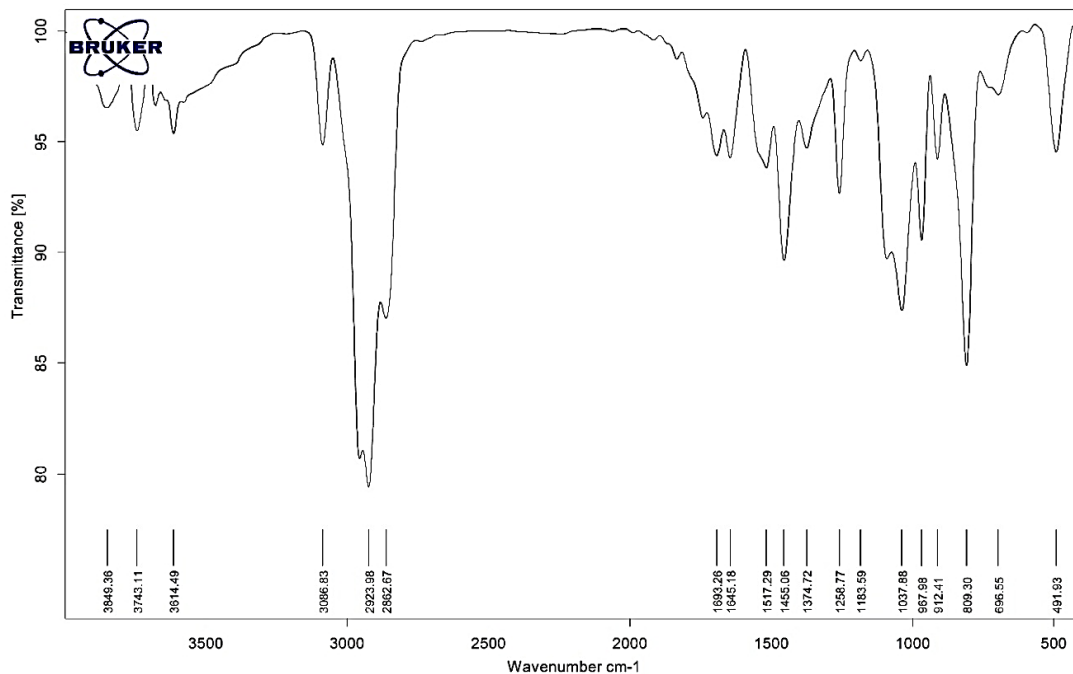
FT-IR spectra of [4-(Dimethylsilyl)butyl]propylferrocene Grafted HTPB with 9% iron (5i)



¹H NMR spectra of [4-(Dimethylsilyl)butyl]propylferrocene Grafted HTPB with 9% iron (5i)

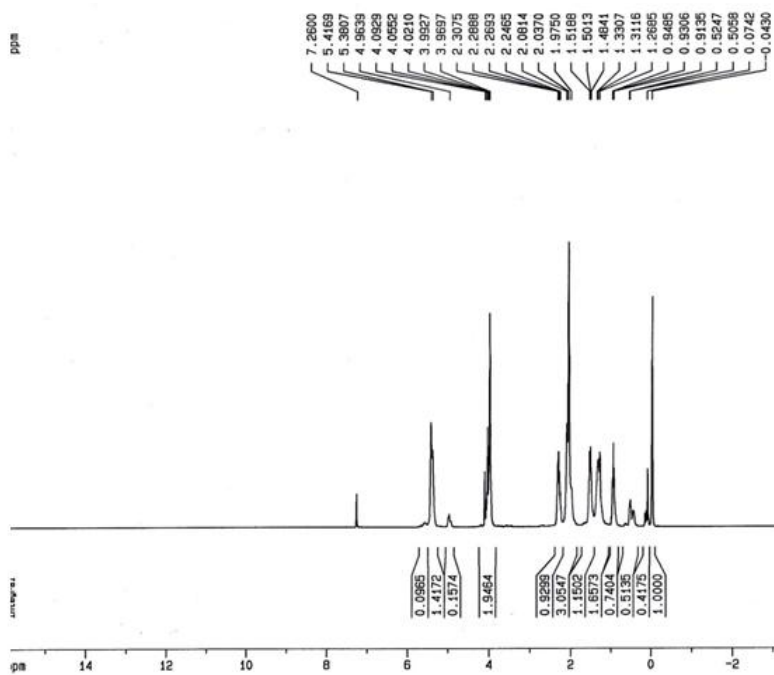


FT-IR spectra of [4-(Dimethylsilyl)butyl]butylferrocene Grafted HTPB with 3% iron (5j)

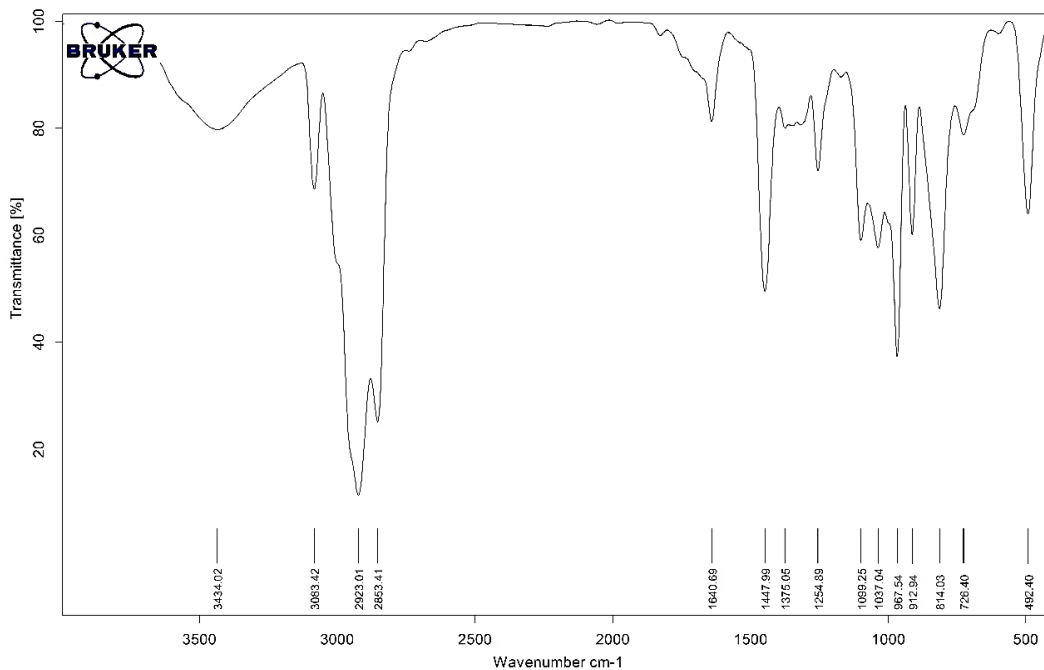


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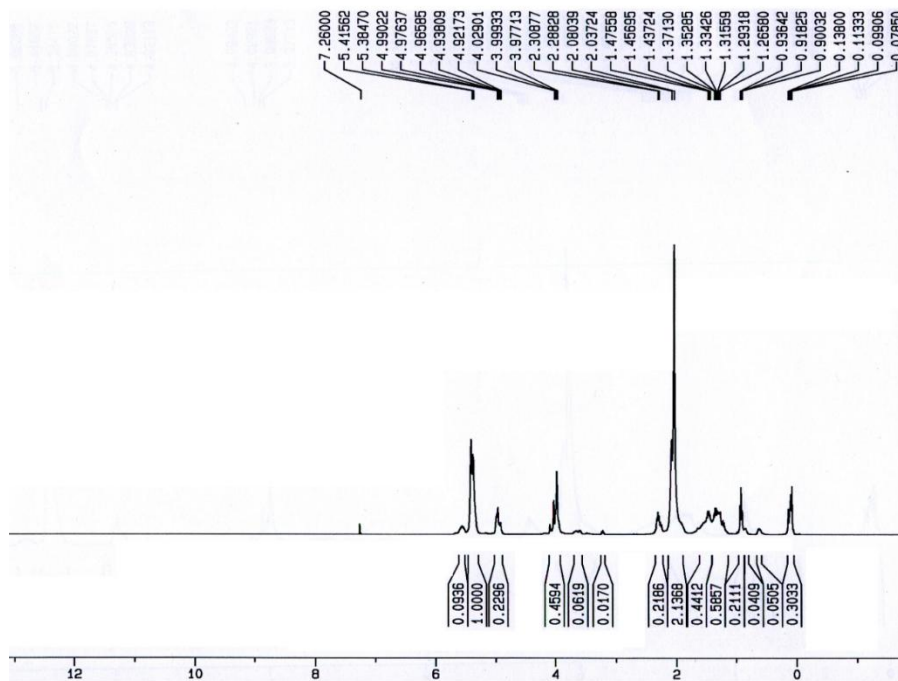
(5j)



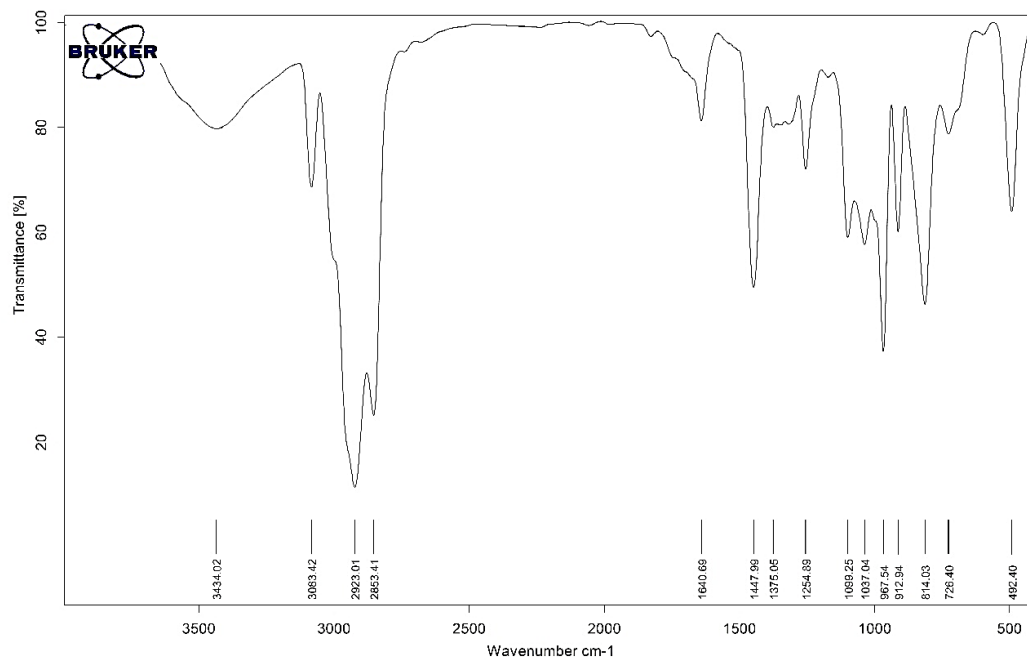
FT-IR spectra of [4-(Dimethylsilyl)butyl]butylferrocene Grafted HTPB with 6% iron (5k)



¹H NMR spectra of [4-(Dimethylsilyl)butyl]butylferrocene Grafted HTPB with 6% iron (5k)



FT-IR spectra of [4-(Dimethylsilyl)butyl]butylferrocene Grafted HTPB with 9% iron (5I)



¹H NMR spectra of [4-(Dimethylsilyl)butyl]butylferrocene Grafted HTPB with 9% iron (5I)

