

Design, synthesis and biological evaluation of novel amide-linked 18 β -glycyrrhetic acid derivatives as novel ALK inhibitors

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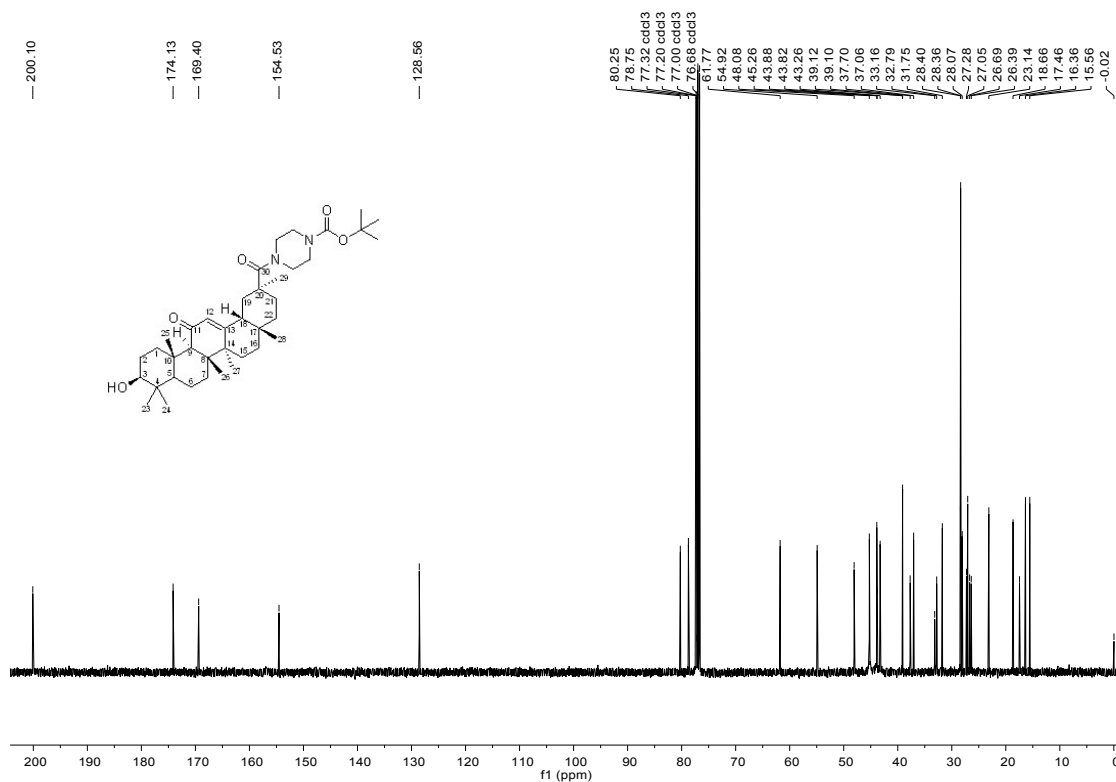
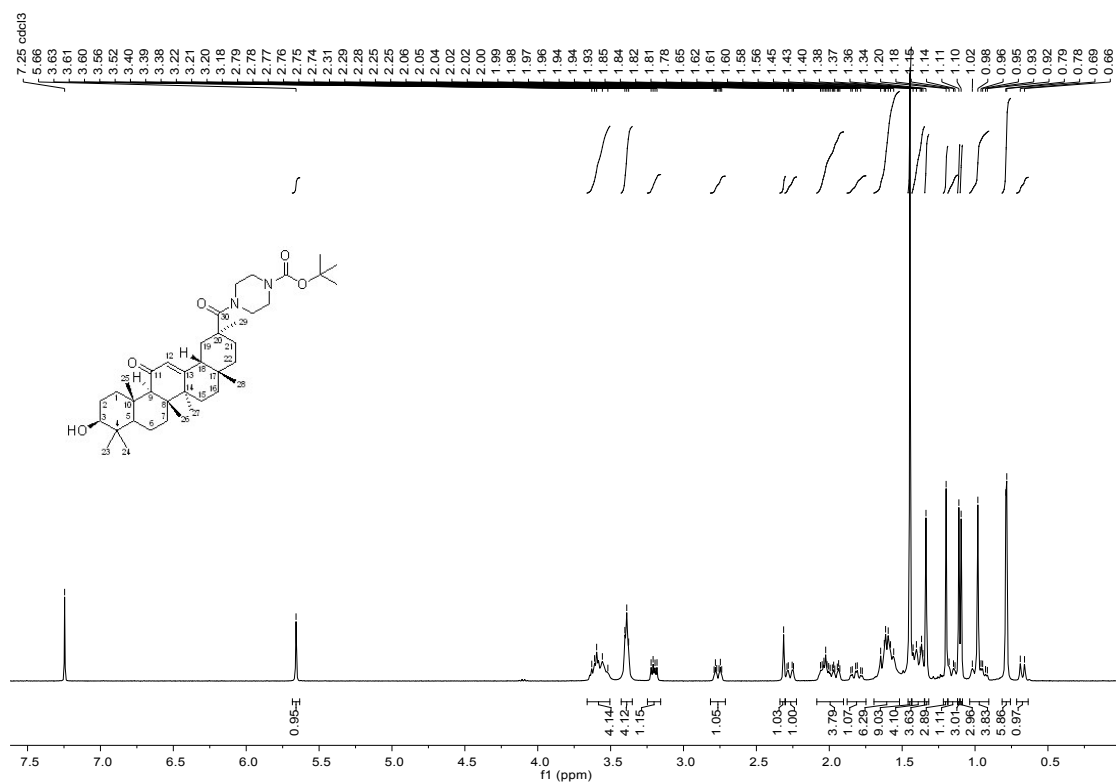
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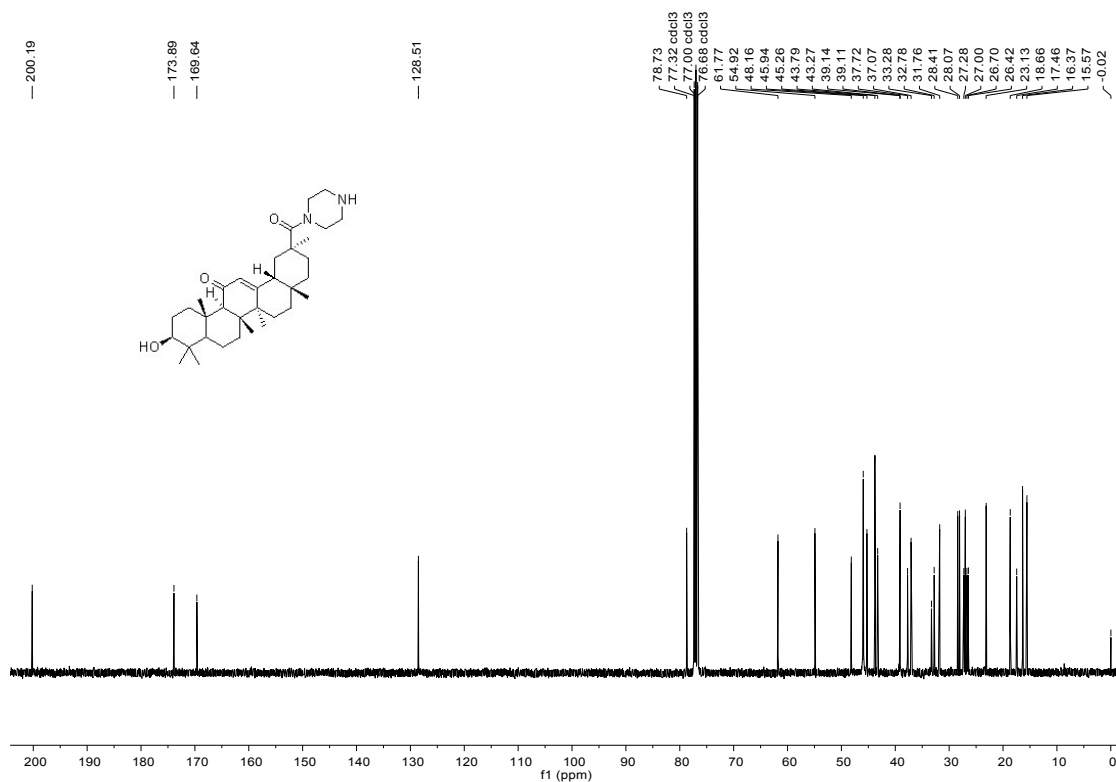
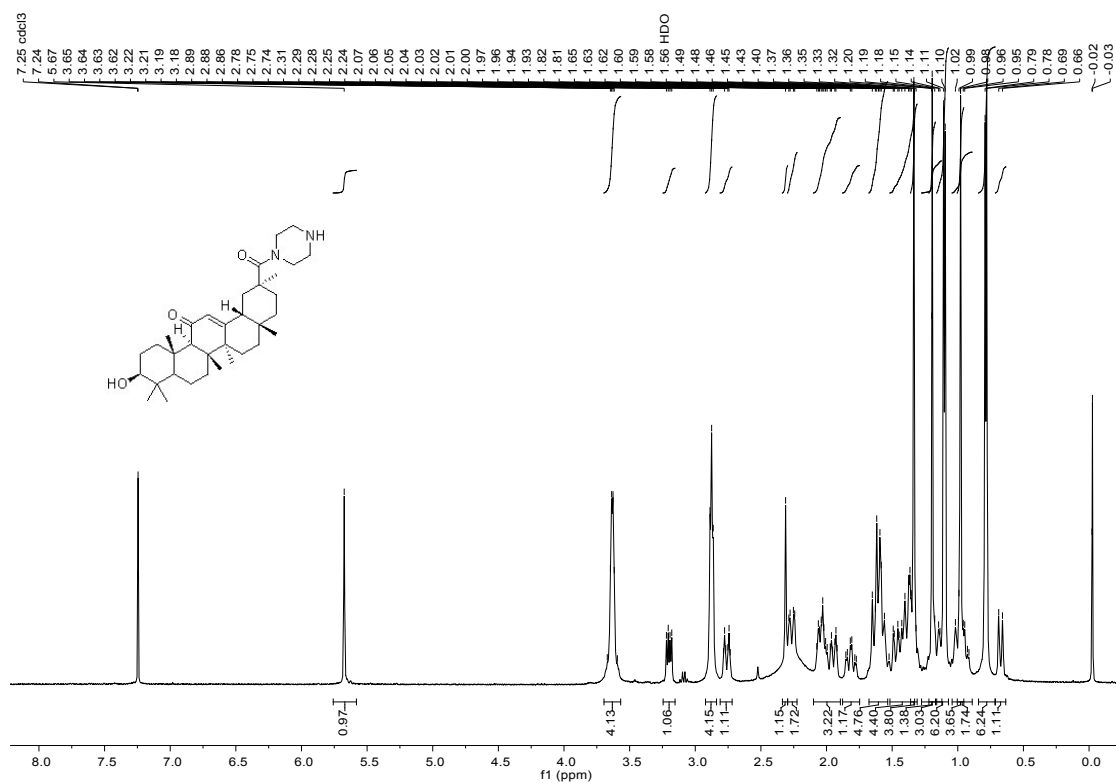
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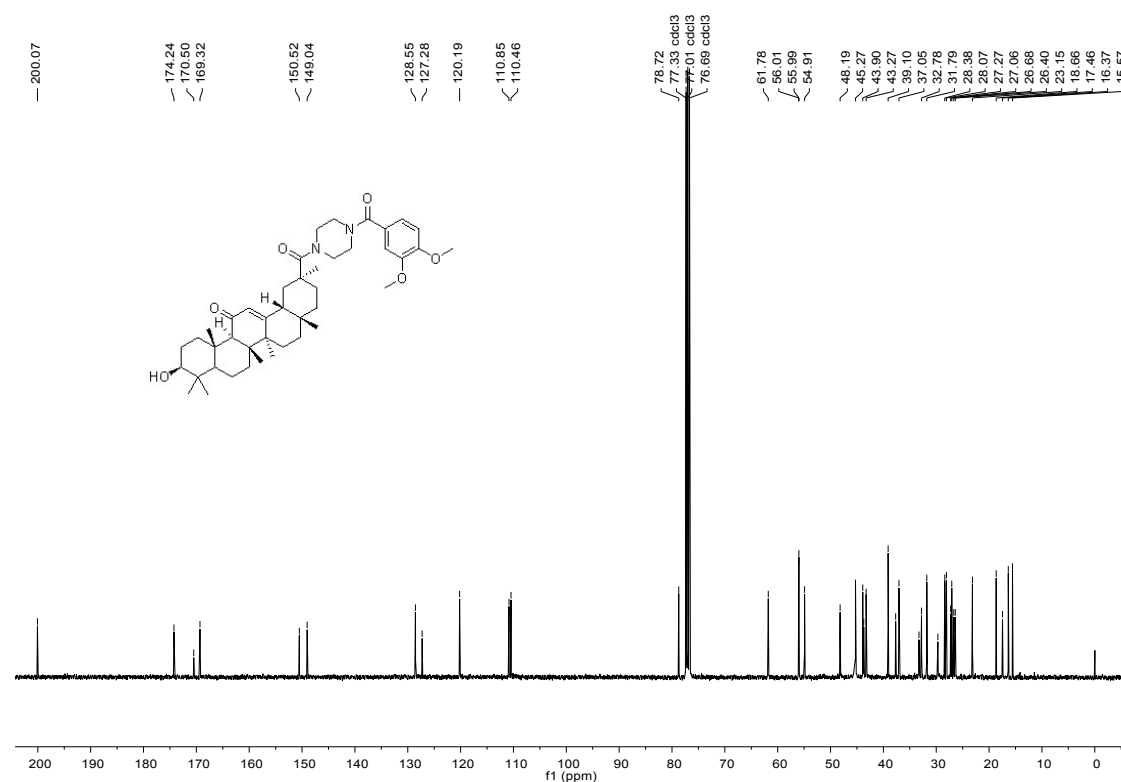
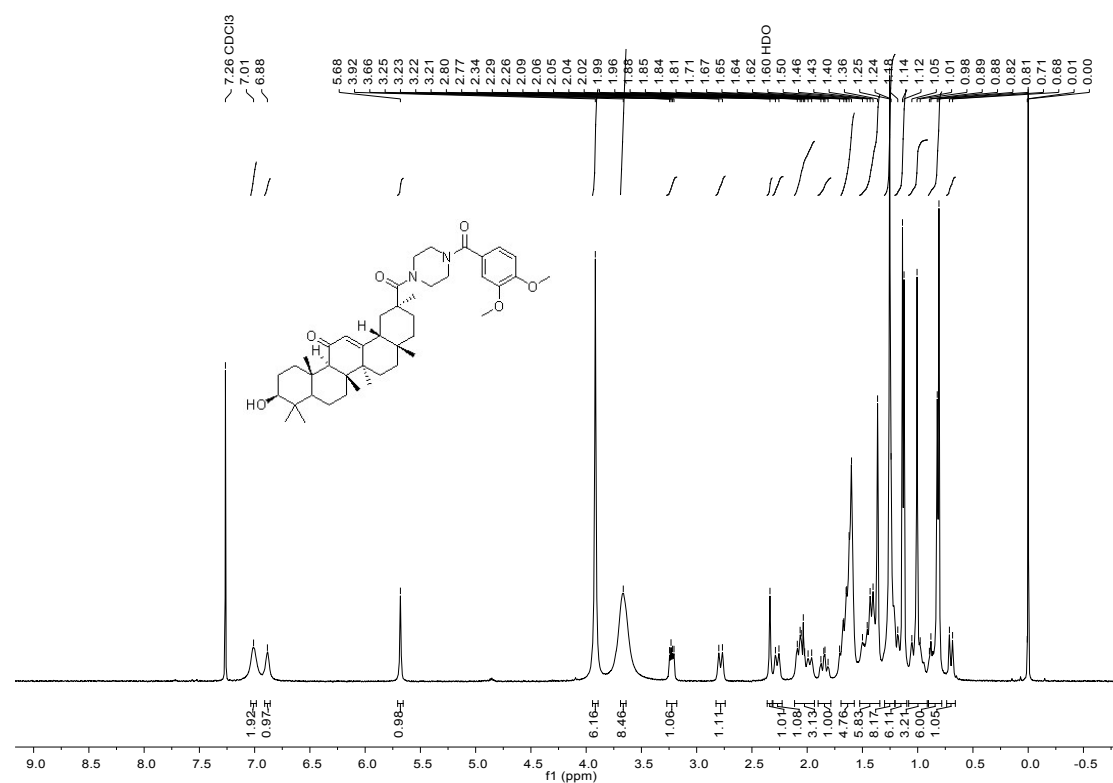
Tert-butyl 4-(36-hydroxy-11-oxo-18 β -olean-12-en-30-carbonyl)piperazine-1-carboxylate (2)



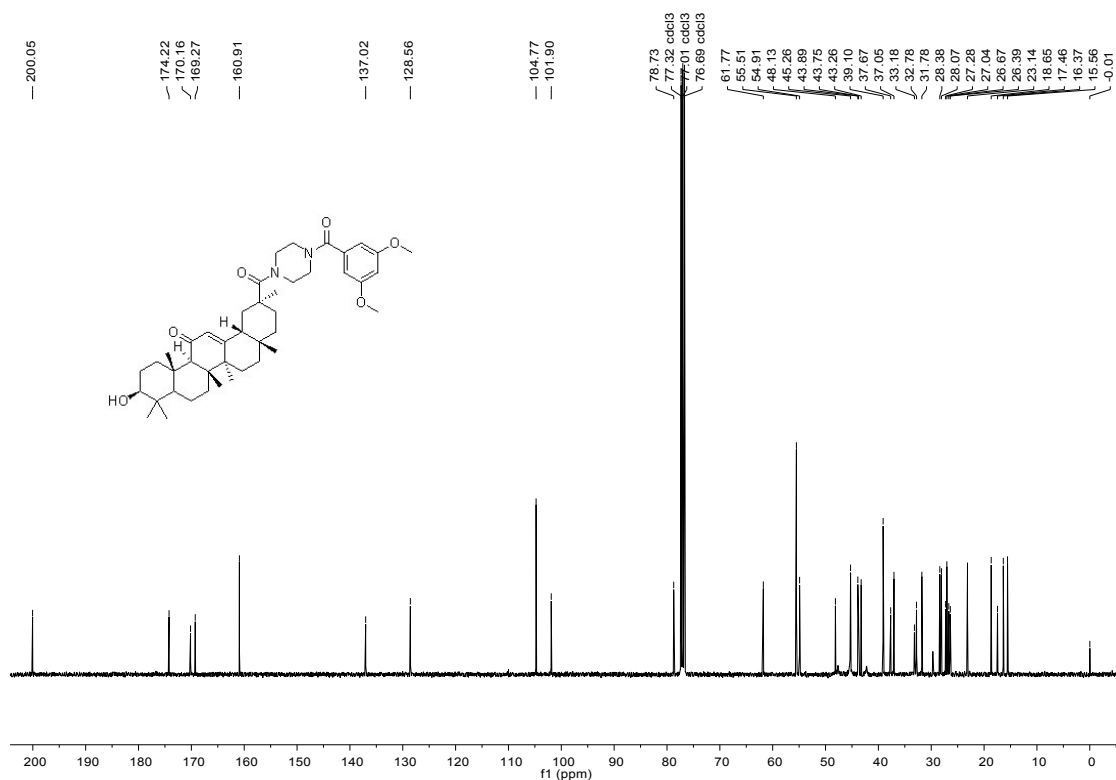
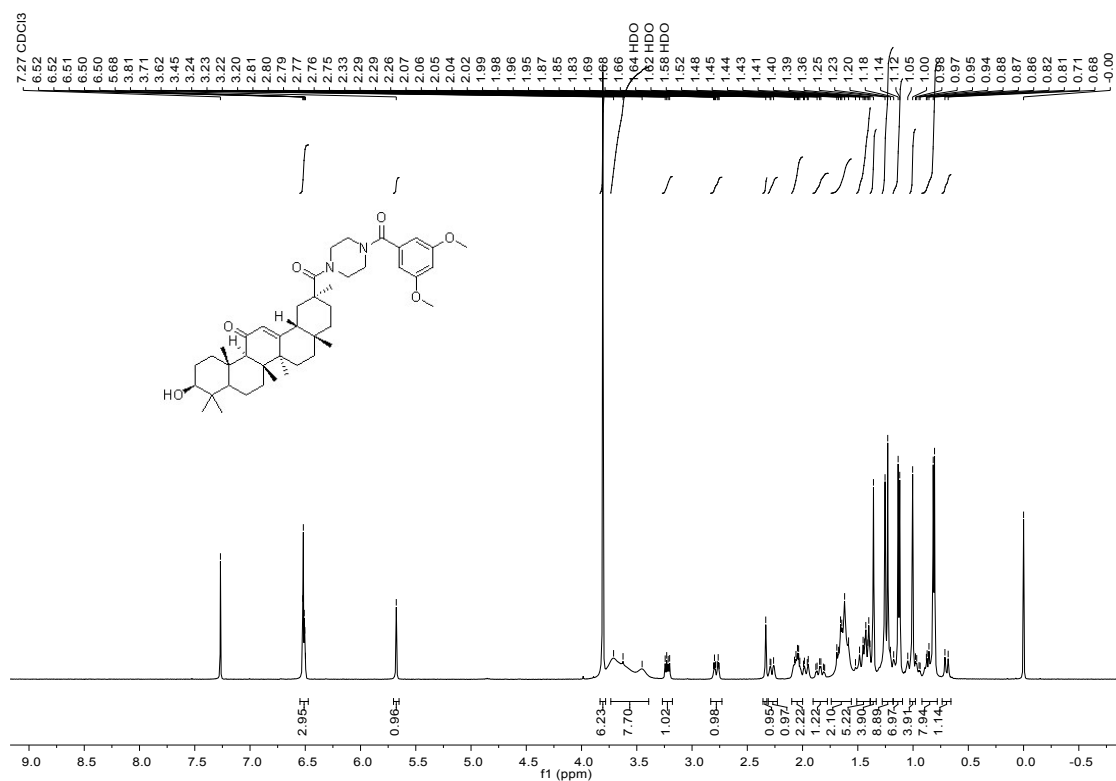
3 β -hydroxyl-11-oxo-18 β -olean-12-en-30- carbonyl piperazine (3)



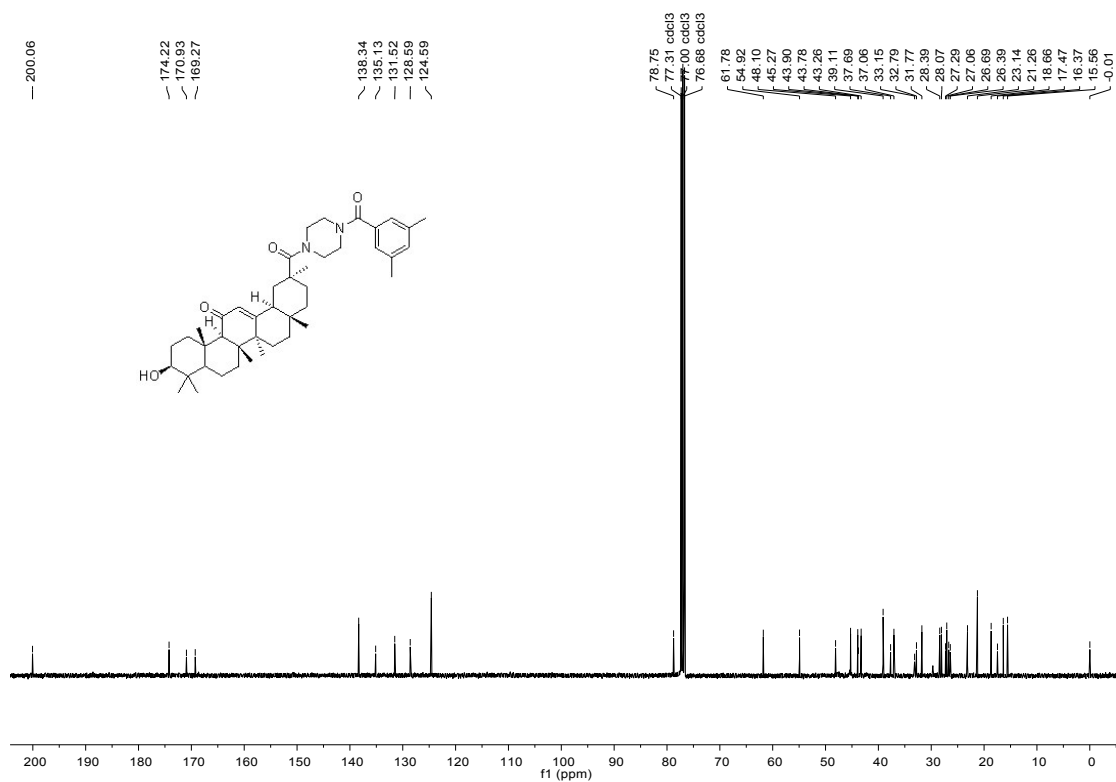
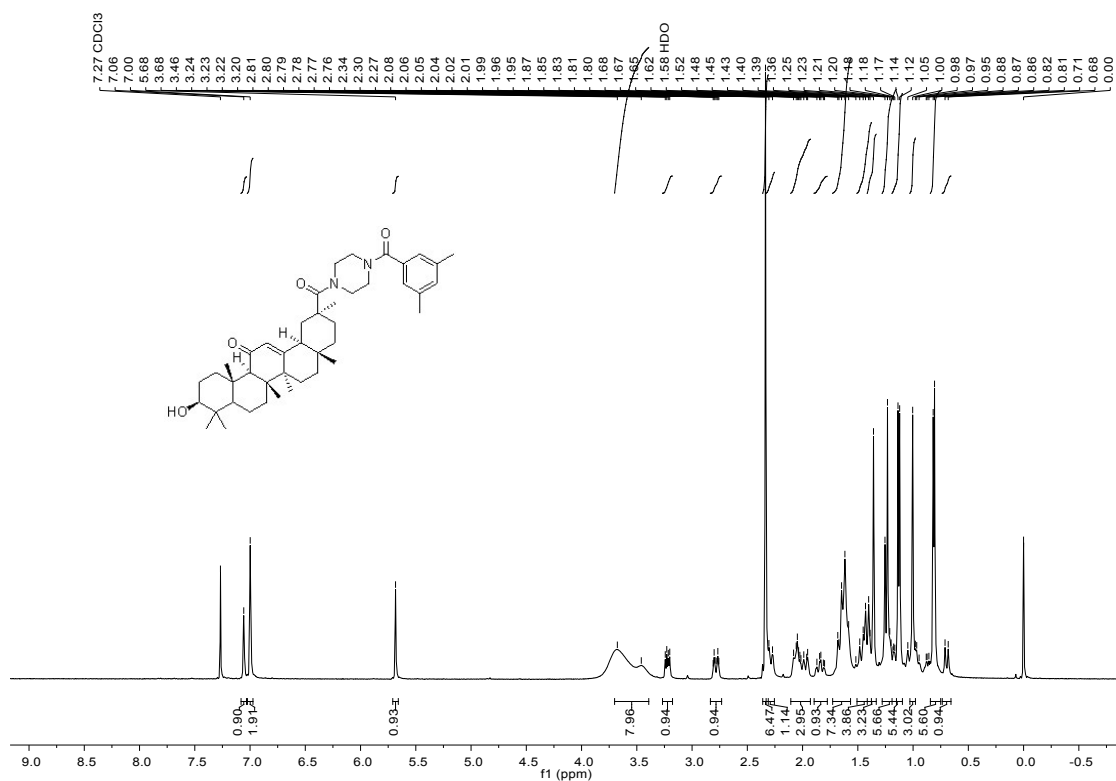
3 β -Hydroxy-30-(4-(3,4-dimethoxybenzoyl)-1-piperazinyl)-olean-12-ene-11,30-dione (**4a**)



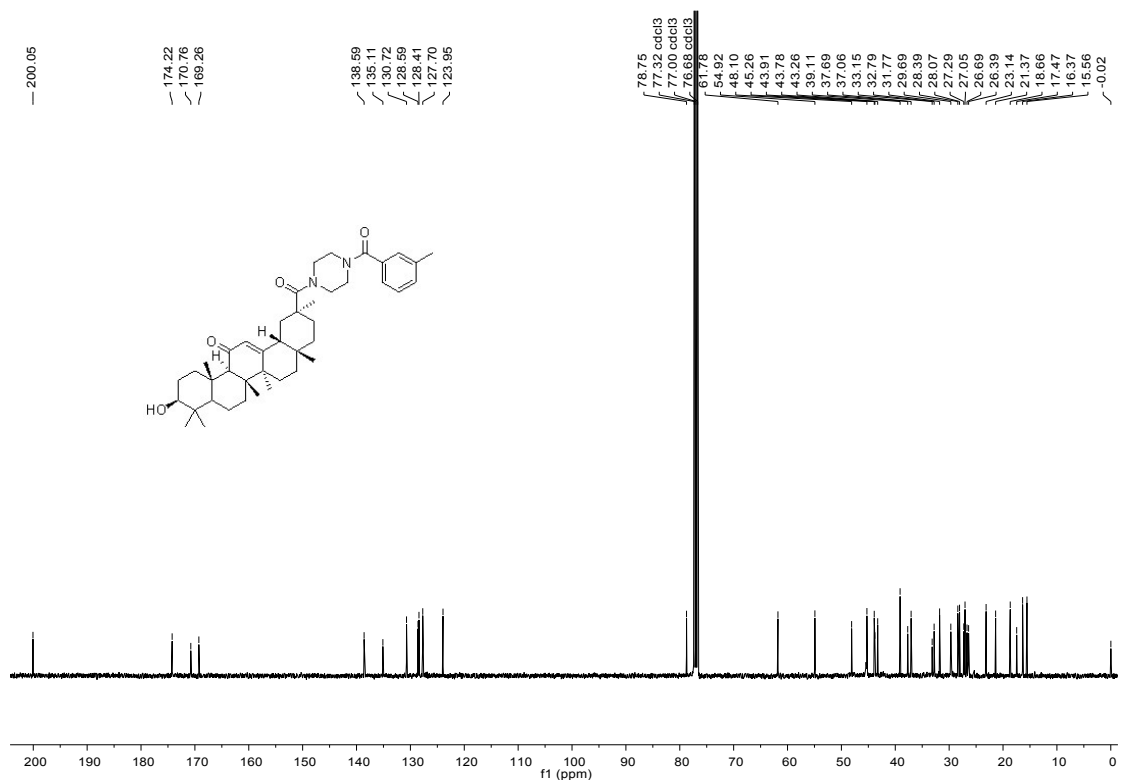
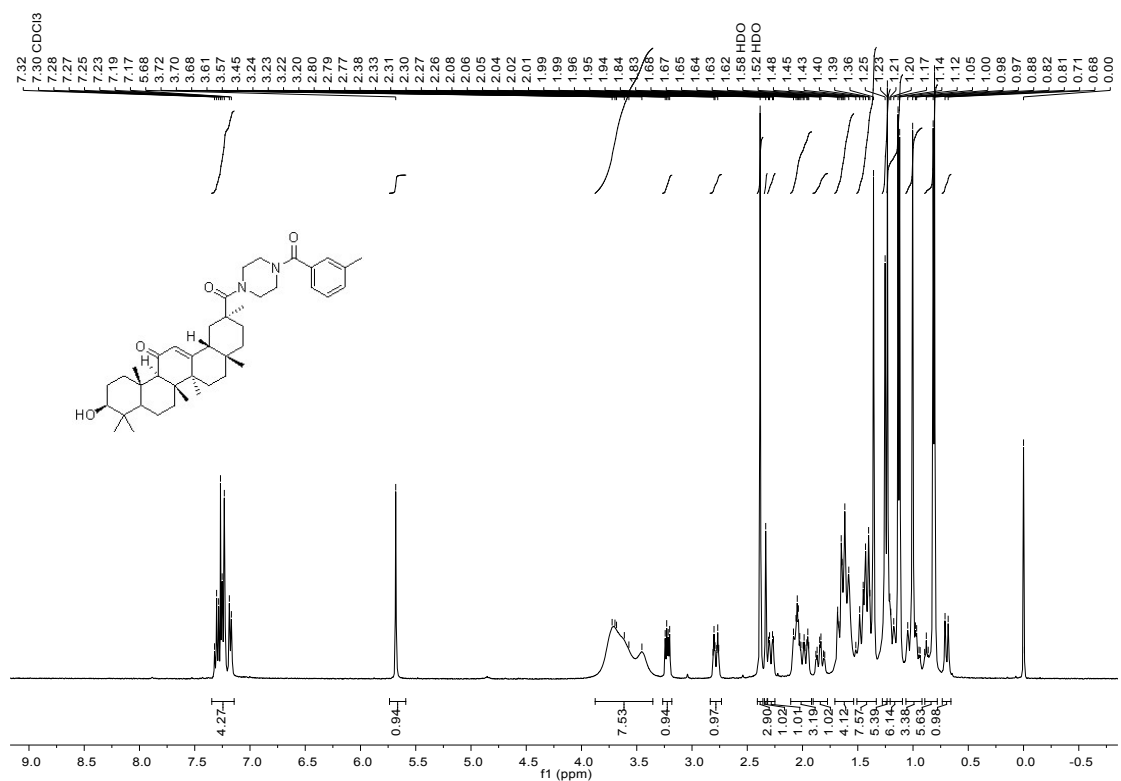
3 β -Hydroxy-30-(4-(3,5-dimethoxybenzoyl)-1-piperazinyl)-olean-12-ene-11,30-dione (4b)



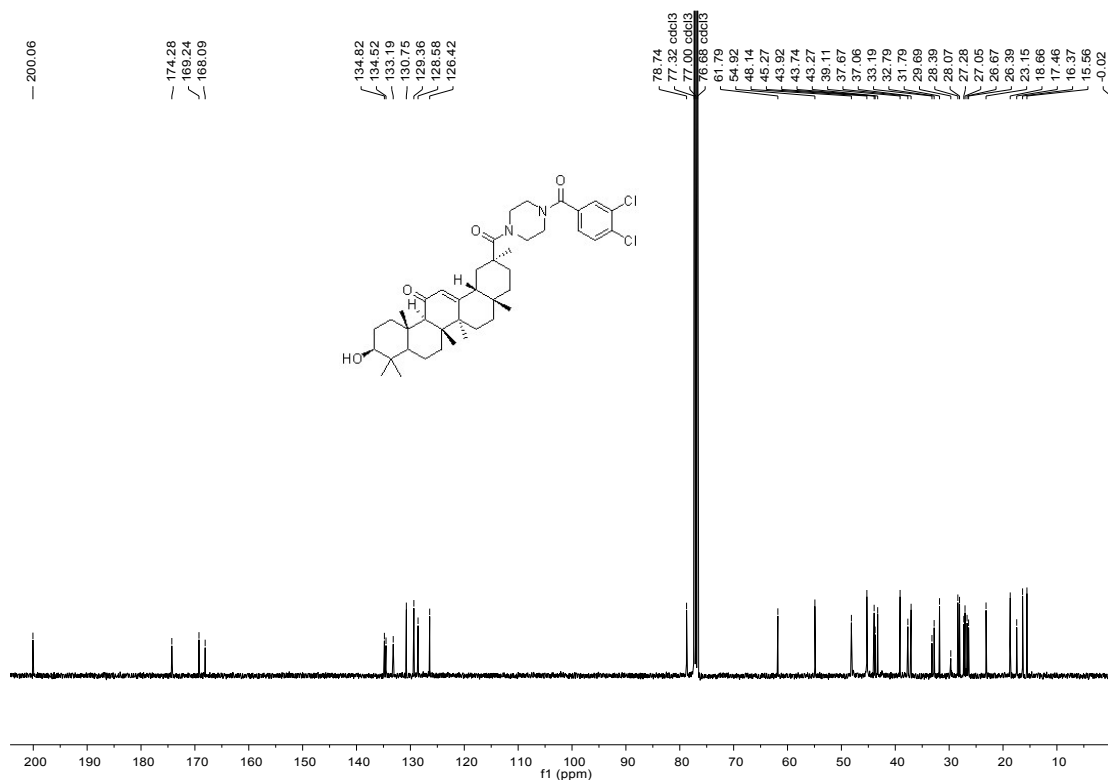
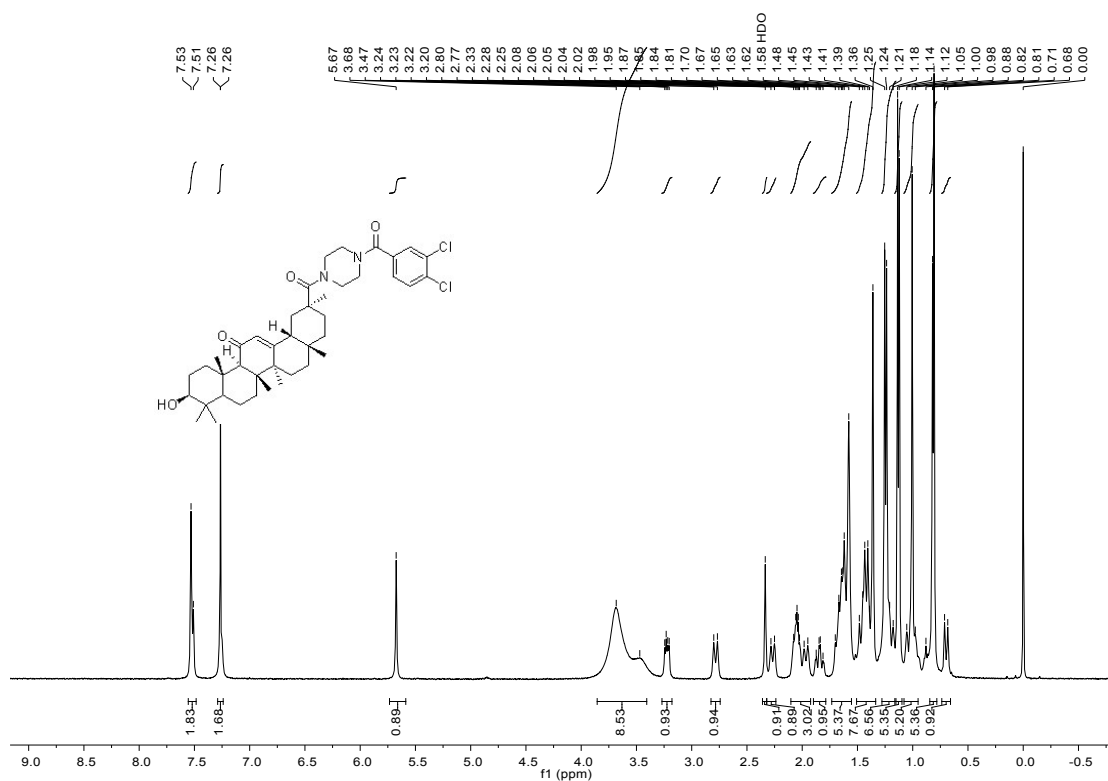
3 β -Hydroxy-30-(4-(3,5-dimethylbenzoyl)-1-piperazinyl)-olean-12-ene-11,30-dione (**4c**)



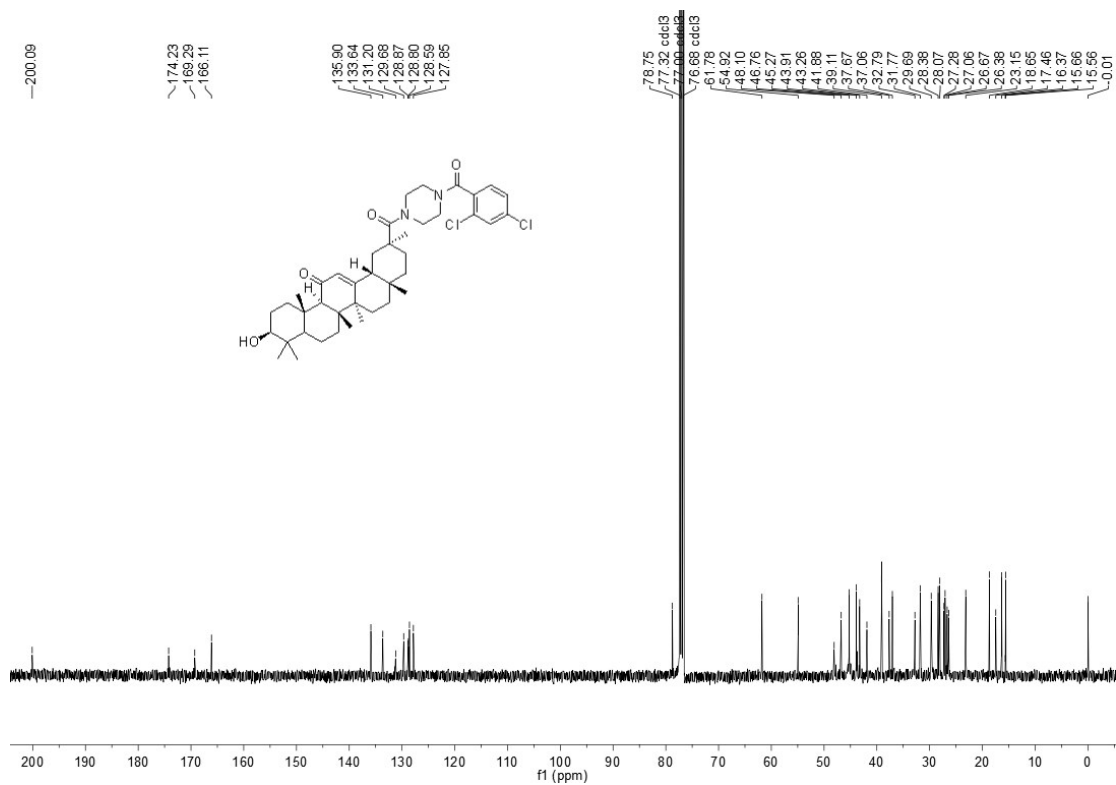
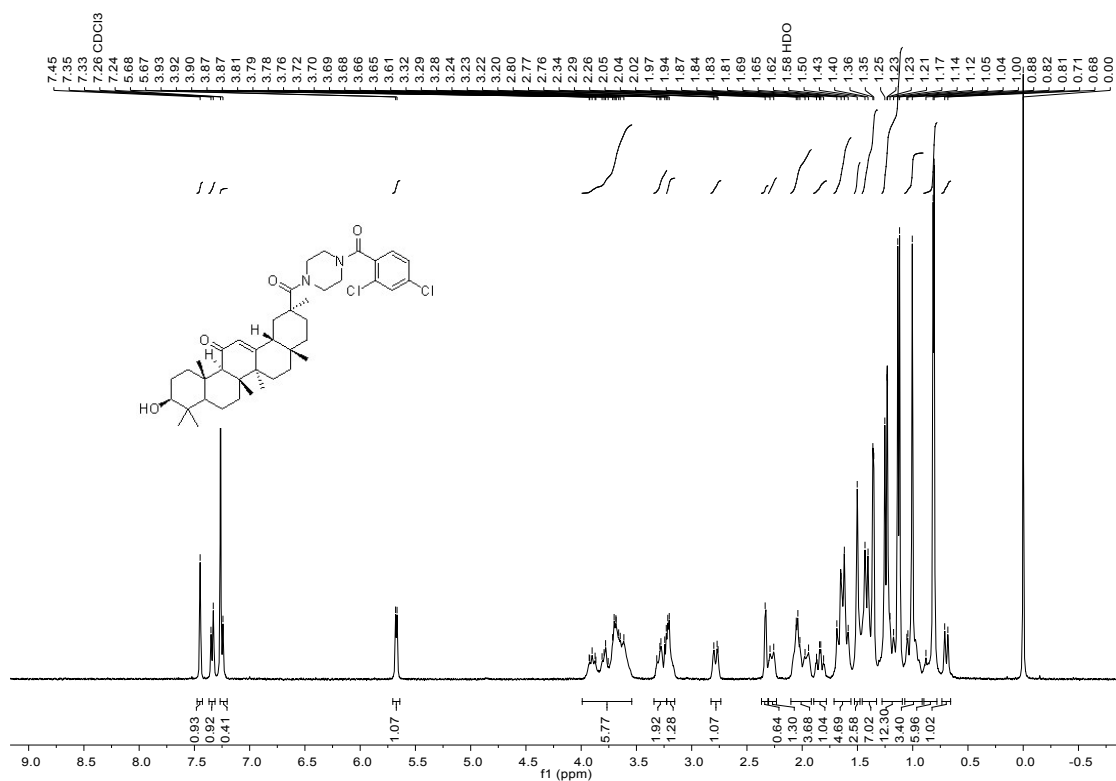
3 β -Hydroxy-30-(4-(3-methylbenzoyl)-1-piperazinyl)-olean-12-ene-11,30-dione (**4d**)



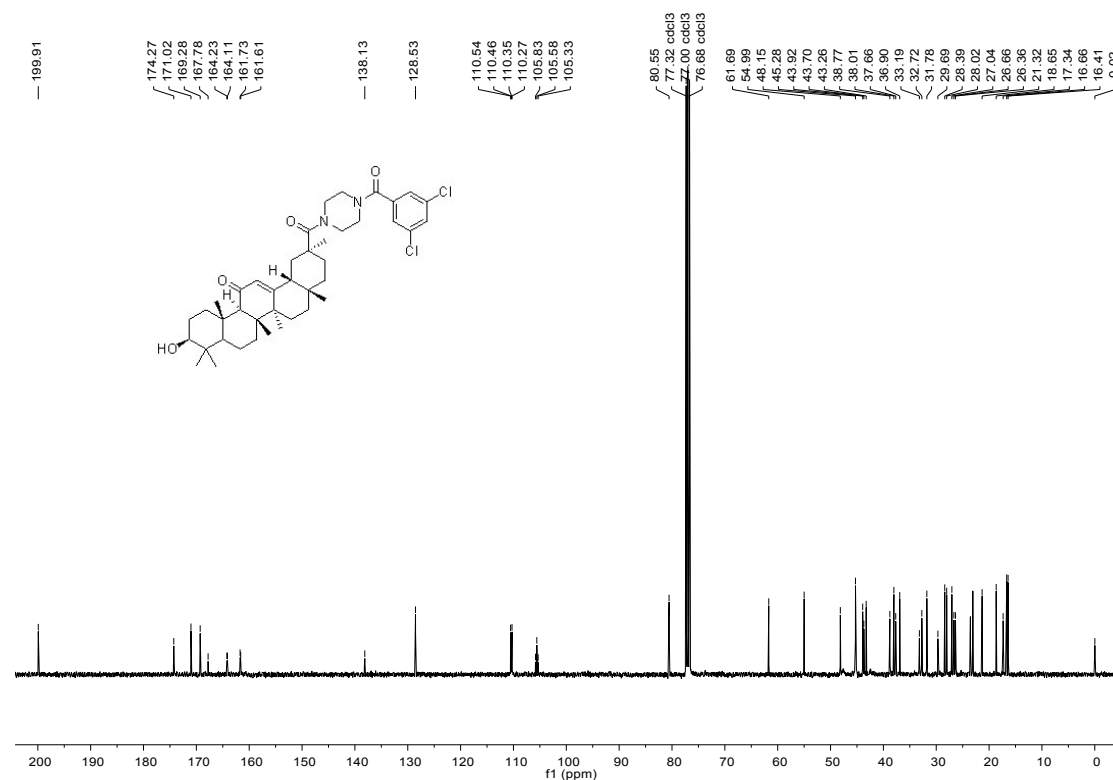
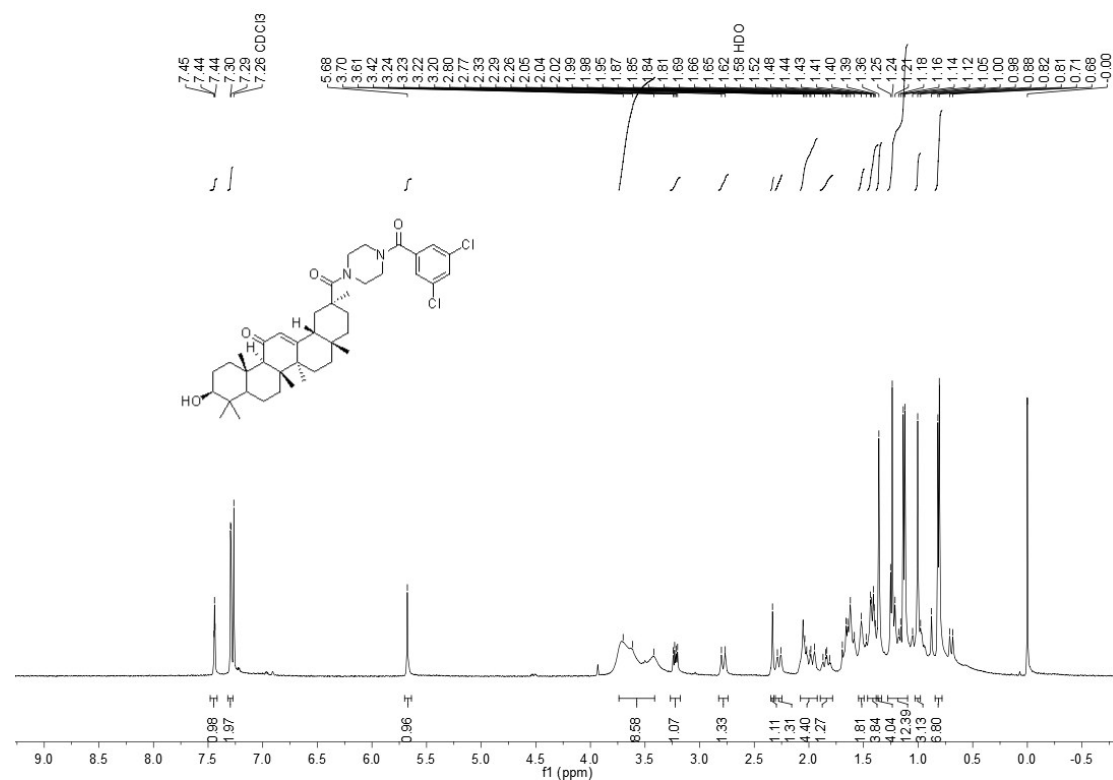
3 β -Hydroxy-30-(4-(3,4-dichlorobenzoyl)-1-piperazinyl)-olean-12-ene-11,30-dione (**4e**)



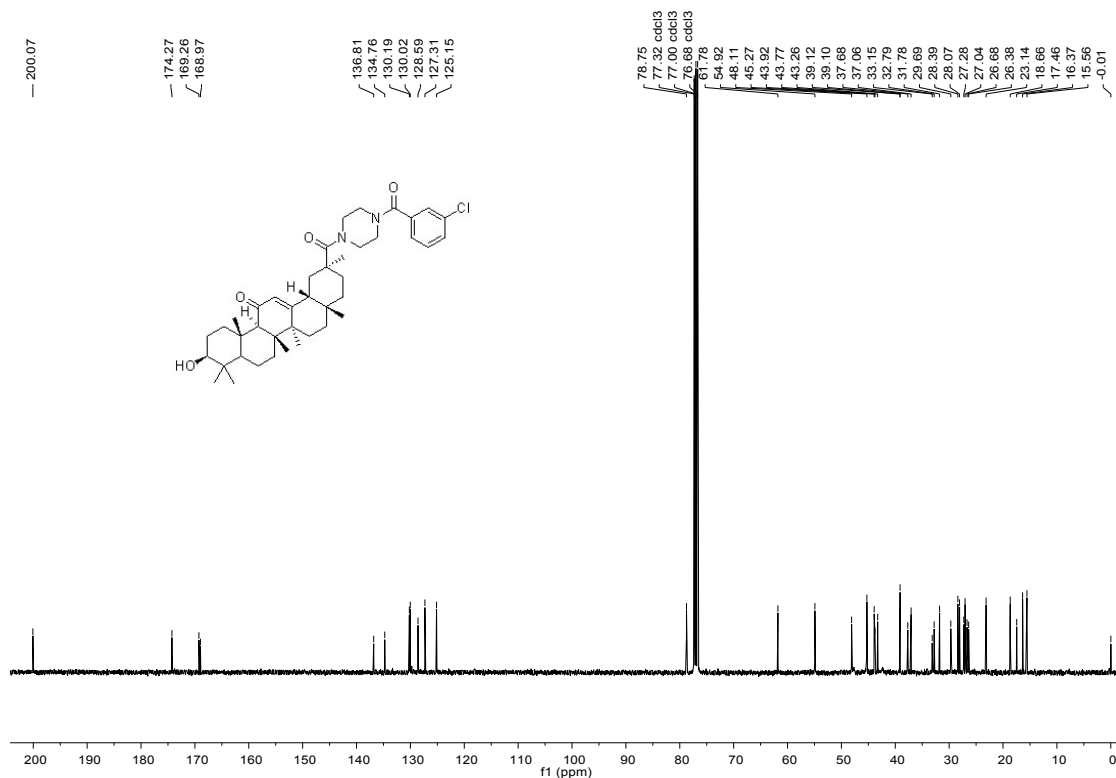
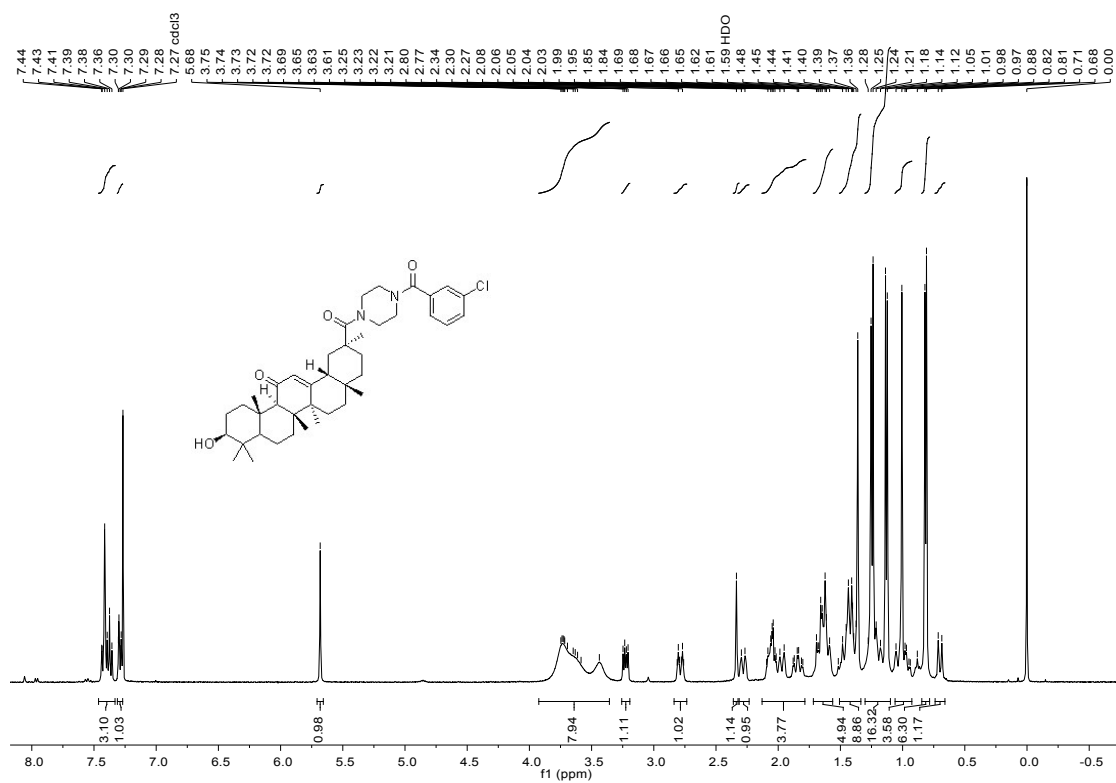
3 β -Hydroxy-30-(4-(2,4-dichlorobenzoyl)-1-piperazinyl)-olean-12-ene-11,30-dione (**4f**)



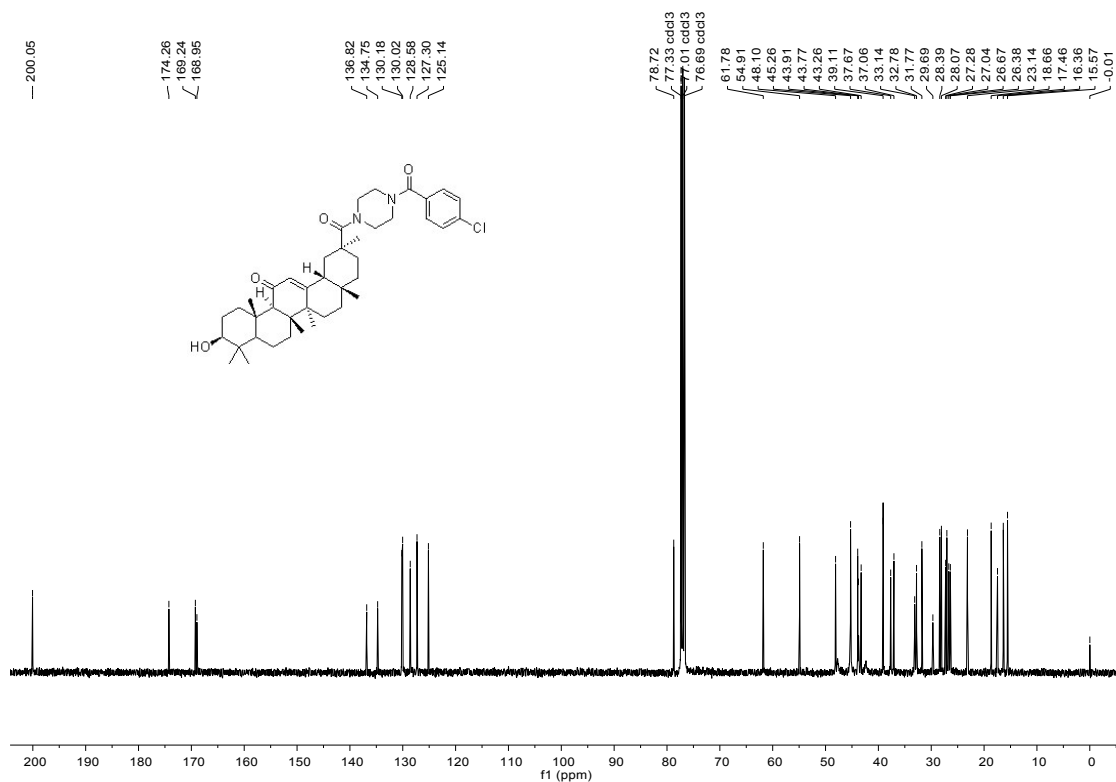
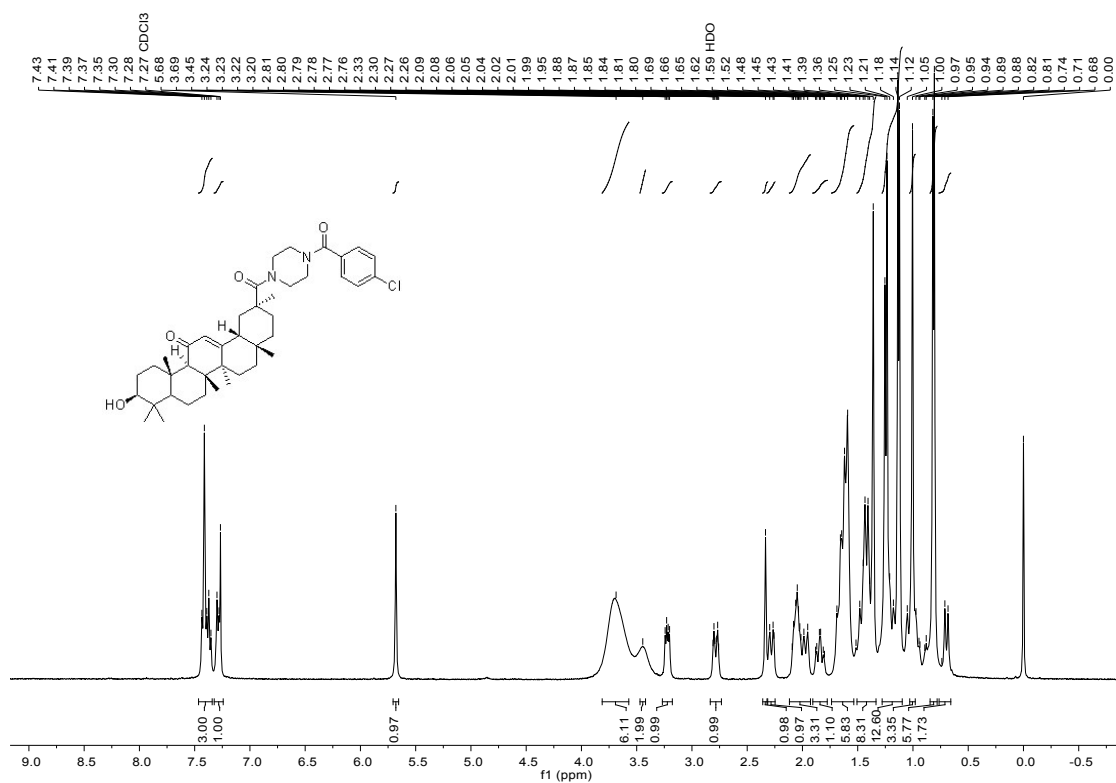
3 β -Hydroxy-30-(4-(3,5-dichlorobenzoyl)-1-piperazinyl)-olean-12-ene-11,30-dione (**4g**)



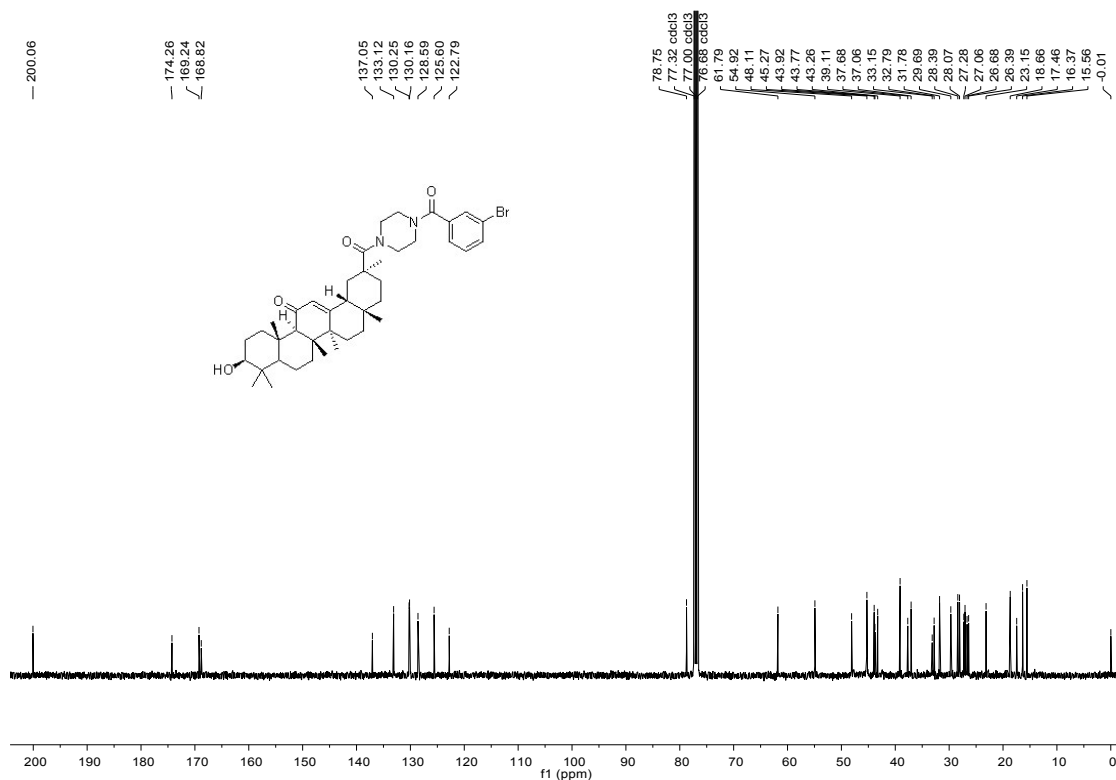
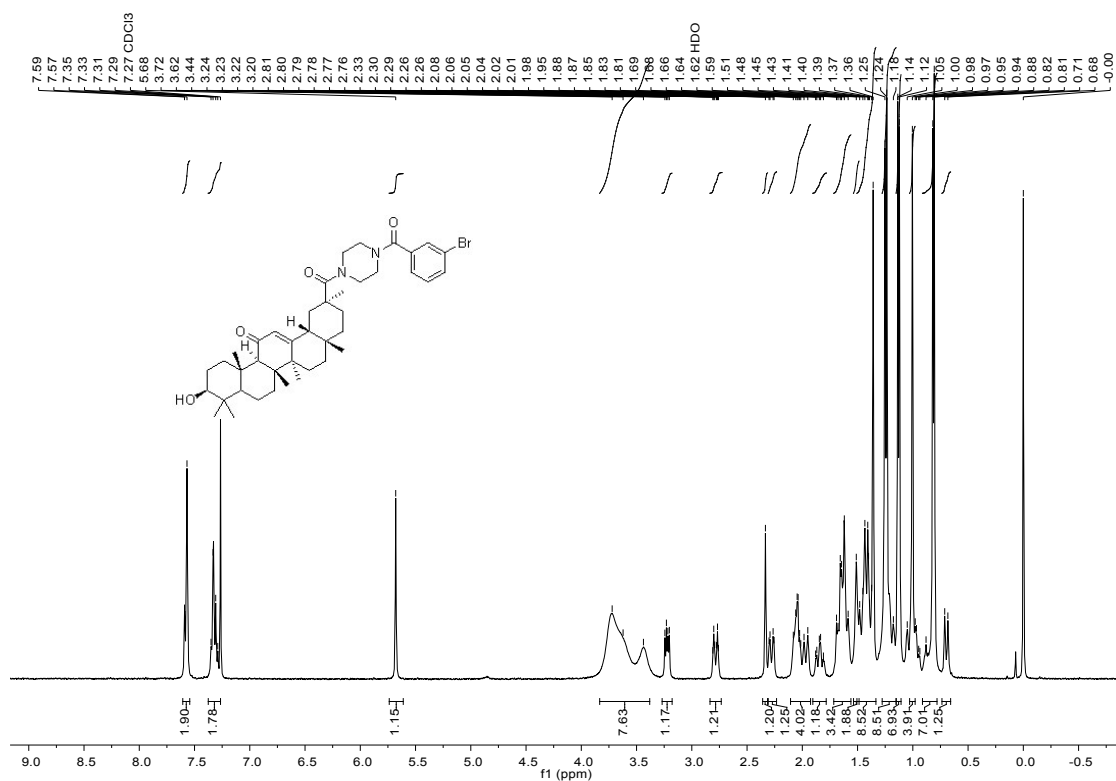
3 β -Hydroxy-30-(4-(3-chlorobenzoyl)-1-piperazinyl)-olean-12-ene-11,30-dione (**4h**)



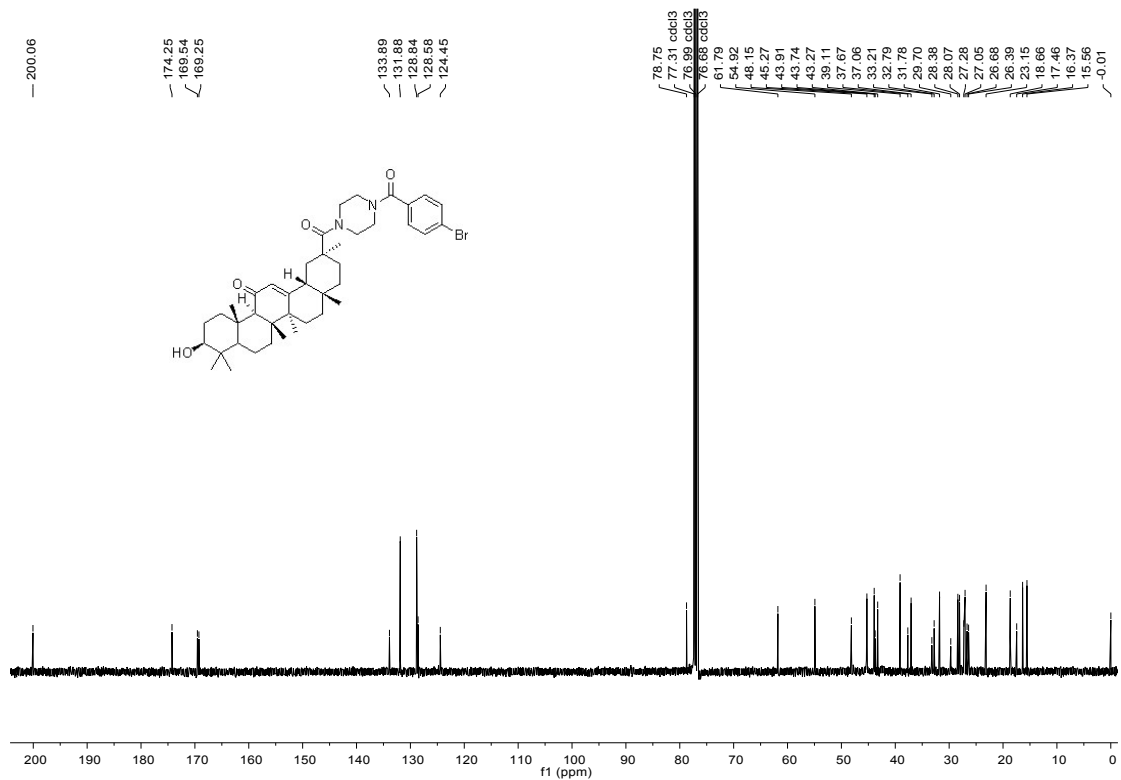
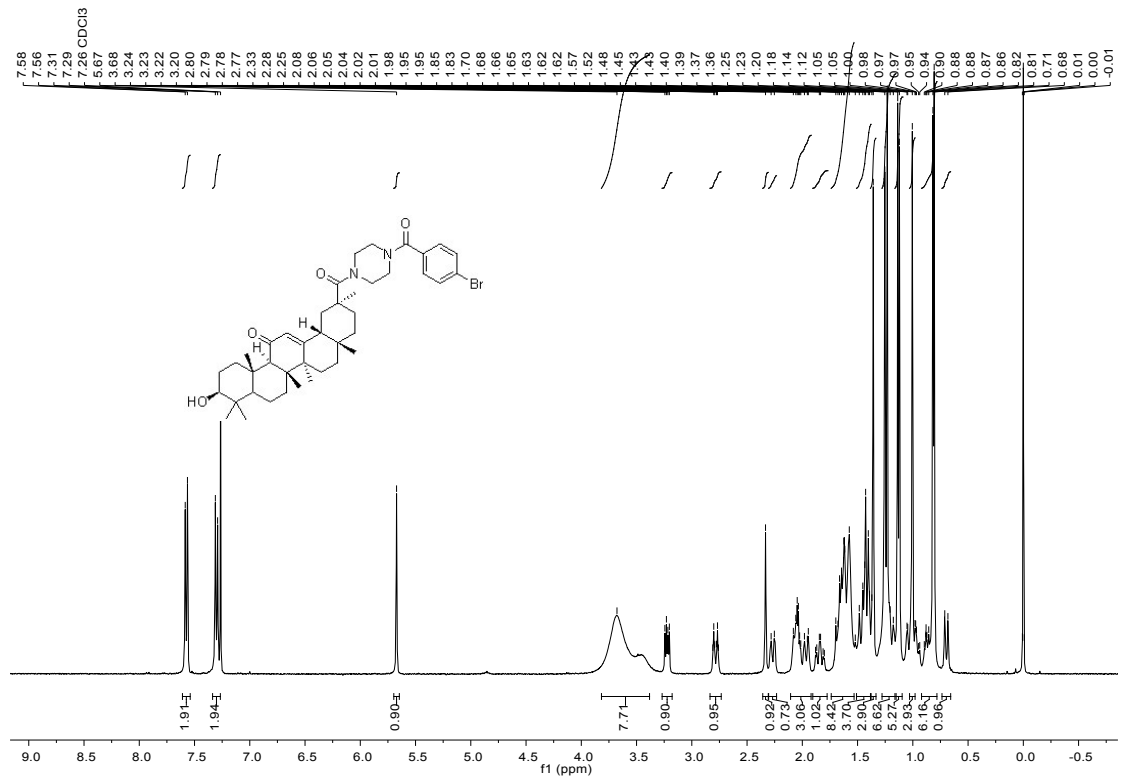
3 β -Hydroxy-30-(4-(4-chlorobenzoyl)-1-piperazinyl)-olean-12-ene-11,30-dione (**4i**)



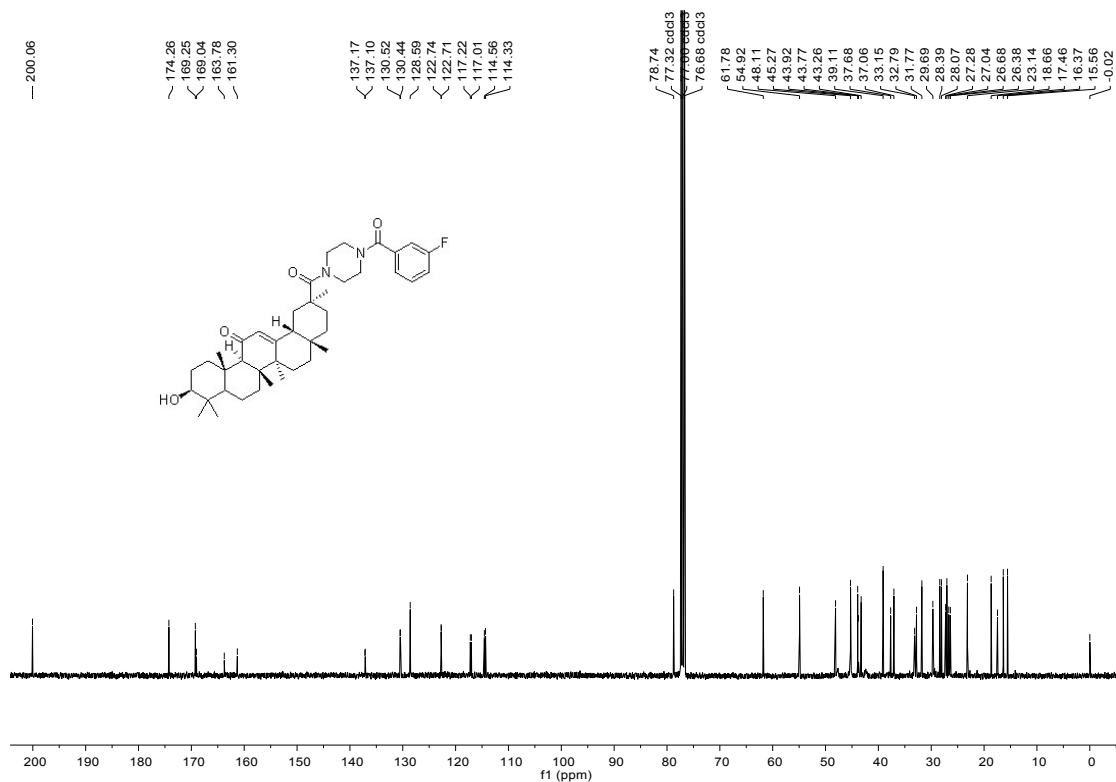
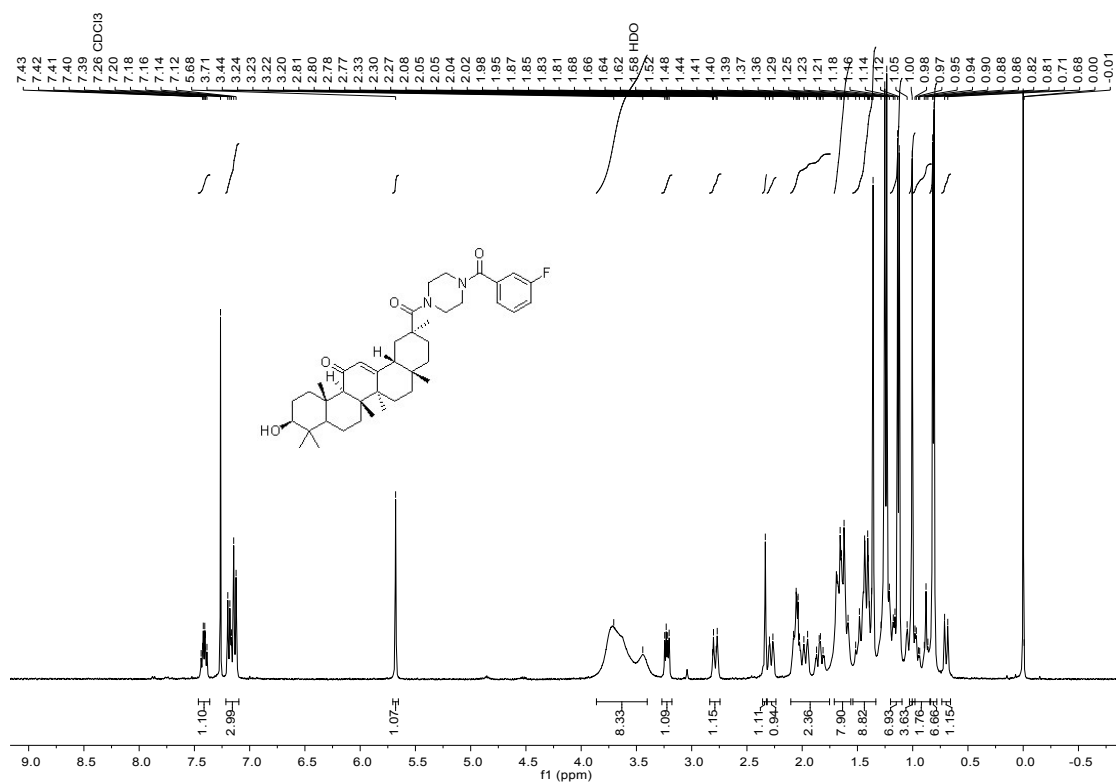
3 β -Hydroxy-30-(4-(3-bromobenzoyl)-1-piperazinyl)-olean-12-ene-11,30-dione (**4j**)



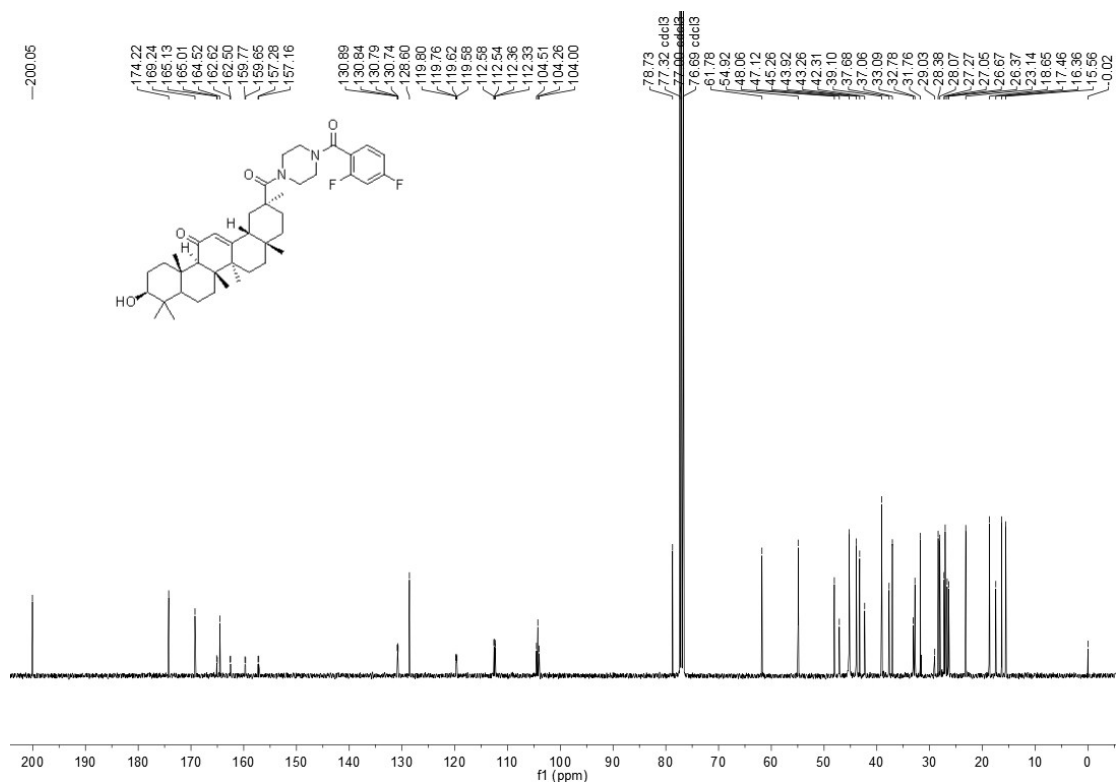
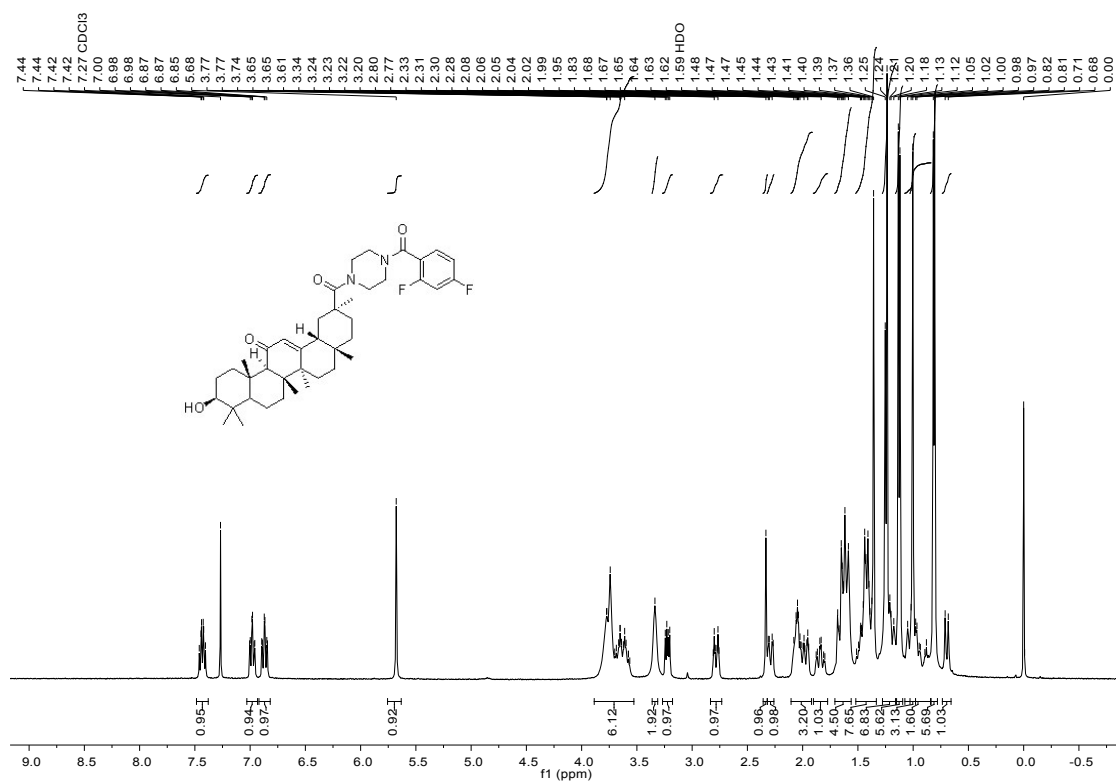
3 β -Hydroxy-30-(4-(4-bromobenzoyl)-1-piperazinyl)-olean-12-ene-11,30-dione (**4k**)



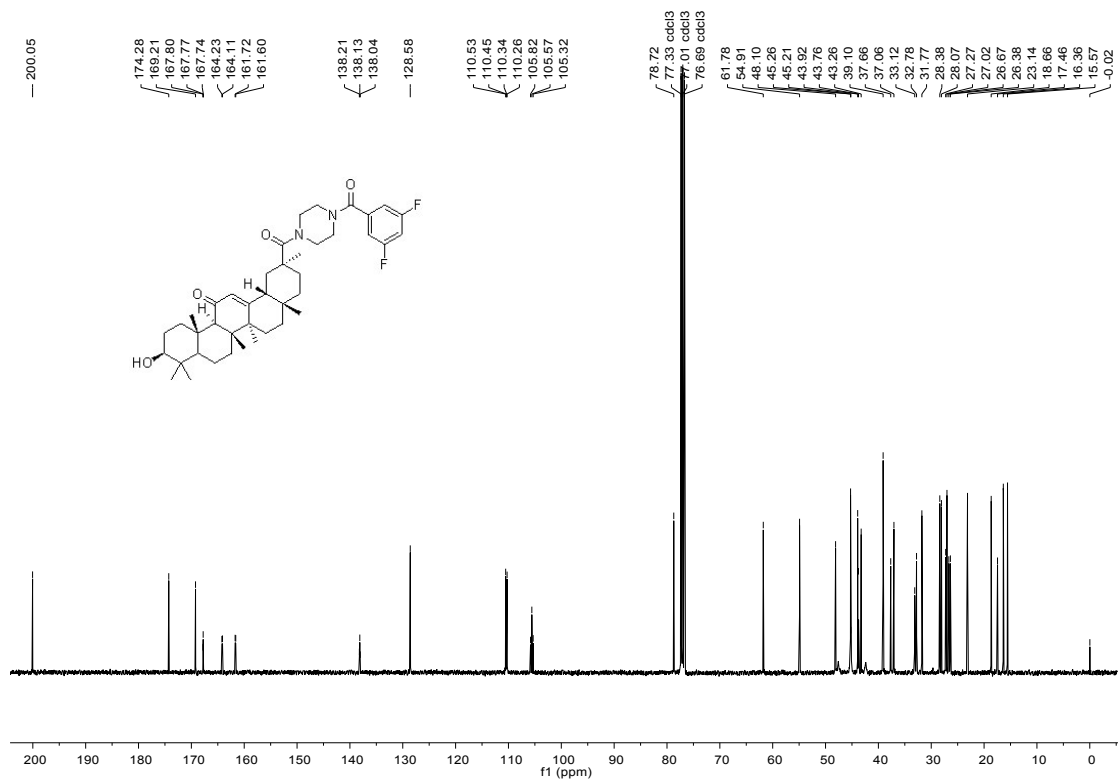
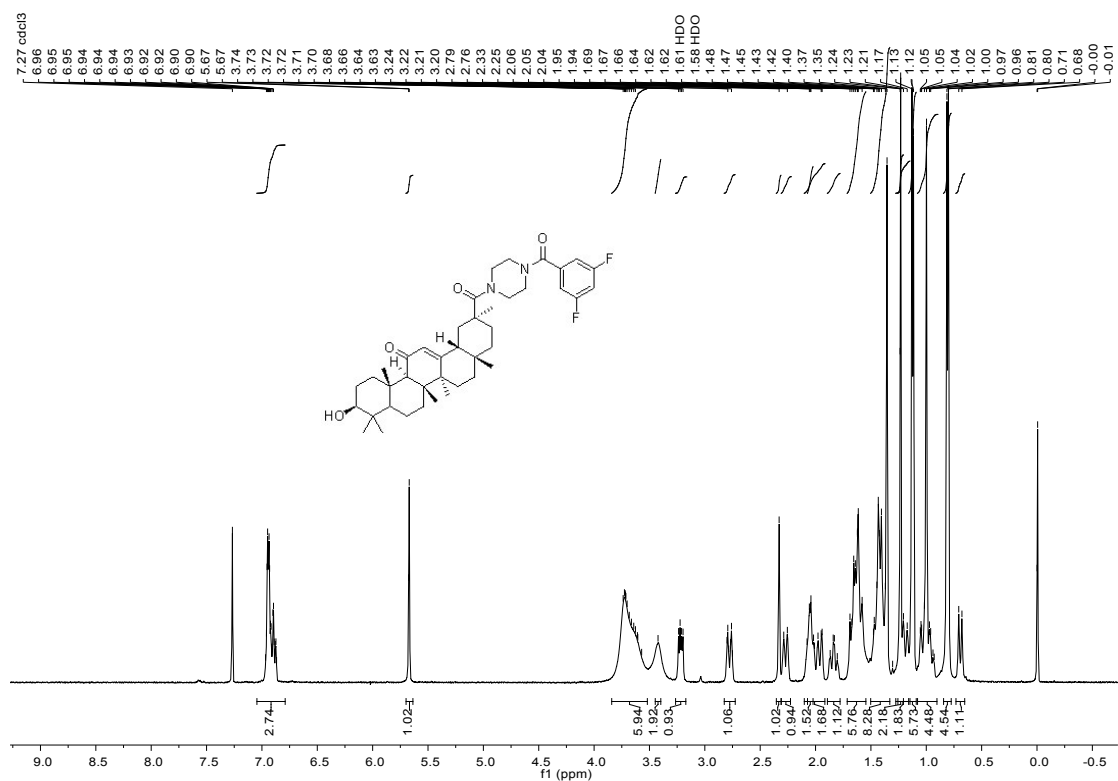
3 β -Hydroxy-30-(4-(3-fluorobenzoyl)-1-piperazinyl)-olean-12-ene-11,30-dione (**4I**)



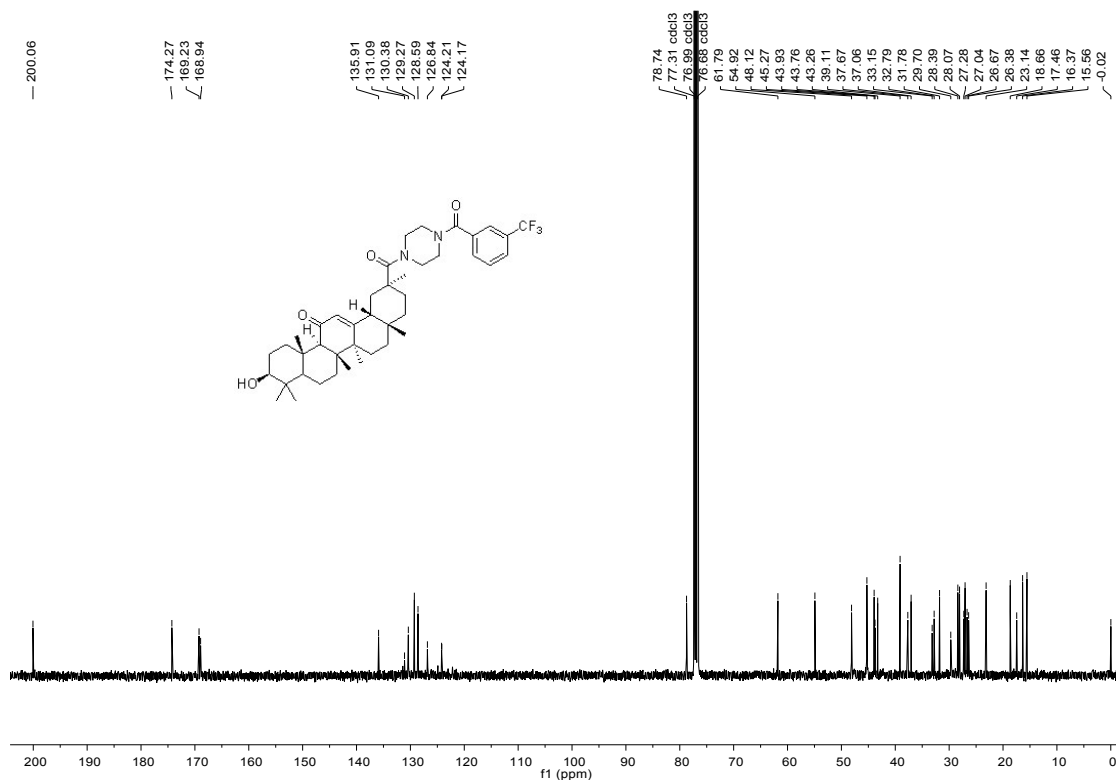
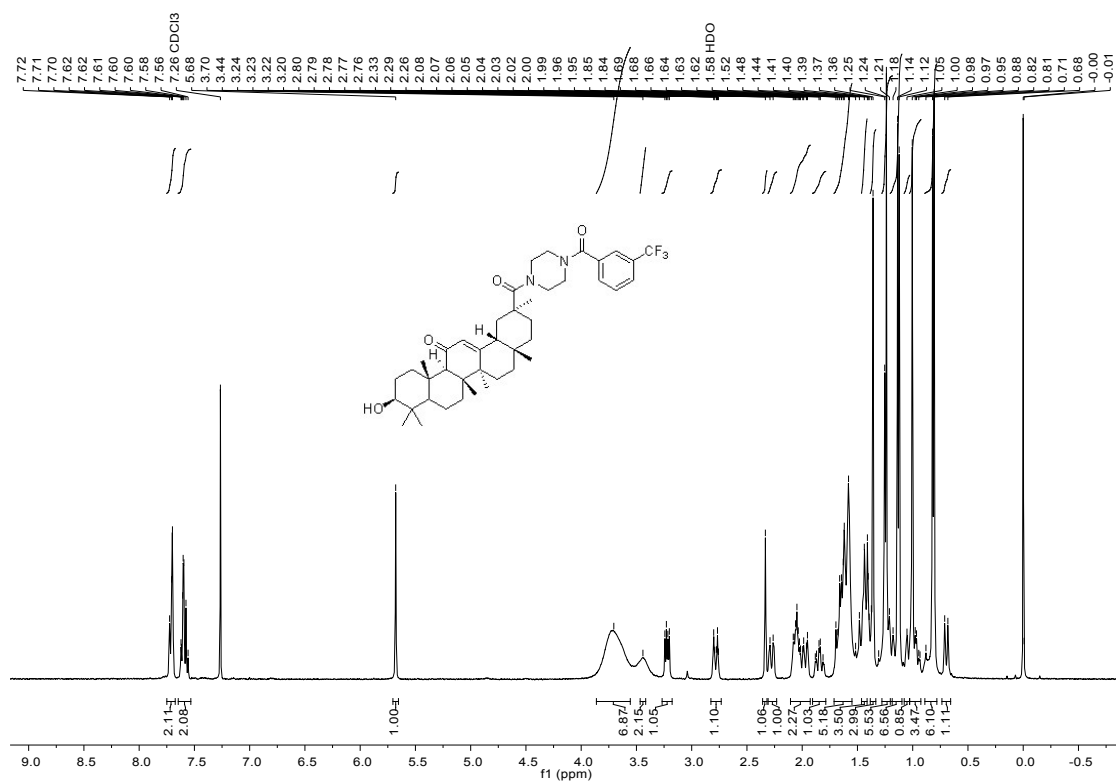
3 β -Hydroxy-30-(4-(2,4-difluorobenzoyl)-1-piperazinyl)-olean-12-ene-11,30-dione (**4m**)



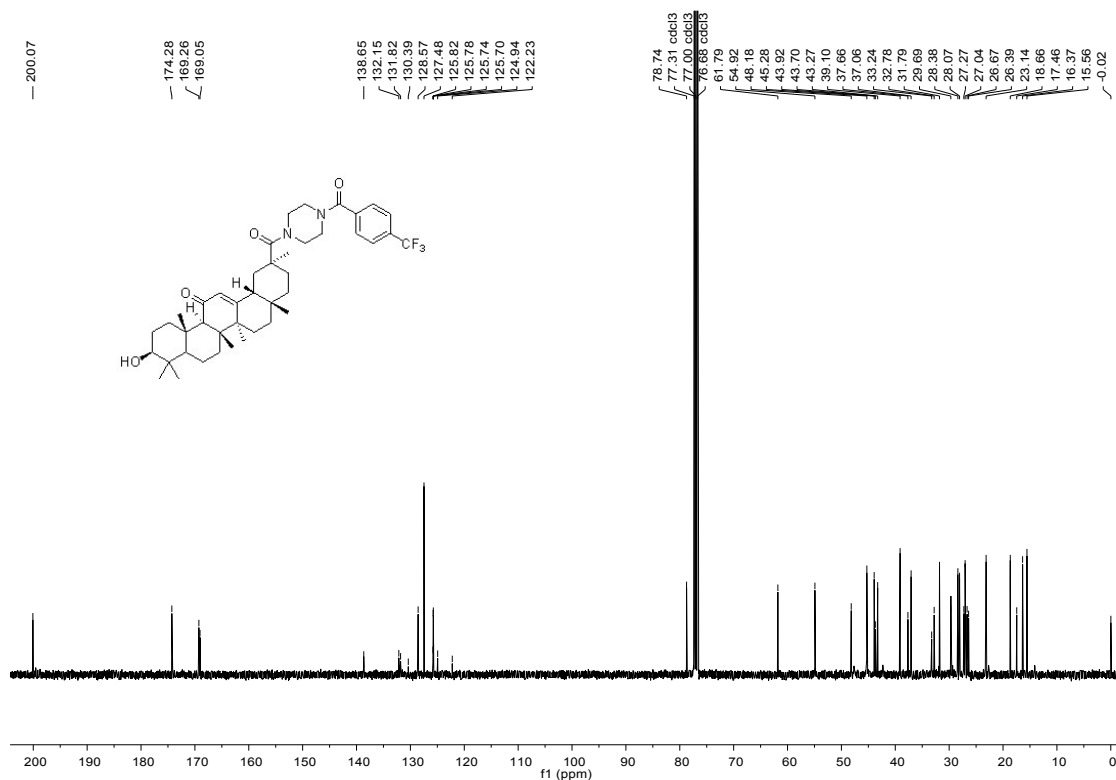
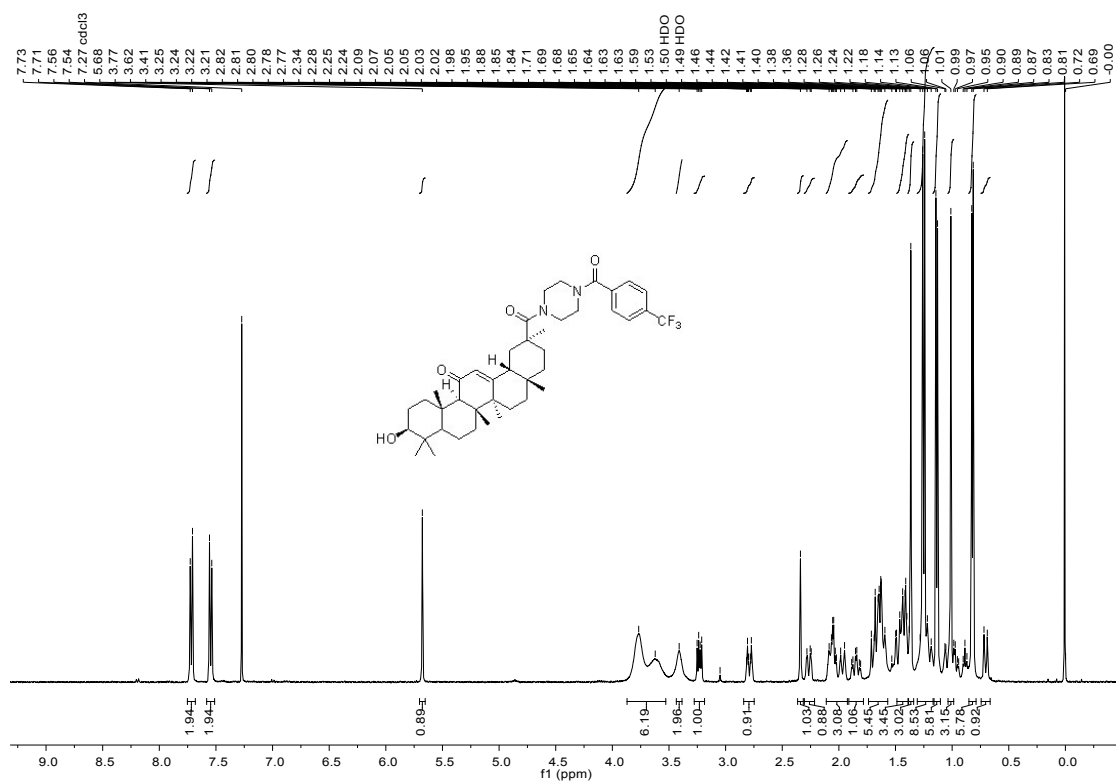
3 β -Hydroxy-30-(4-(3,5-difluorobenzoyl)-1-piperazinyl)-olean-12-ene-11,30-dione (**4n**)



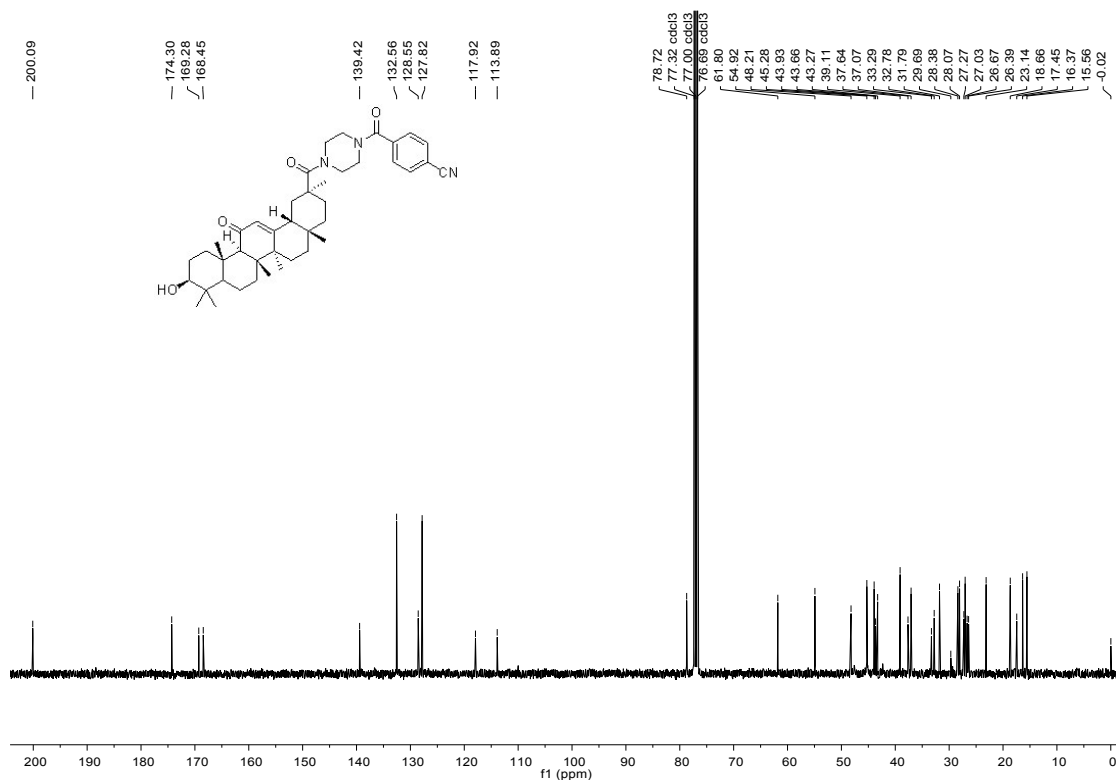
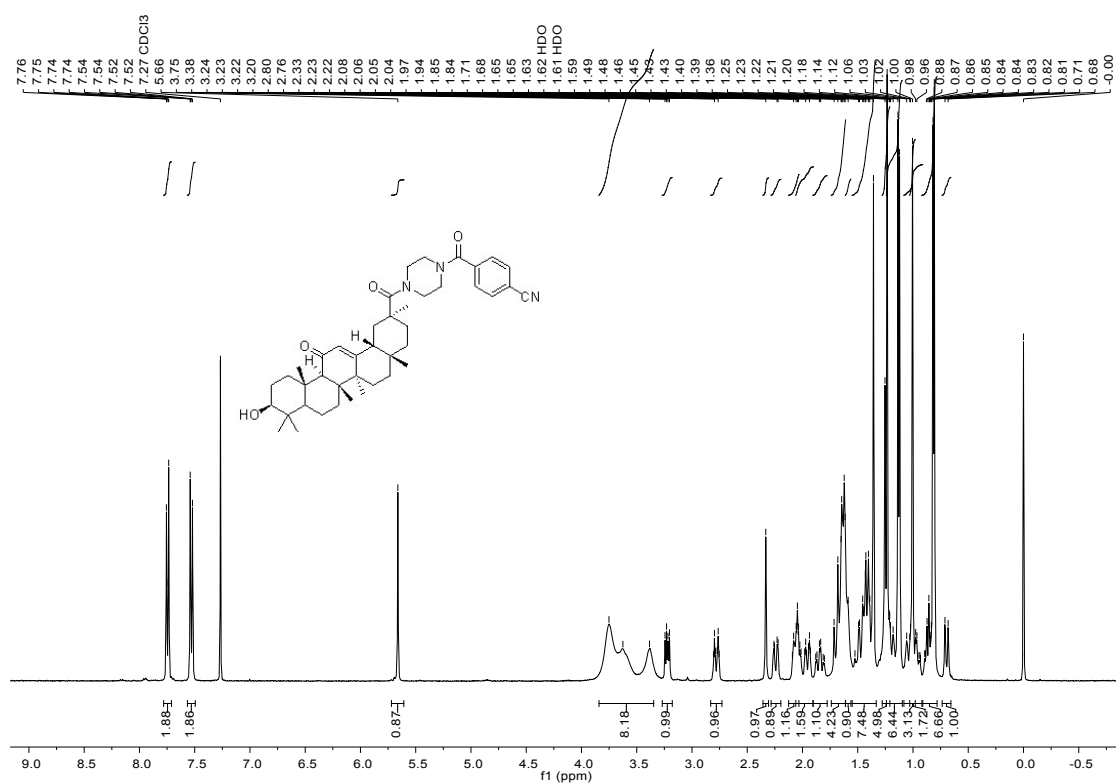
3 β -Hydroxy-30-(4-(3-(trifluoromethyl)benzoyl)-1-piperazinyl)-olean-12-ene-11,30-dione (**4o**)



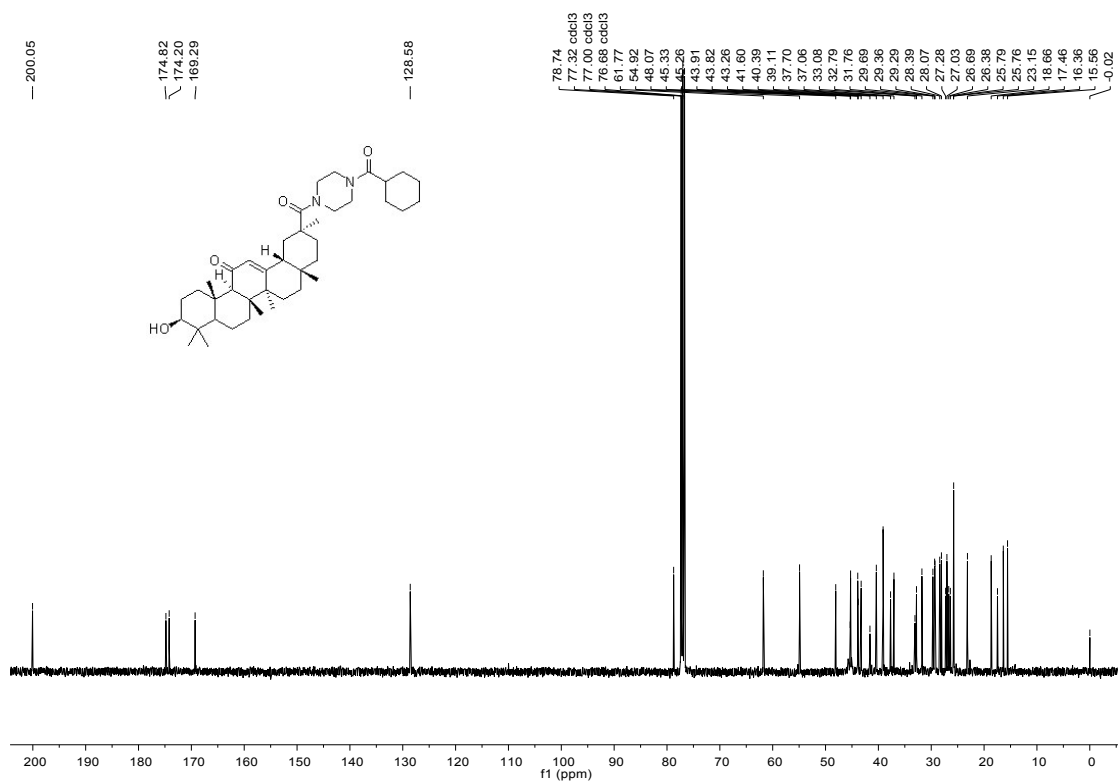
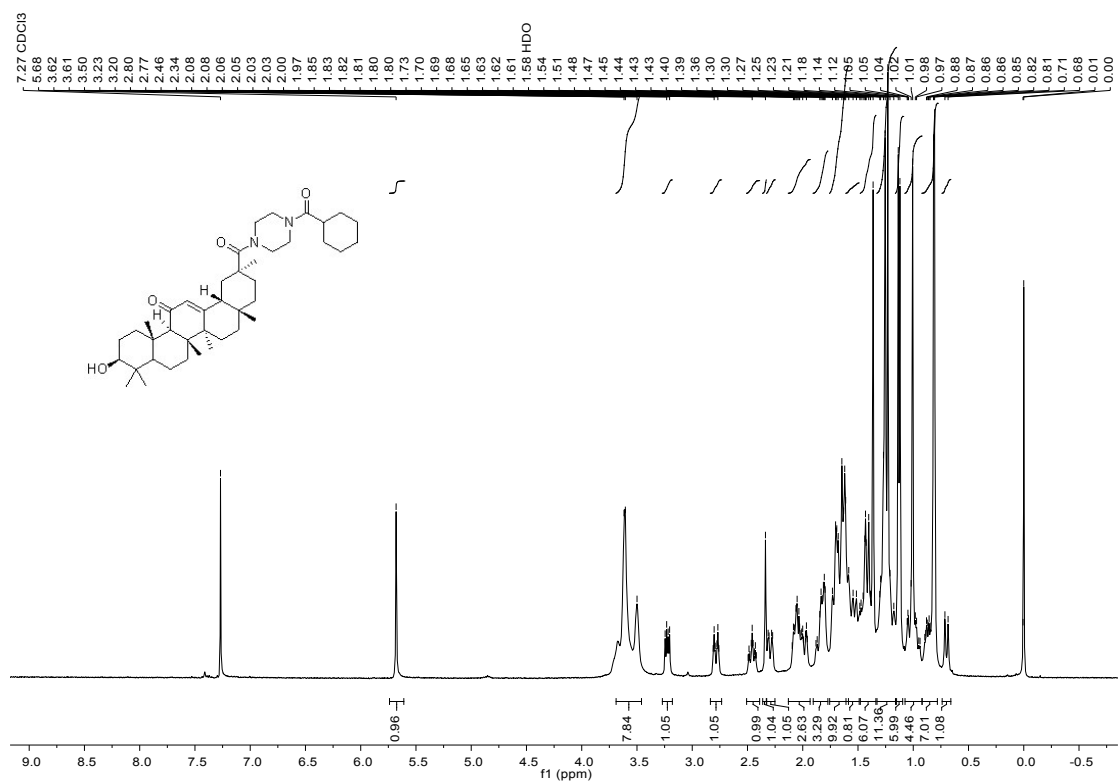
3 β -Hydroxy-3 α -(4-(4-(trifluoromethyl)benzoyl)-1-piperazinyl)-olean-12-ene-11,30-dione (**4p**)



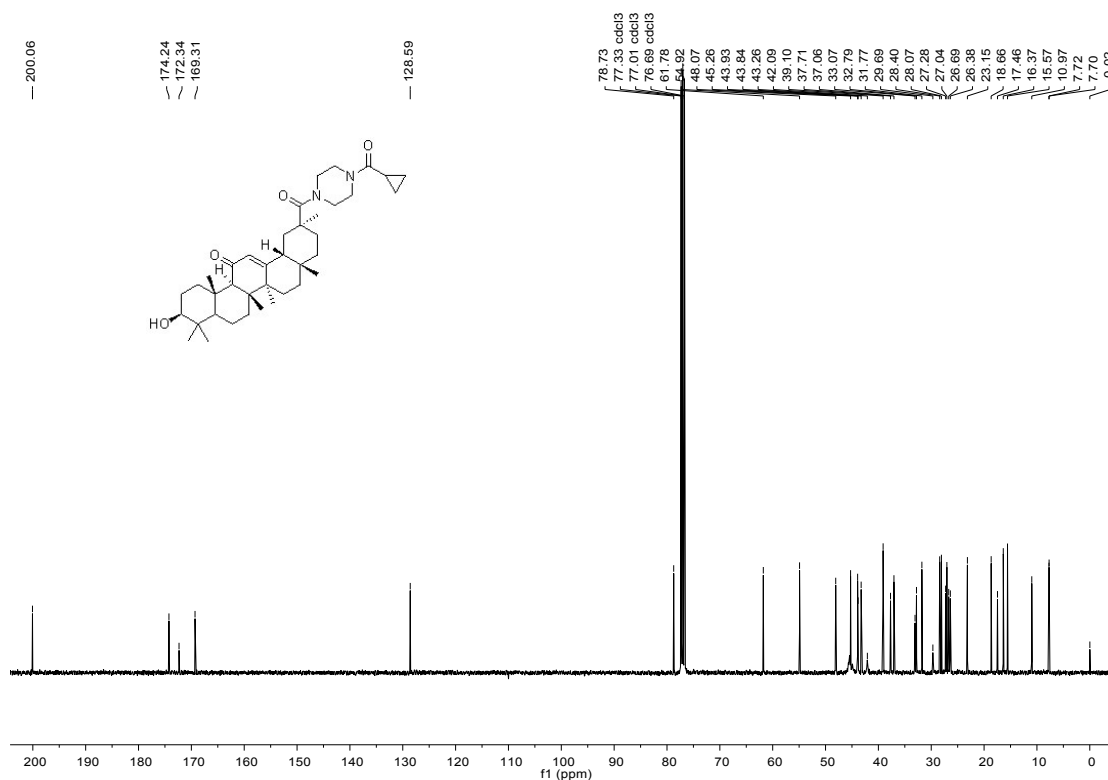
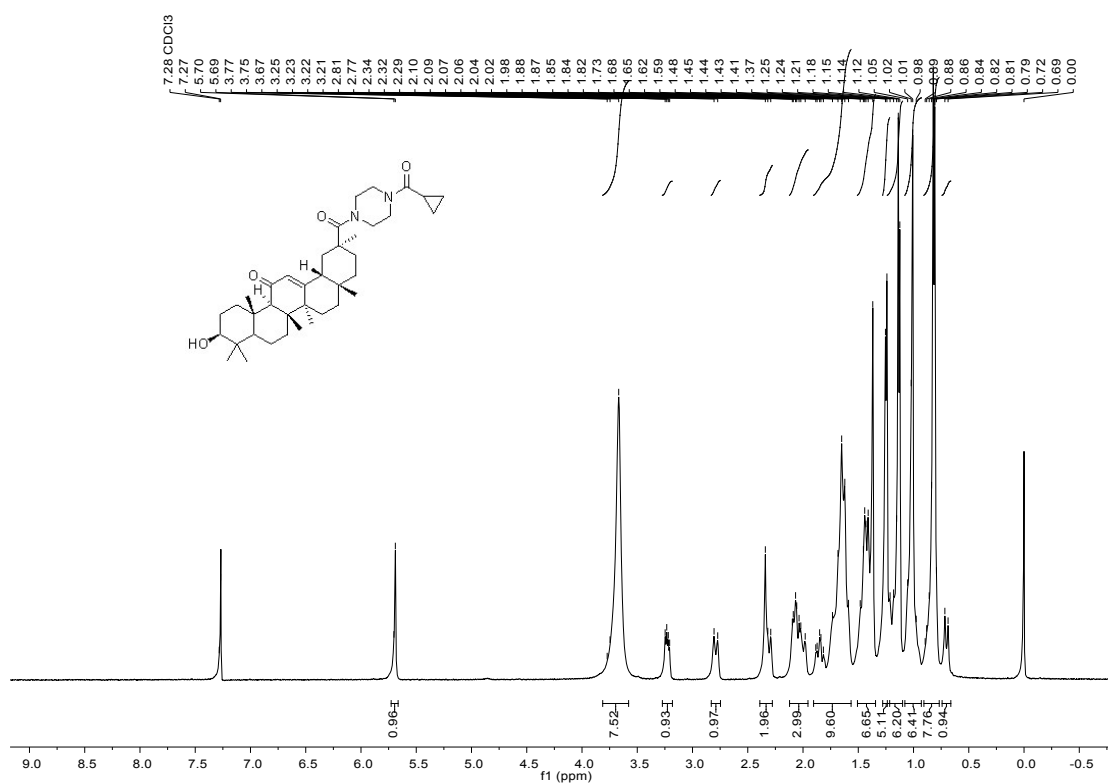
3 β -Hydroxy-30-(4-(4-cyanobenzoyl)-1-piperazinyl)-olean-12-ene-11,30-dione (4q)



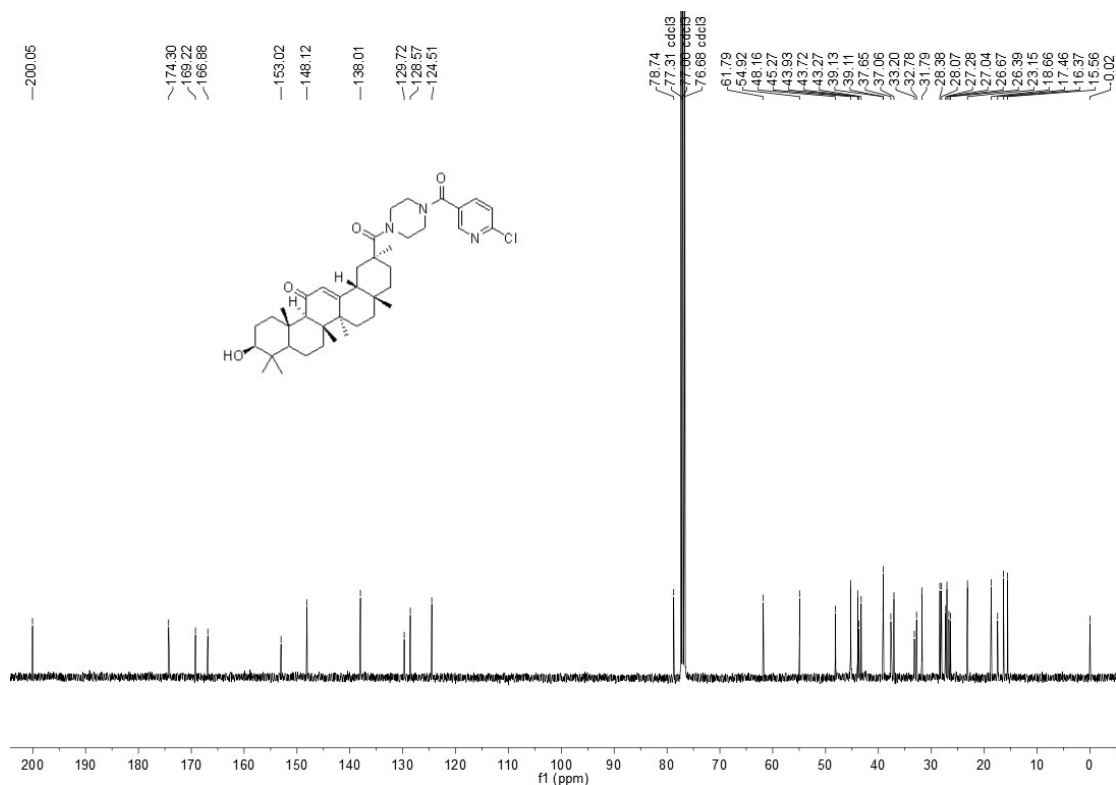
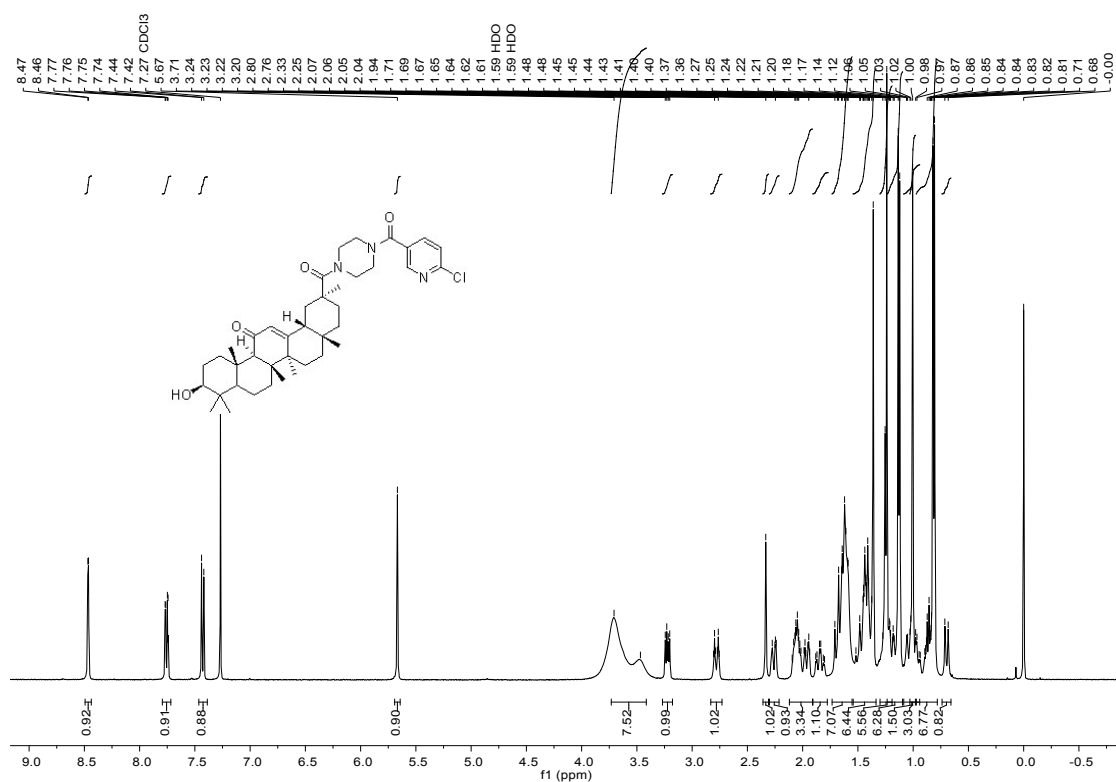
3 β -Hydroxy-30-(4-cyclohexanecarbonyl-1-piperazinyl)-olean-12-ene-11,30-dione (**4r**)



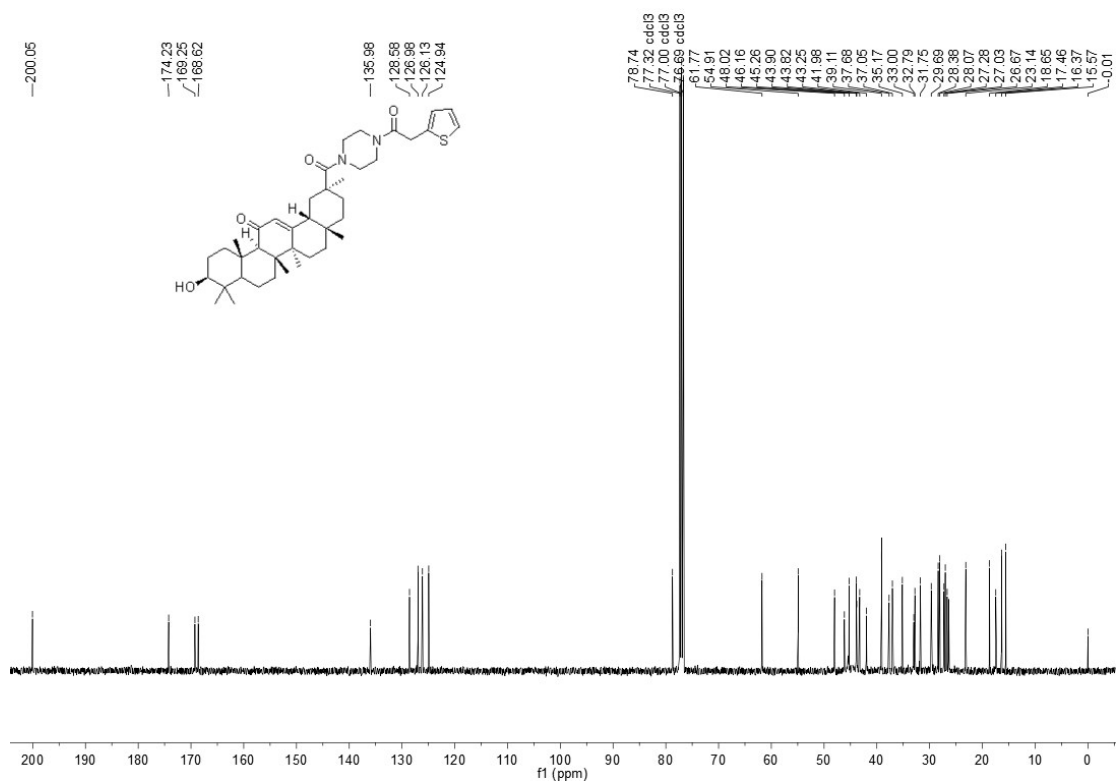
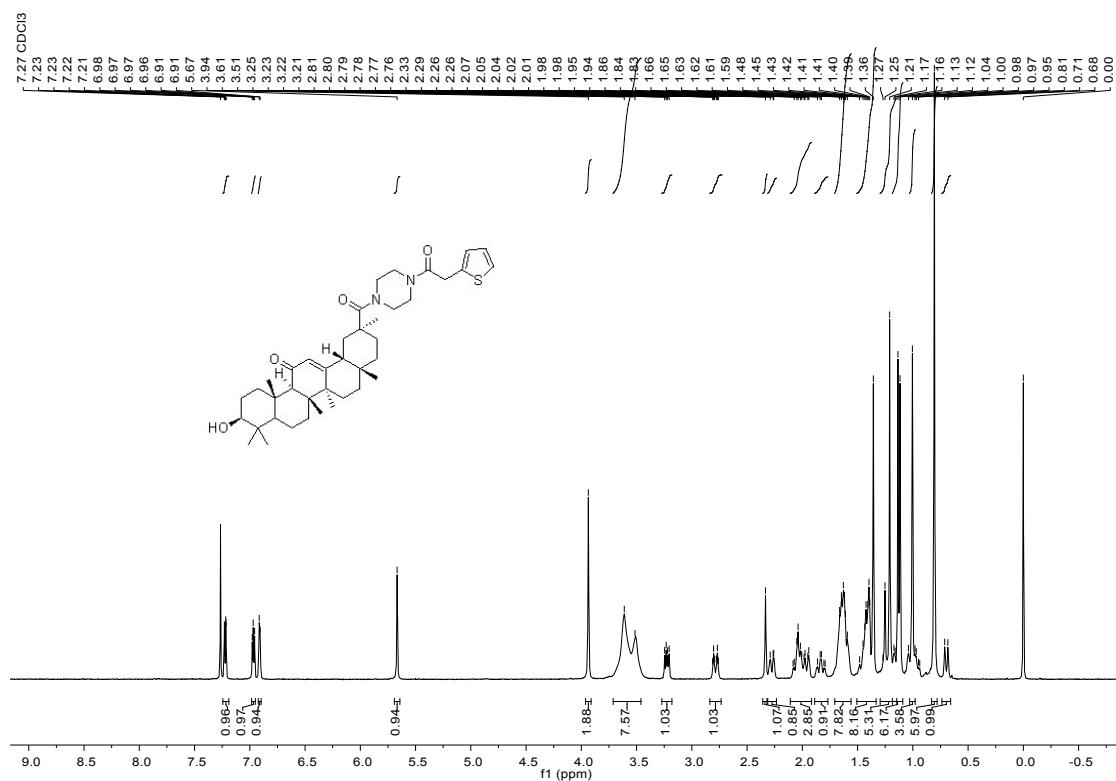
3 β -Hydroxy-30-(4-cyclopropanecarbonyl-1-piperazinyl)-olean-12-ene-11,30-dione (**4s**)



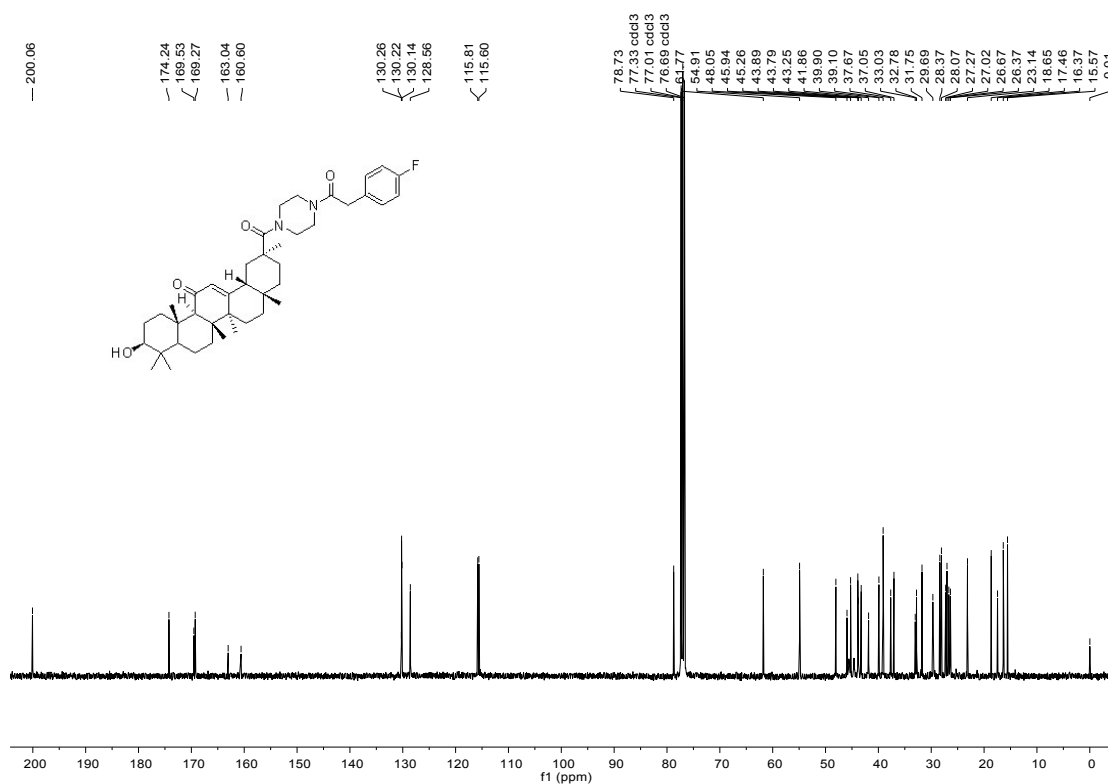
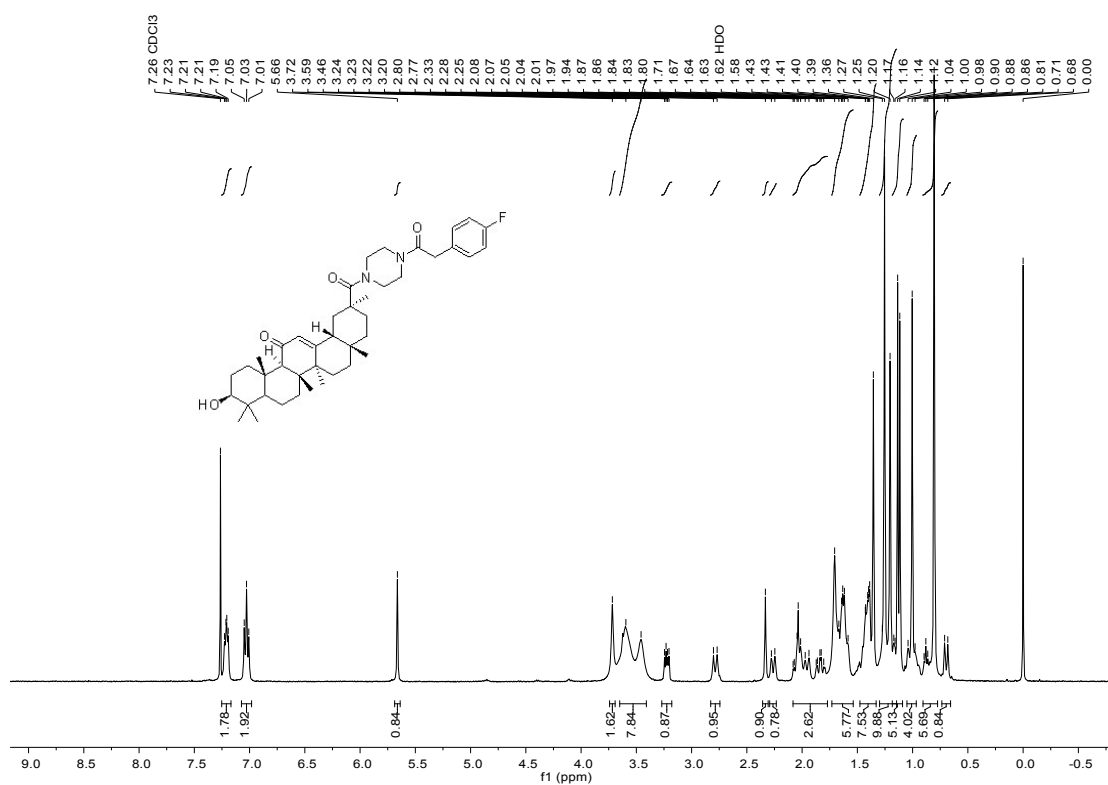
3 β -Hydroxy-30-(4-(6-chloronicotinoyl)-1-piperazinyl)-olean-12-ene-11,30-dione (**4t**)



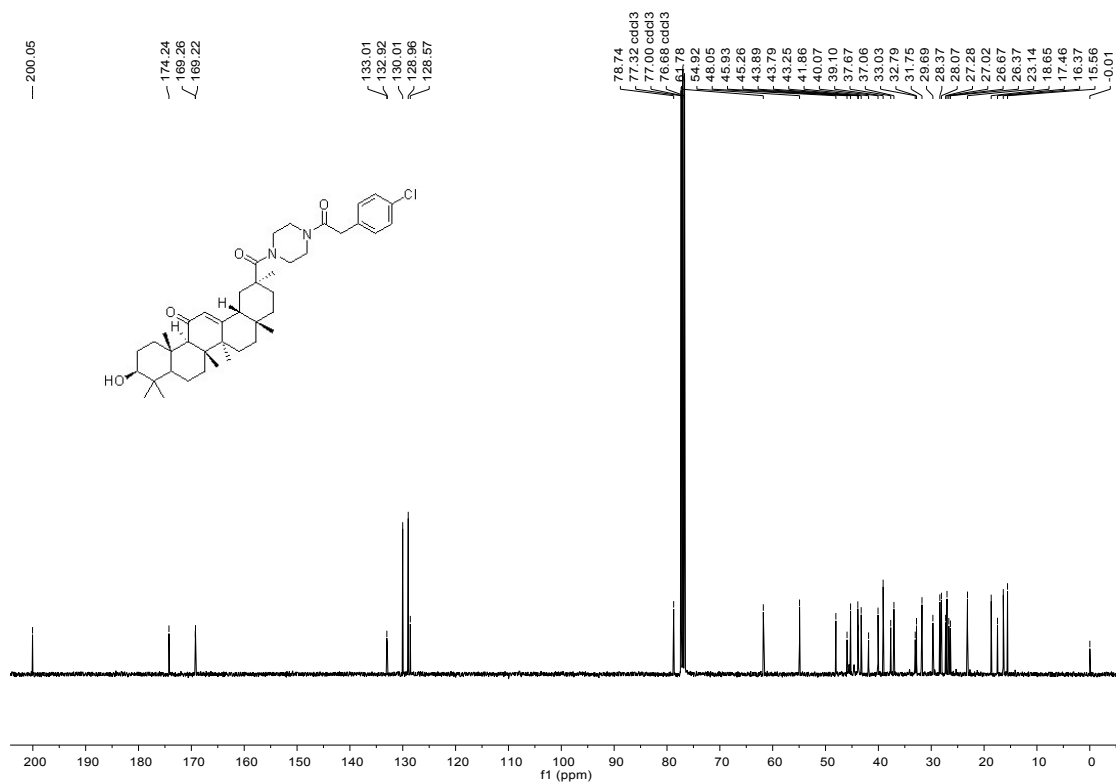
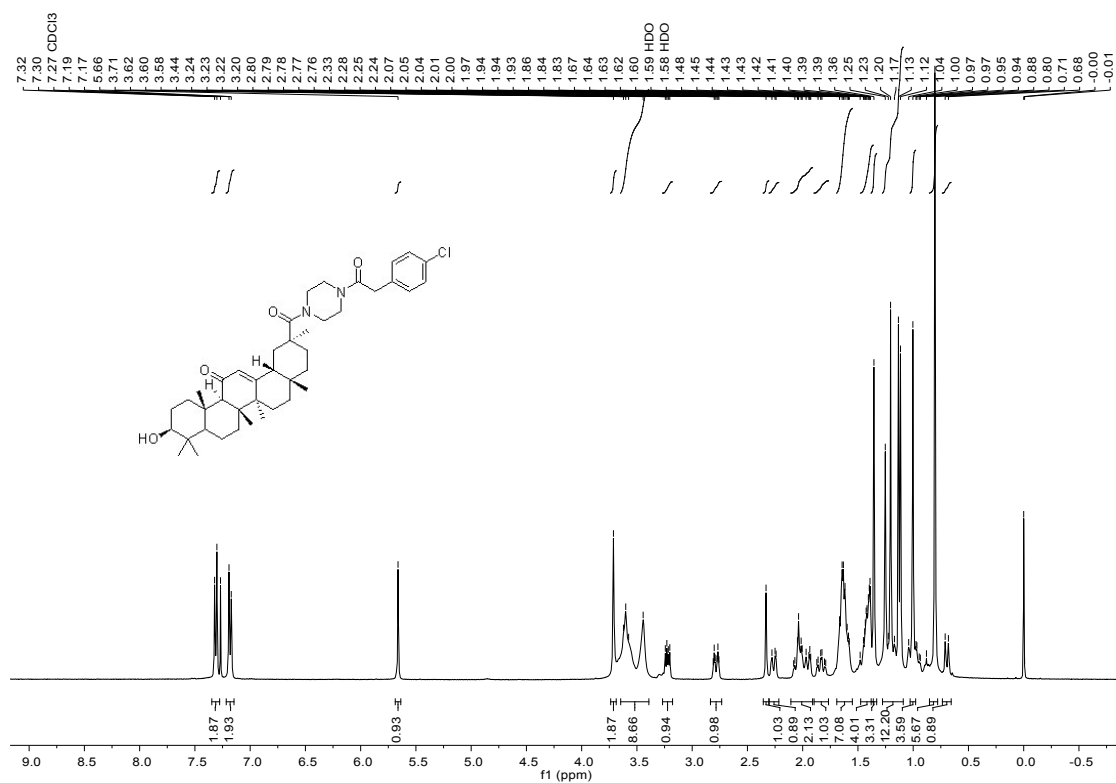
3 β -Hydroxy-30-(4-(2-(thiophen-2-yl)acetyl)-1-piperazinyl)-olean-12-ene-11,30-dione (**4u**)



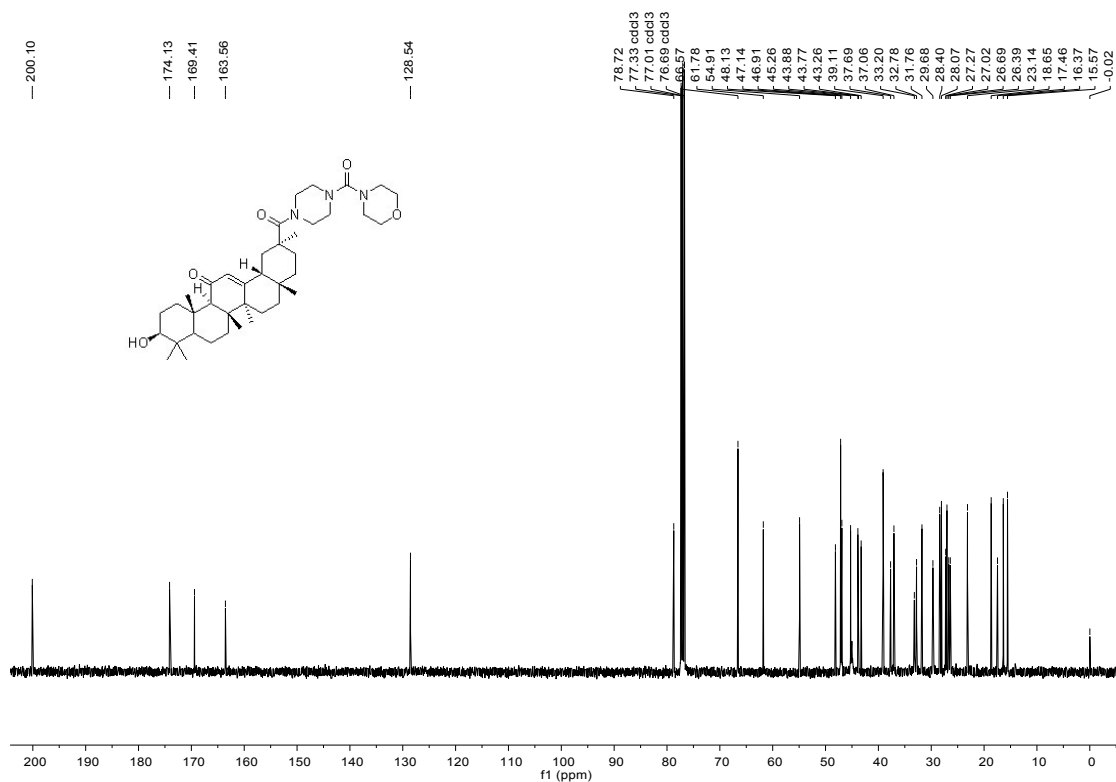
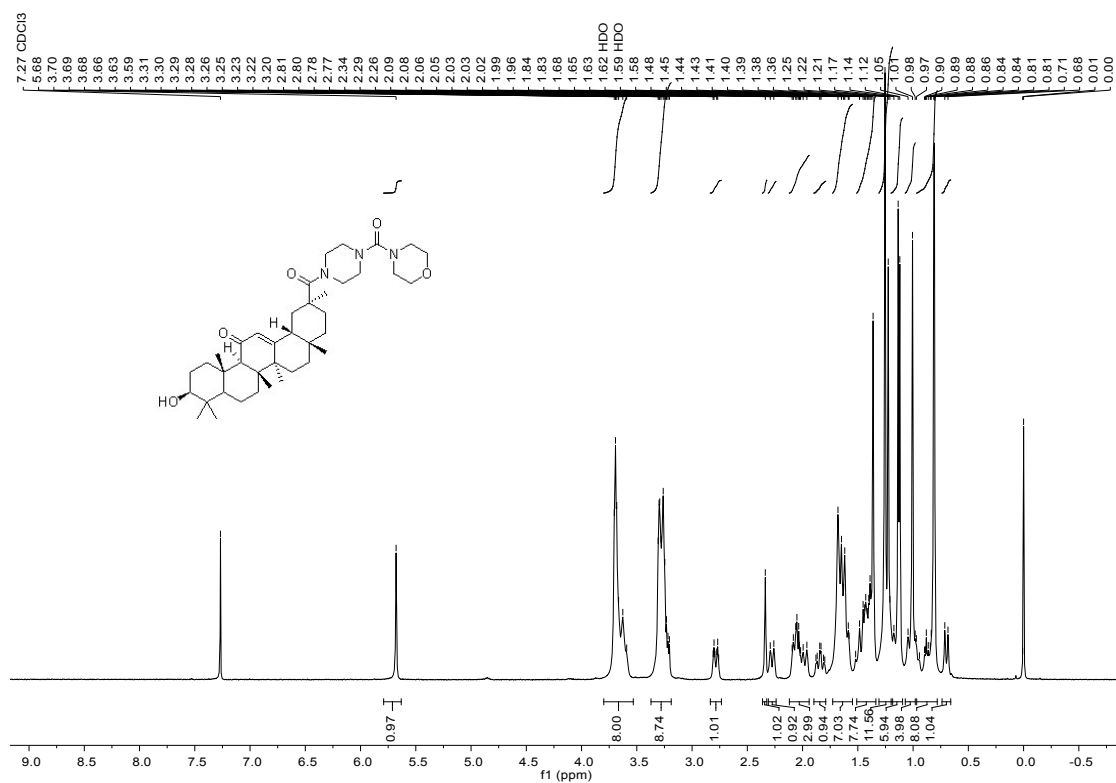
3 β -Hydroxy-30-(4-(2-(4-fluorophenyl)acetyl)-1-piperazinyl)-olean-12-ene-11,30-dione (**4v**)



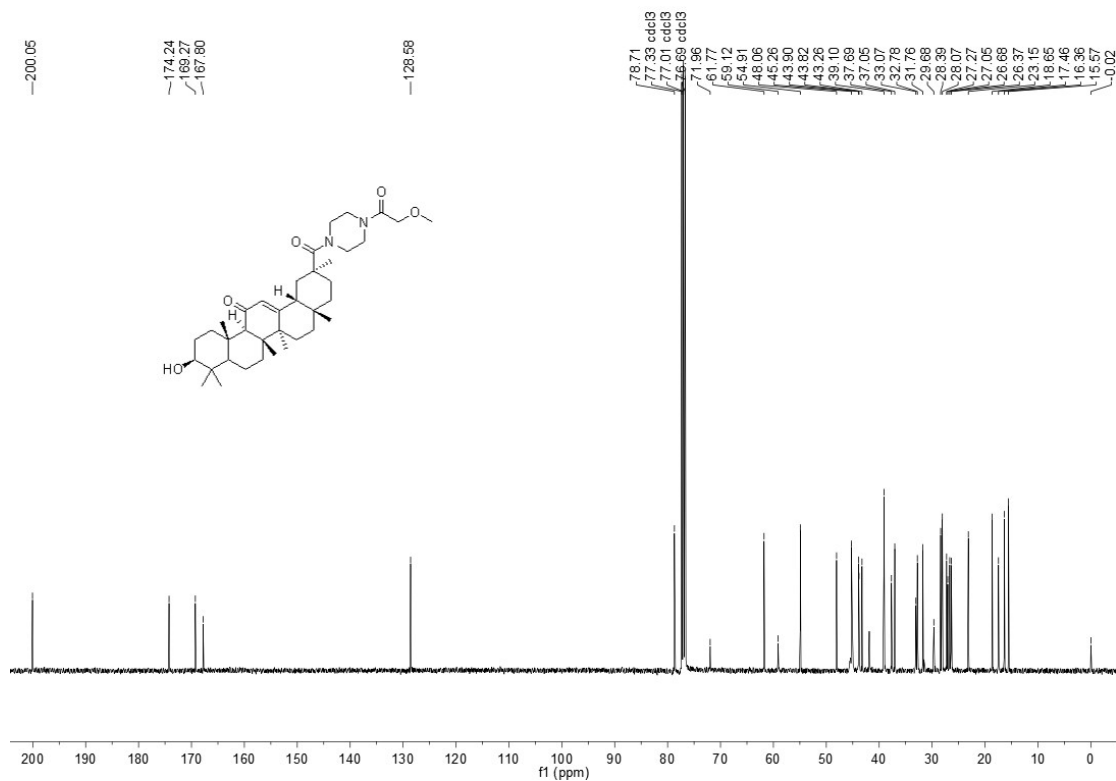
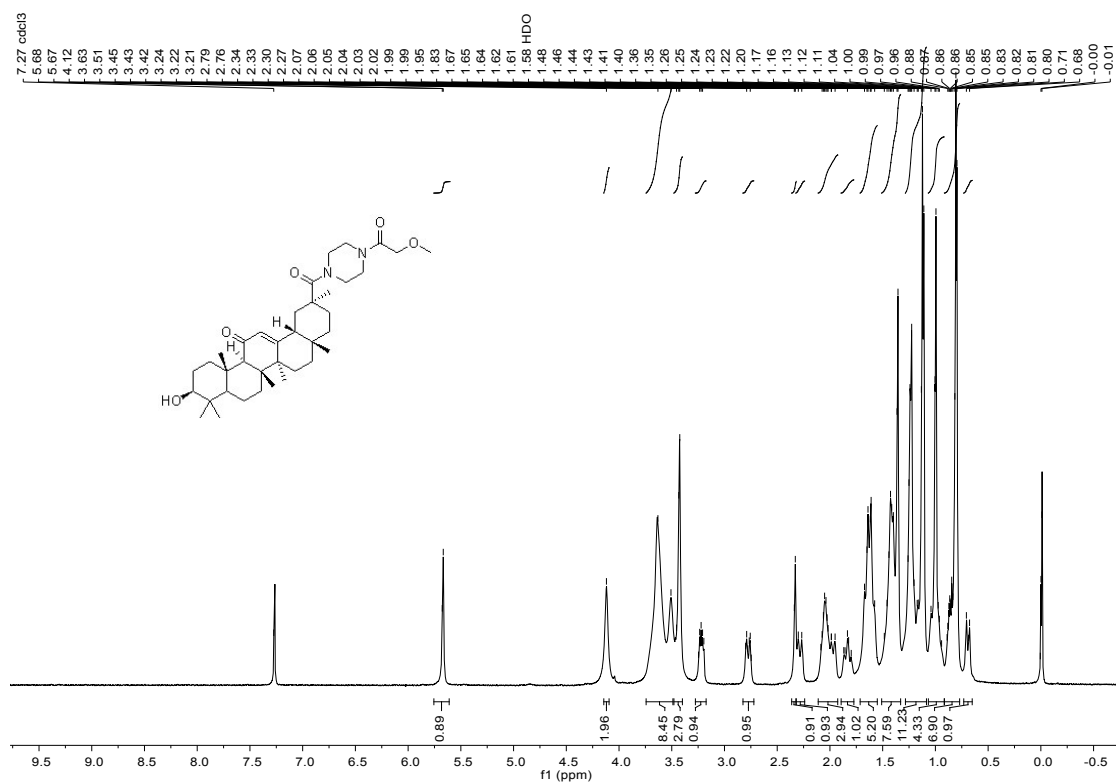
3 β -Hydroxy-30-(4-(2-(4-chlorophenyl)acetyl)-1-piperazinyl)-olean-12-ene-11,30-dione (**4w**)



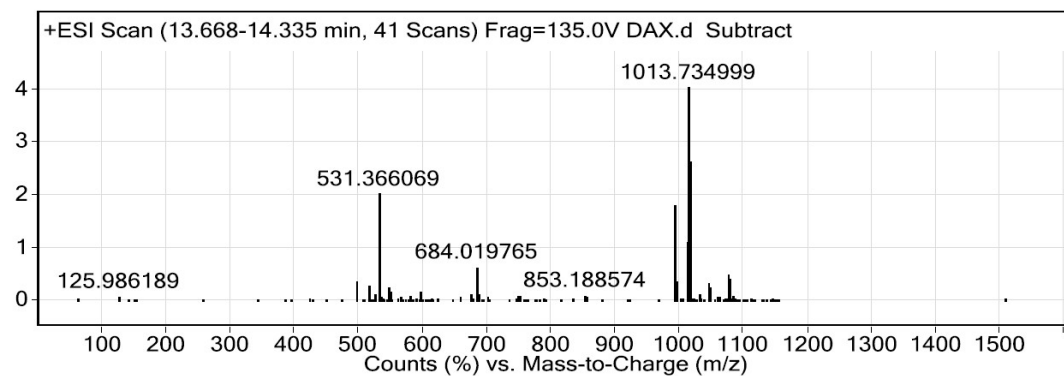
3 β -Hydroxy-30-(4-(morpholine-4-carbonyl)-1-piperazinyl)-olean-12-ene-11,30-dione (**4x**)



β -Hydroxy-30-(4-(2-methoxyacetyl)-1-piperazinyl)-olean-12-ene-11,30-dione (4y**)**



bisamide (5)



Compound (7)

