SUPPLEMENTARY INFORMATION

List of Figures

Figure S1: Characterization of **[La(L^{Et})$_3$]**: (a) IR spectrum; (b) ^{1}H NMR spectrum at 303K in C_6D_6; (c) $^{19}F\{^1H\}$ NMR spectrum at 303K in C_6D_6; and (d) $^{19}F\{^1H\}$ NMR spectrum at 203K in C_7D_8.*

Figure S2: Characterization of **[Ce(L^{Me})$_3$]**: (a) IR spectrum; (b) ^{1}H NMR spectrum at 303K in C_7D_8; (c) ^{1}H NMR spectrum at 343K in C_7D_8; (d) $^{19}F\{^1H\}$ NMR spectrum at 303K in C_7D_8 and (e) $^{19}F\{^1H\}$ NMR spectrum at 343K in C_7D_8.*

Figure S3: Characterization of **[Ce(L^{Me})$_2$F]$_3$**: (a) ^{1}H NMR spectrum at 373K in C_7D_8; (b) $^{19}F\{^1H\}$ NMR spectrum at 373K in C_7D_8.*

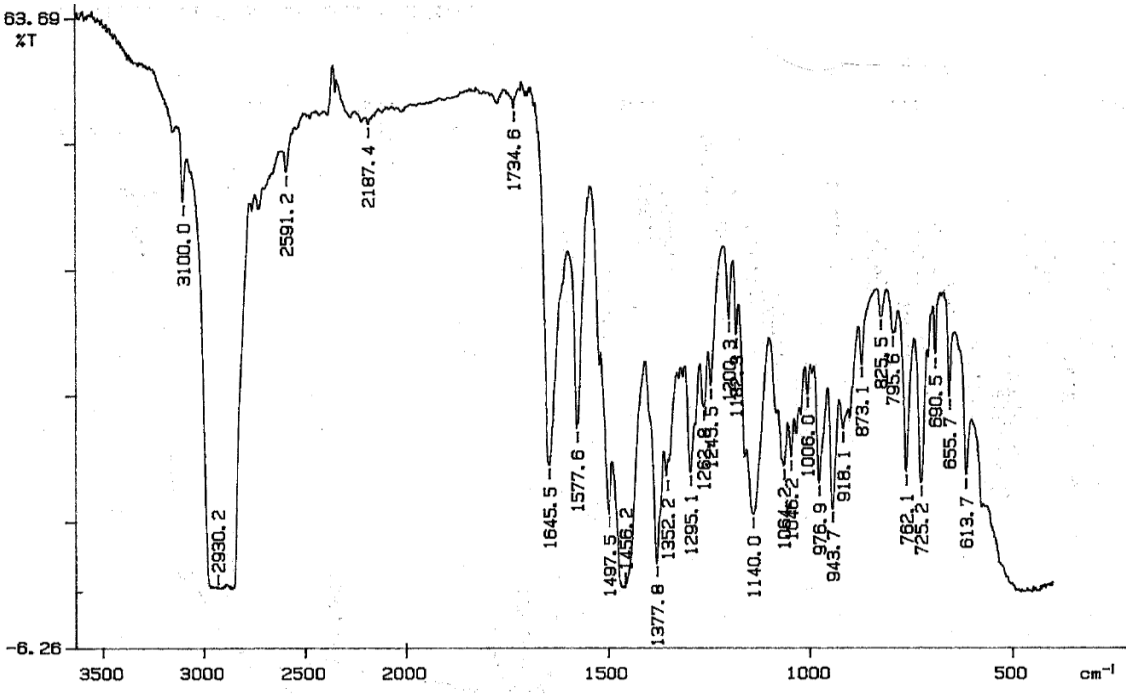
Figure S4: Characterization of **[Nd(L^{Me})$_3$]**: (a) IR spectrum; (b) ^{1}H NMR spectrum at 303K in C_7D_8; and (c) $^{19}F\{^1H\}$ NMR spectrum at 343K in C_7D_8.*

S5: GC /MS analyses of reaction mixture forming [Ce(L^{Me})$_3$] and [CeF(L^{Me})$_2$]$_3$:

*Due to the high sensitivity of the complexes to moisture, traces of ligand HL^{Me}/HL^{Et} were present in the NMR spectra of the [Ln($L^{Me/Et}$)$_3$] or [Ln(L^{Me})$_2$F]$_n$ products, as shown from their spectra, e.g. the two singlet or two multiplet resonances at -140 to -142 ppm and -160 to -162 ppm in the $^{19}F\{^1H\}$ NMR spectrum, belong to F3,5 and F2,6 respectively of HL^{Me}/HL^{Et}.

If both products [Ln($L^{Me/Et}$)$_3$] and [Ln(L^{Me})$_2$F]$_n$ were isolated from the same reaction, one or the other was sometimes present as a minor contaminant in the isolated [Ln($L^{Me/Et}$)$_3$] or [Ln(L^{Me})$_2$F]$_n$ products, e.g. resonances at -142.8 and -177.6 ppm, which belong to [Ce(L^{Me})$_3$], are visible in the $^{19}F\{^1H\}$ NMR spectrum of [Ce(L^{Me})$_2$F]$_3$ (Figure S3(b)).

Figure S1: Characterization of **[La(L^{Et})$_3$]**: (a) IR spectrum; (b) ^{1}H NMR spectrum at 303K in C_6D_6; (c) ^{19}F{^{1}H} NMR spectrum at 303K in C_6D_6; and (d) ^{19}F{^{1}H} NMR spectrum at 203K in C_7D_8.*



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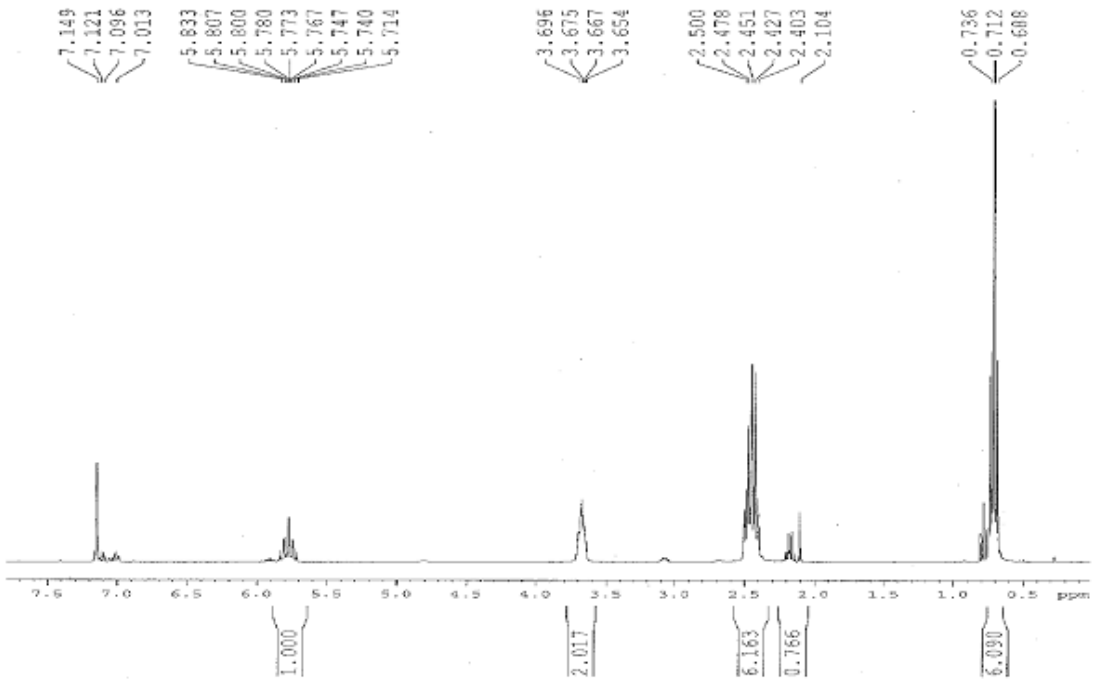

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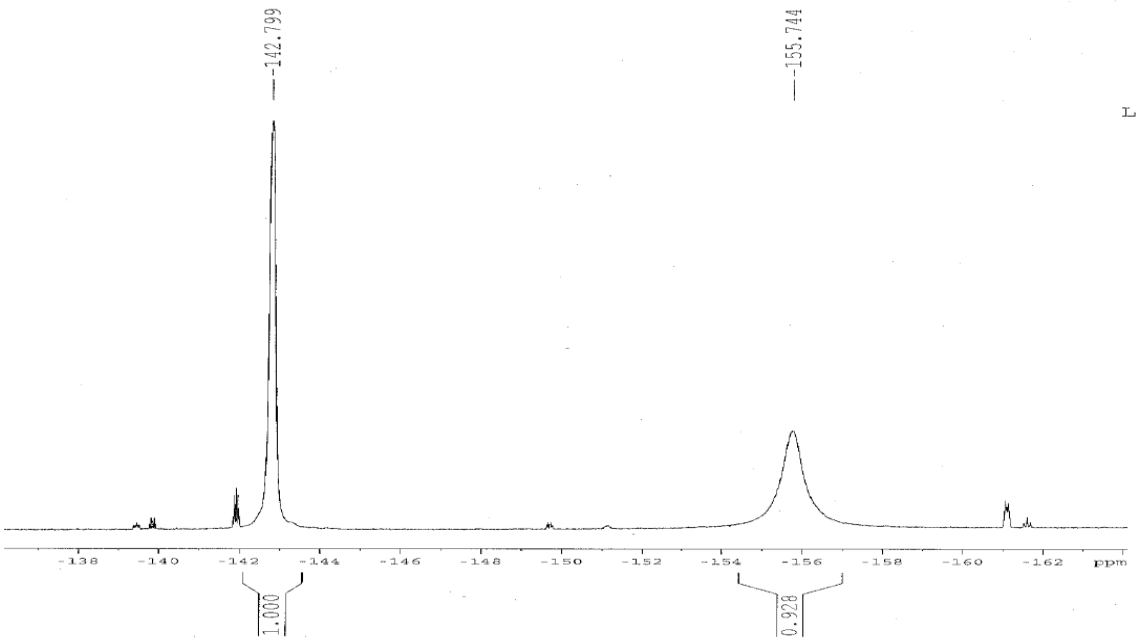

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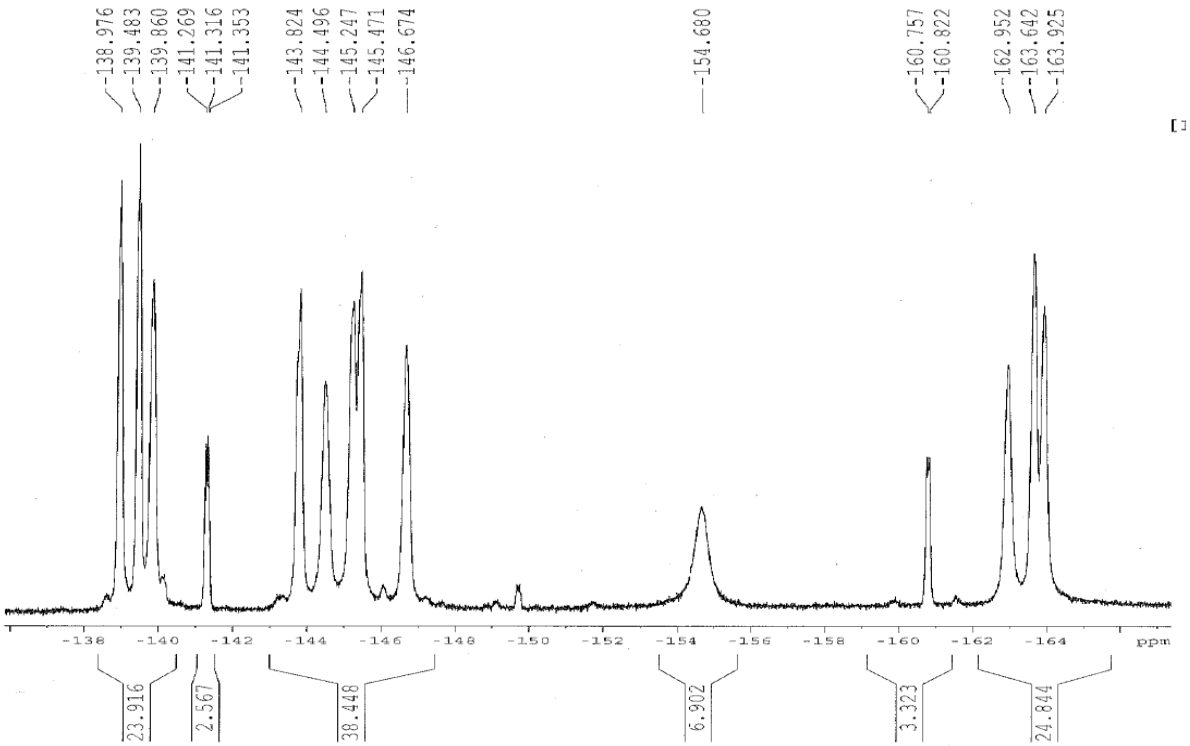
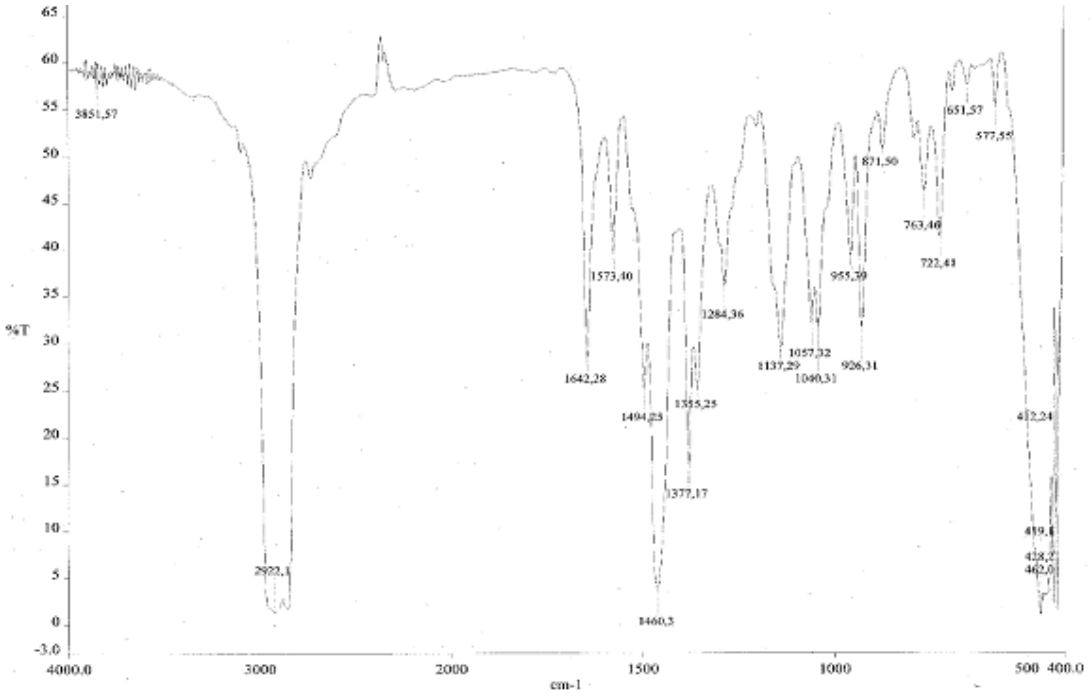


(d)

Figure S2: Characterization of **[Ce(L^{Me})$_3$]**: (a) IR spectrum; (b) ^{1}H NMR spectrum at 303K in C_7D_8; (c) ^{1}H NMR spectrum at 343K in C_7D_8; (d) ^{19}F{^{1}H} NMR spectrum at 303K in C_7D_8 and (e) ^{19}F{^{1}H} NMR spectrum at 343K in C_7D_8.*



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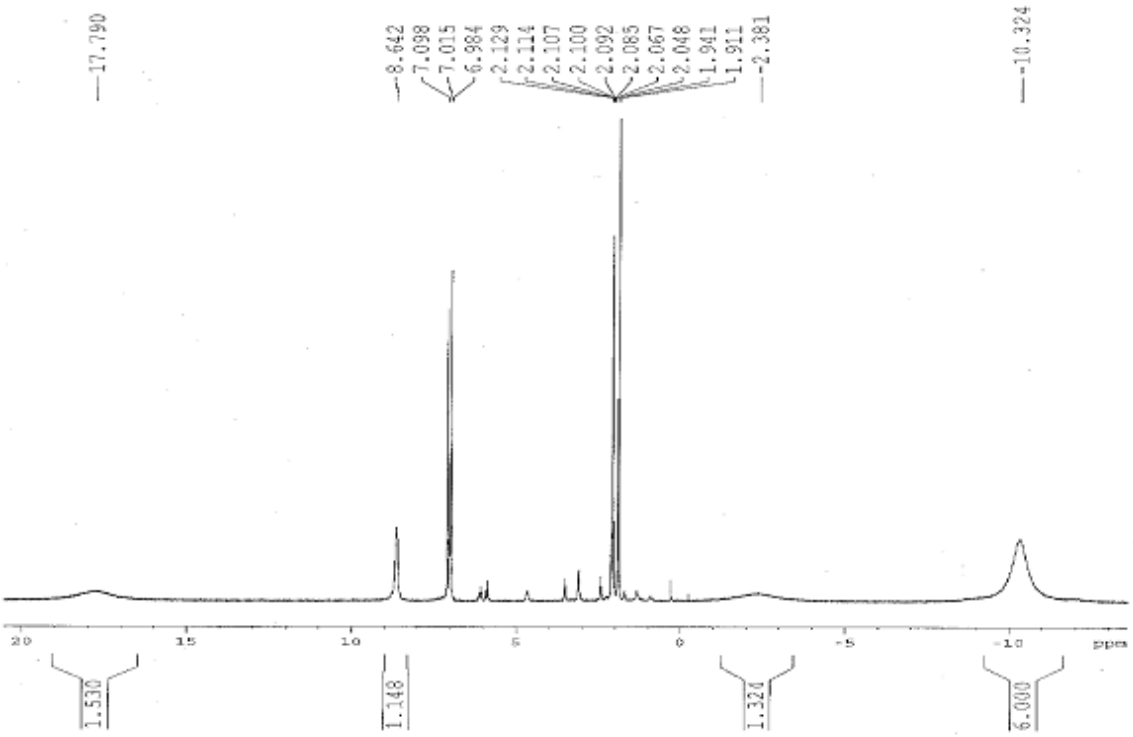

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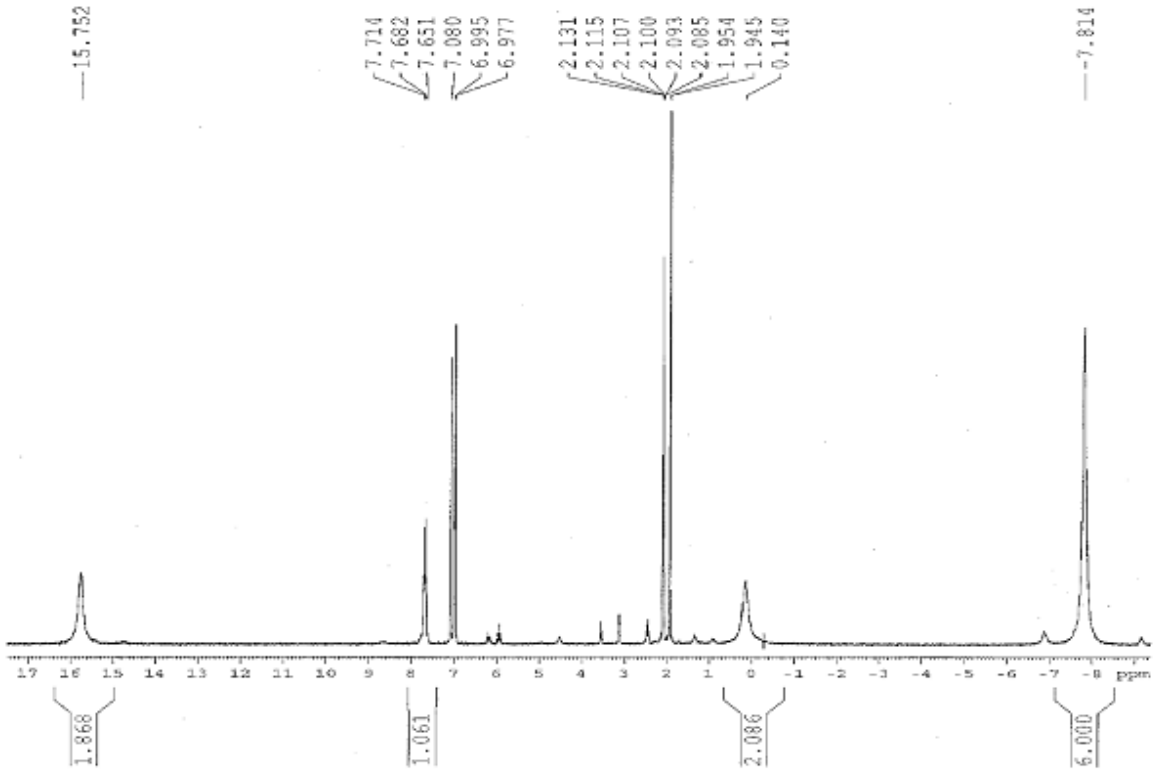

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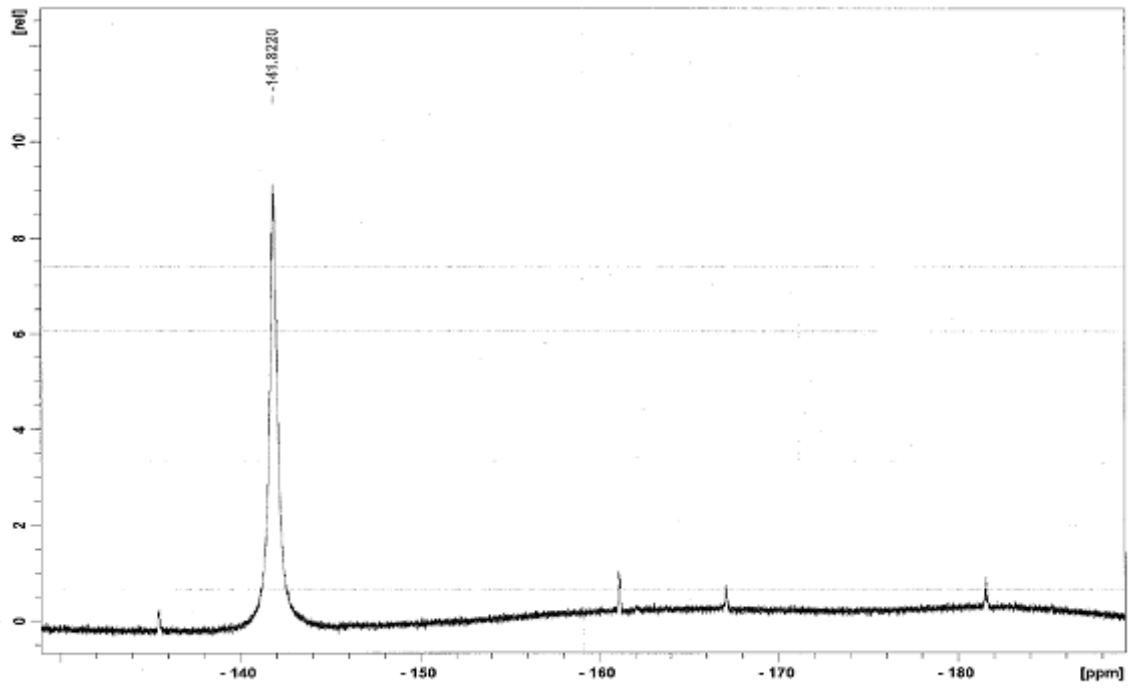

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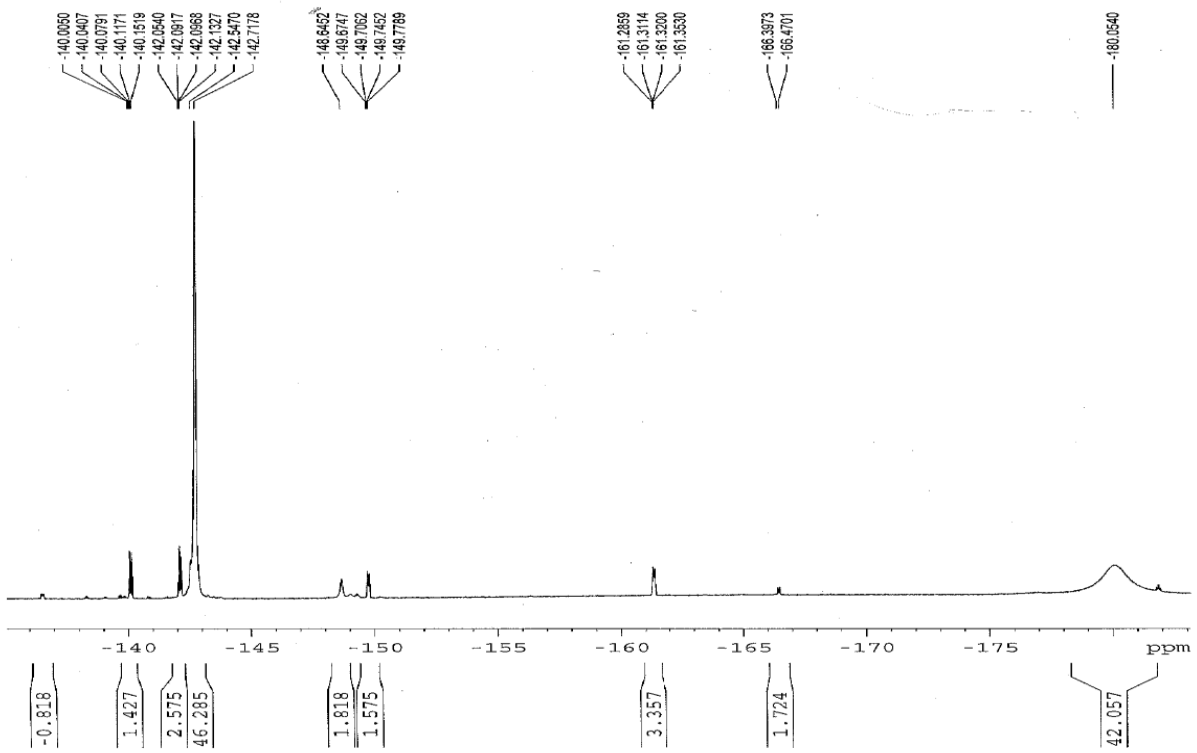
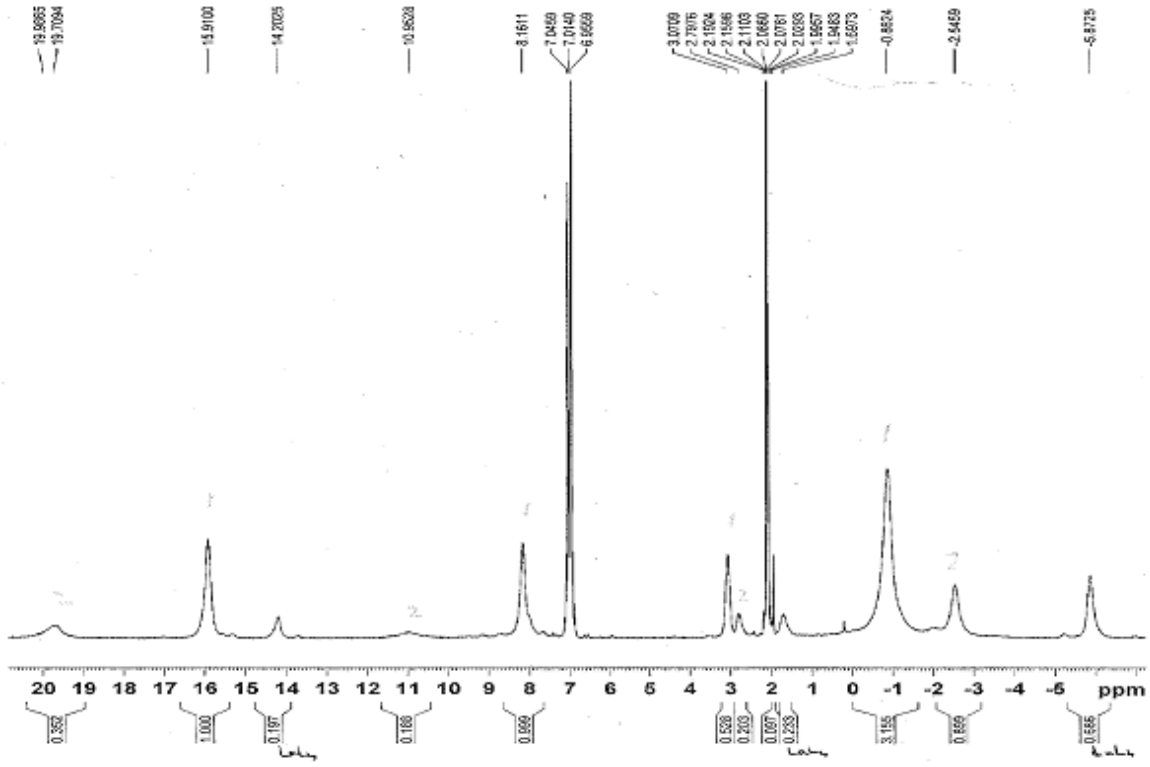


(e)

Figure S3: Characterization of **[Ce(L^{Me})$_2$F]$_3$**: (a) ^{1}H NMR spectrum at 373K in C_7D_8; (b) ^{19}F{^{1}H} NMR spectrum at 373K in C_7D_8.*



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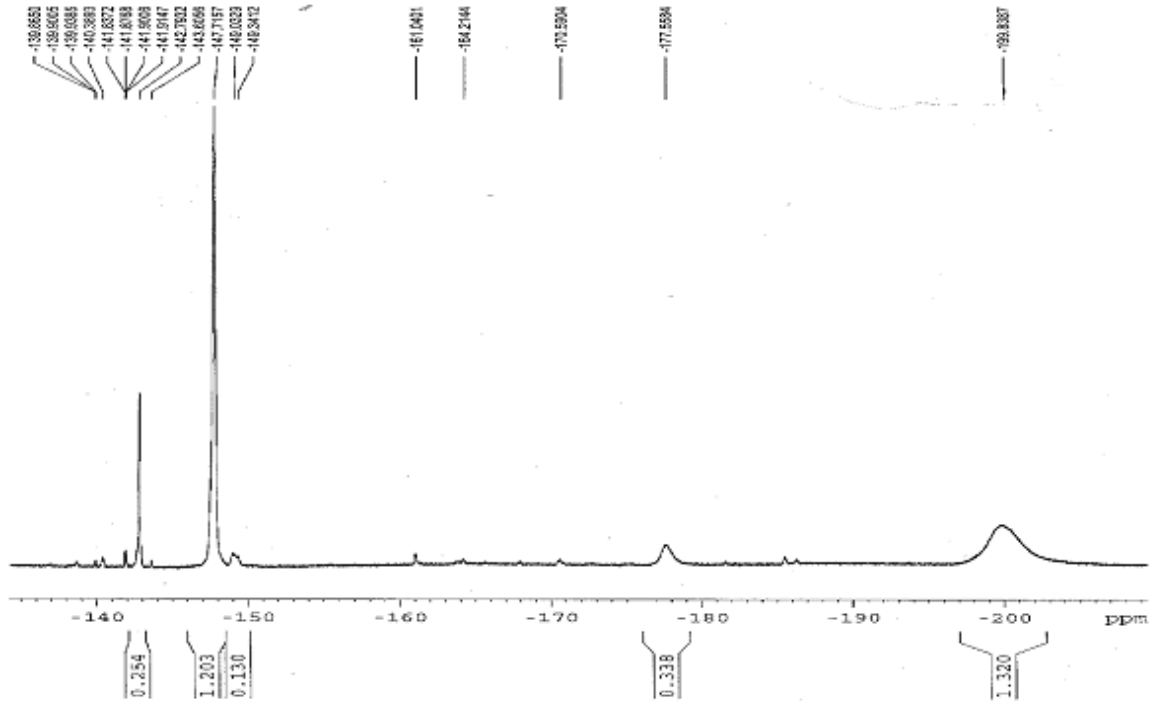
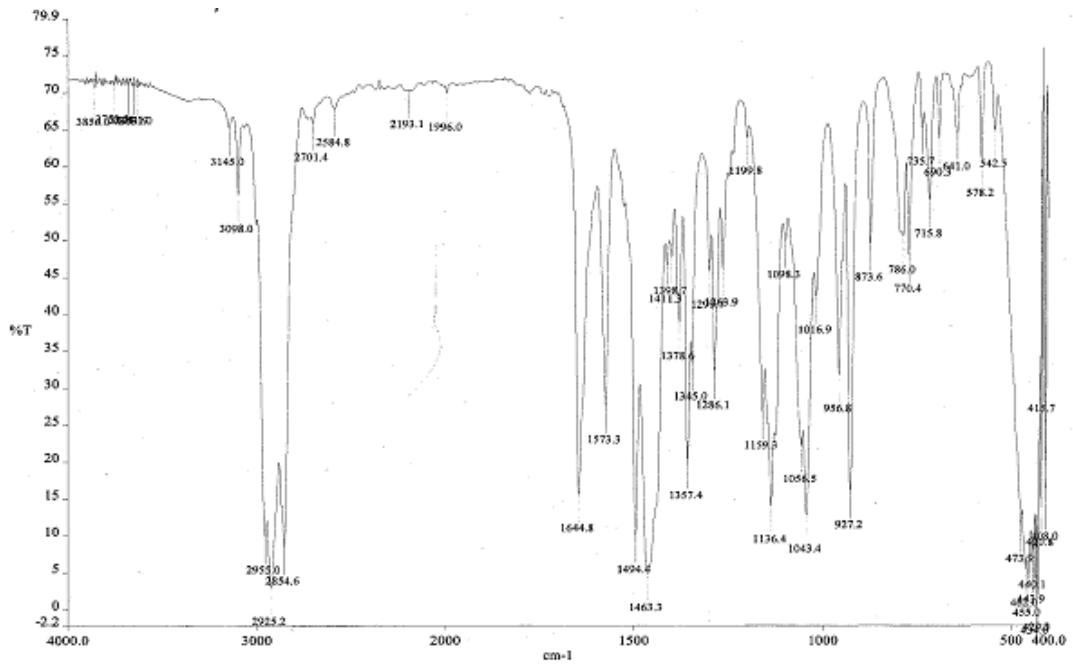


(b)

Figure S4: Characterization of **[Nd(L^{Me})$_3$]**: (a) IR spectrum; (b) ^{1}H NMR spectrum at 303K in C_7D_8; and (c) ^{19}F{^{1}H} NMR spectrum at 343K in C_7D_8.*



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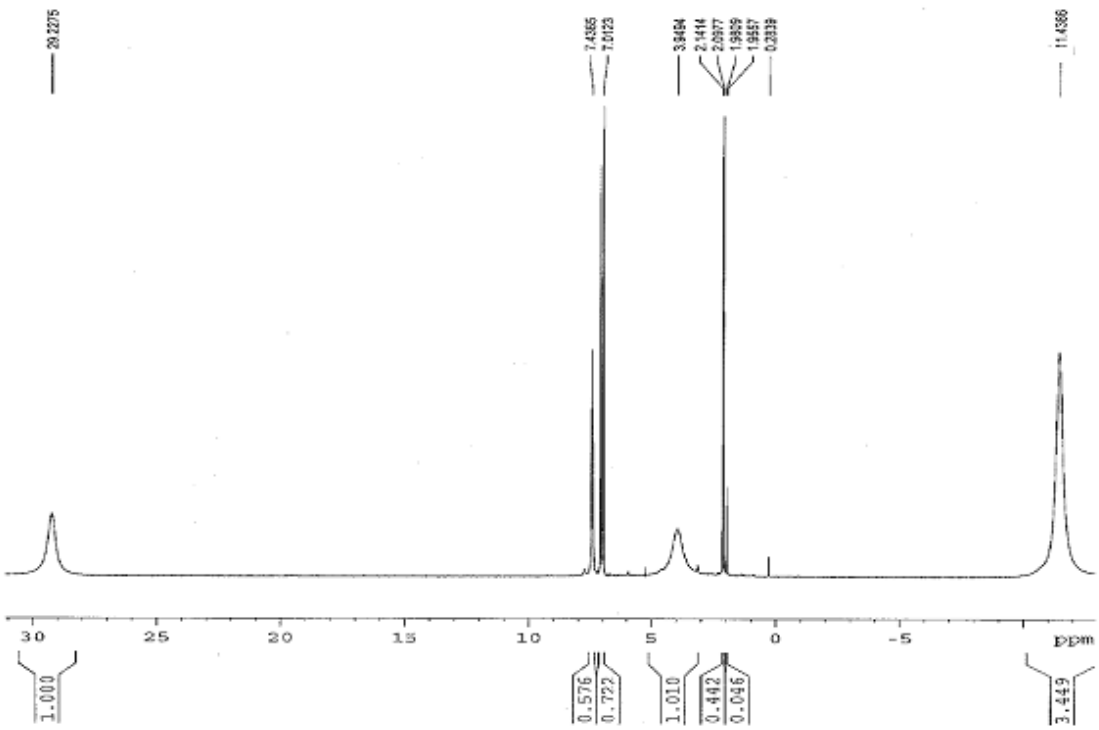

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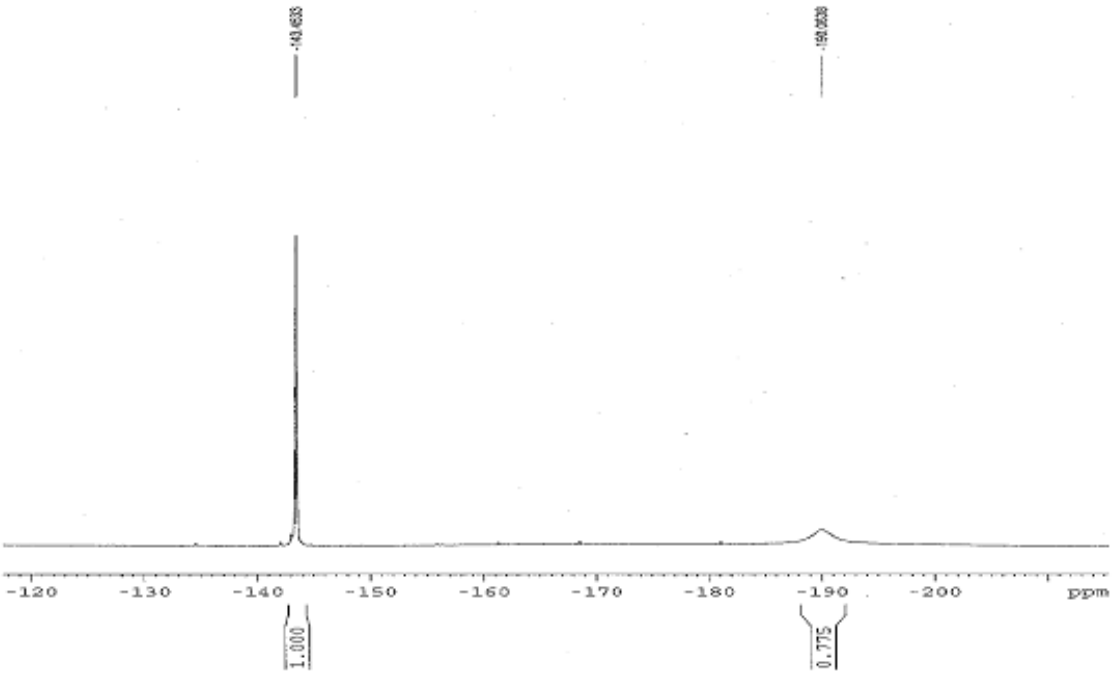

(c)

S5: GC /MS analyses of reaction mixture forming $[Ce(L^{Me})_3]$ and $[CeF(L^{Me})_2]_3$:

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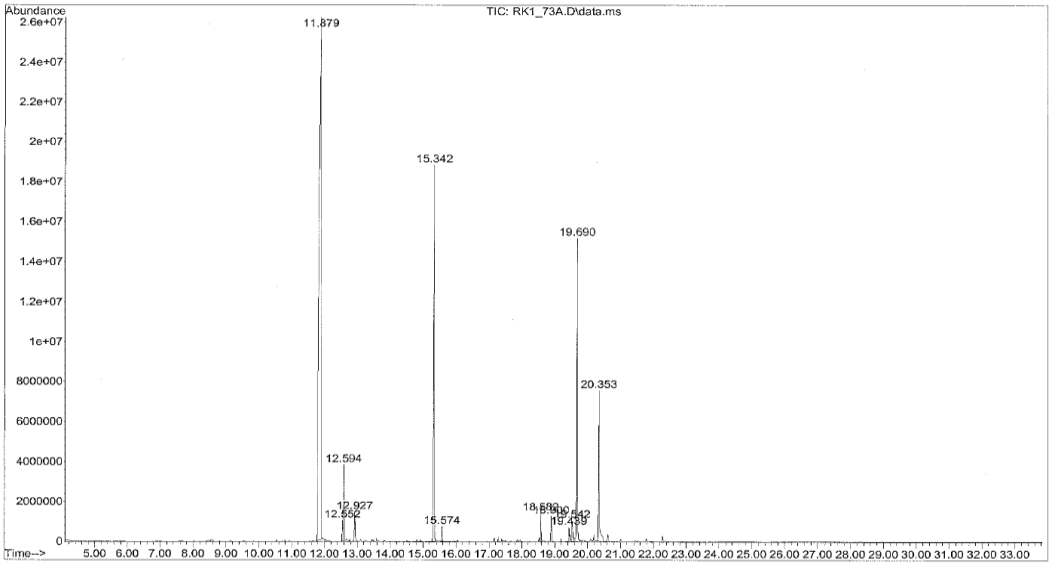


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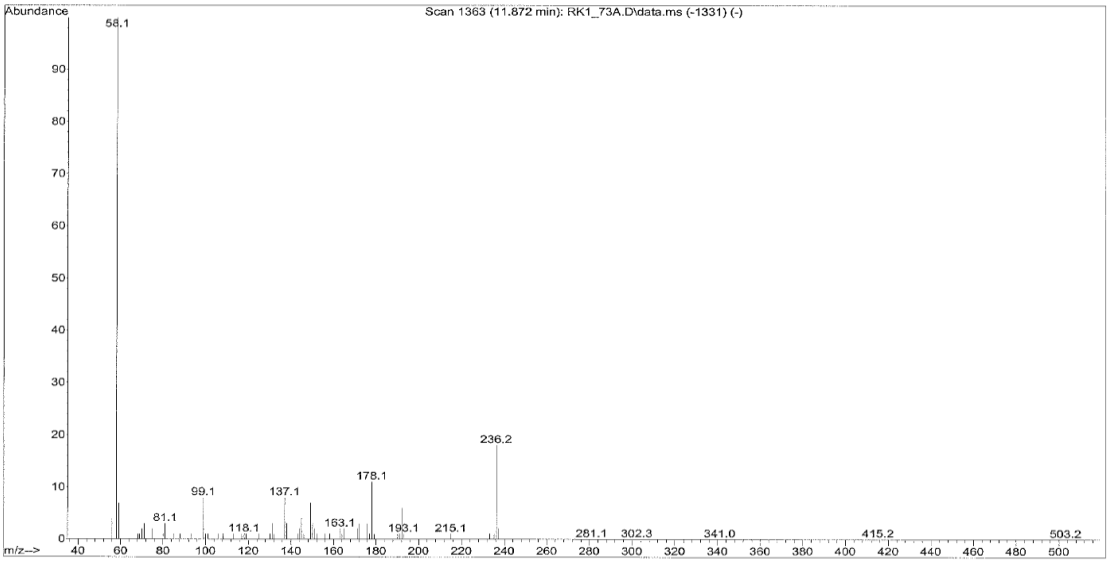

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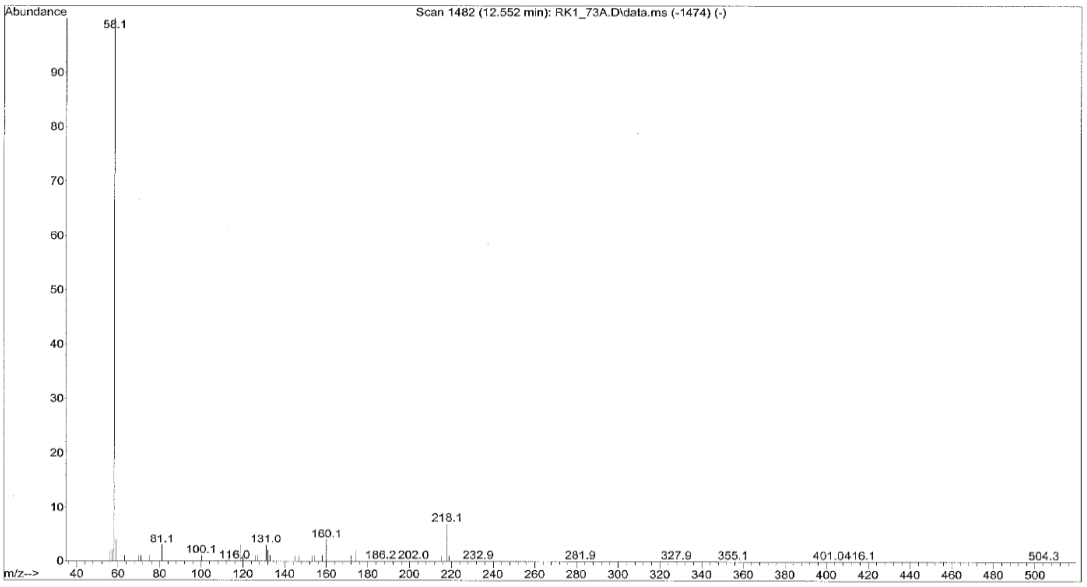


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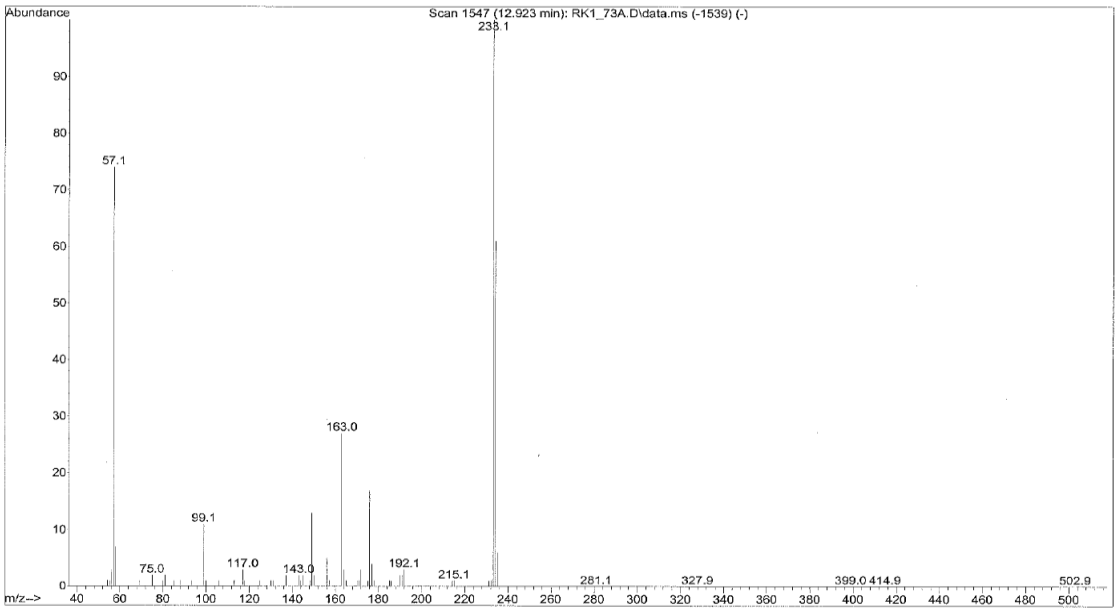

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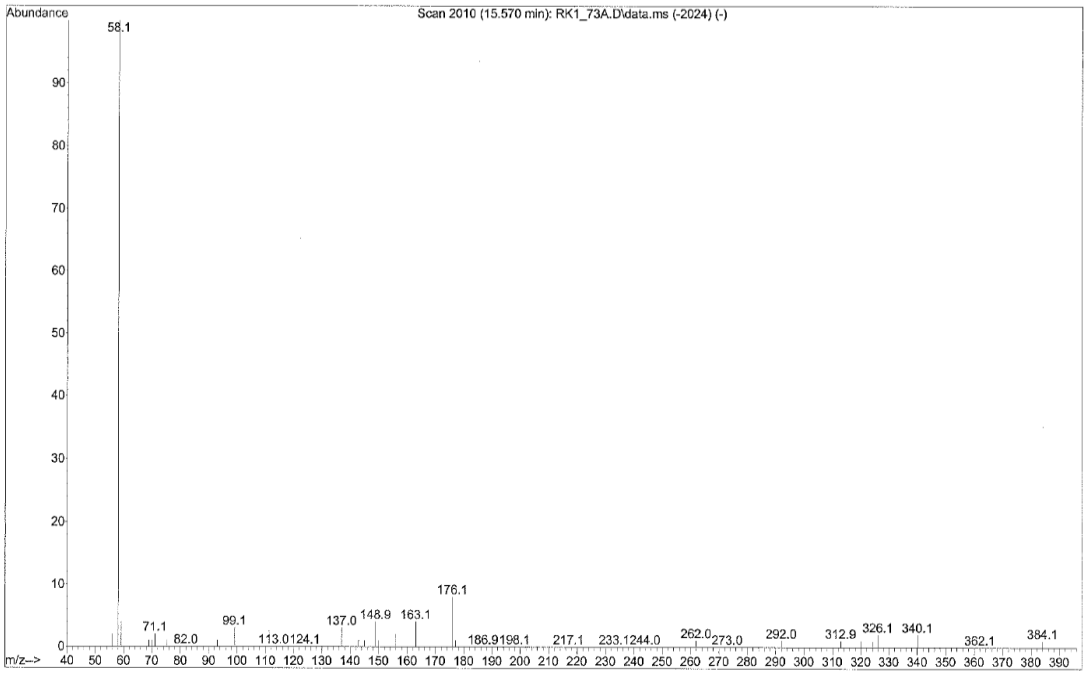


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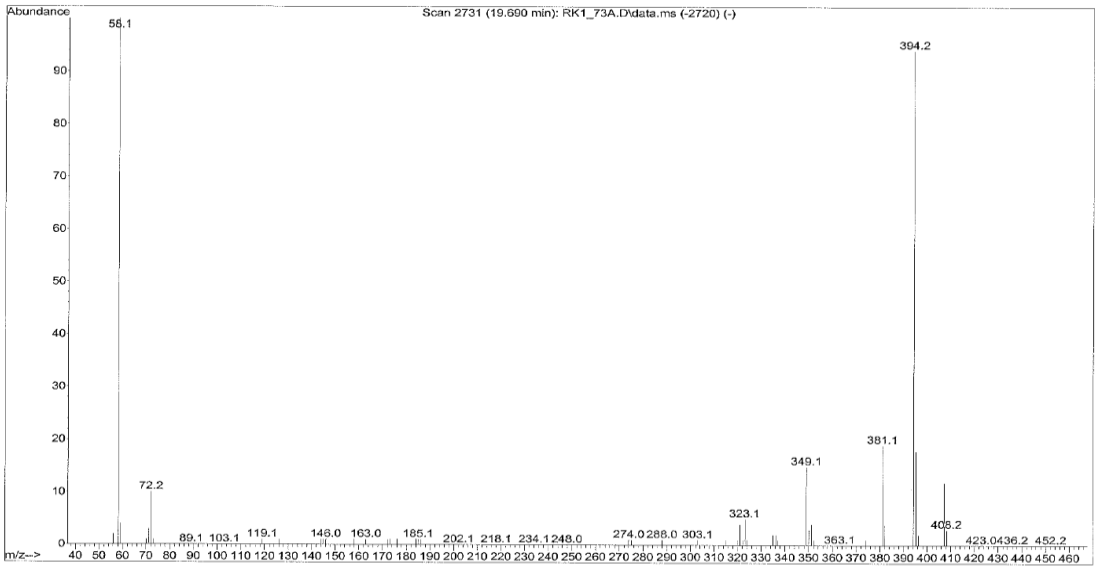

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