**FIGURE 1**

**XRPD Pattern of Rifaximin Form γ-1 (ζ)**

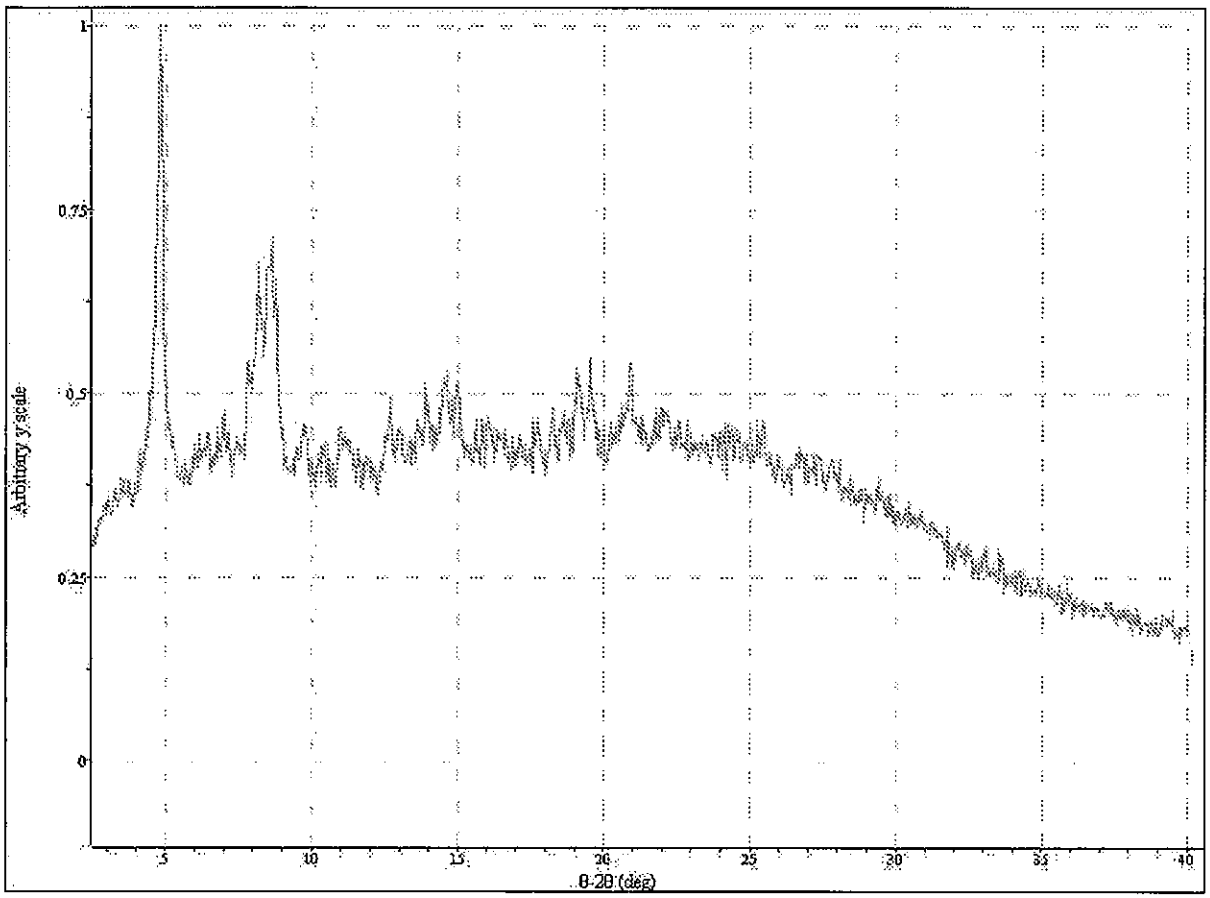


**FIGURE 2**

**XRPD Pattern of Rifaximin Form ζ**

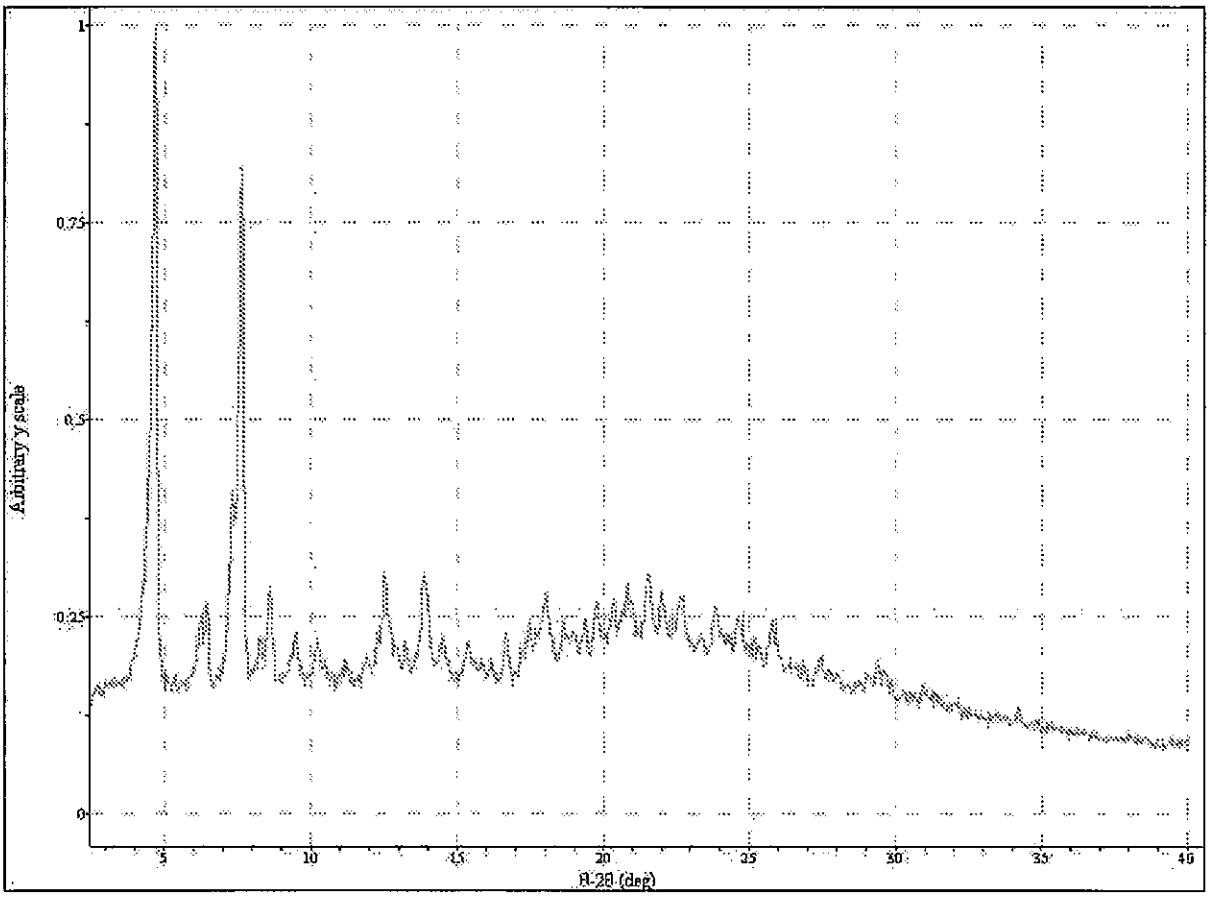


**FIGURE 3**

**XRPD Pattern of Rifaximin Form η**

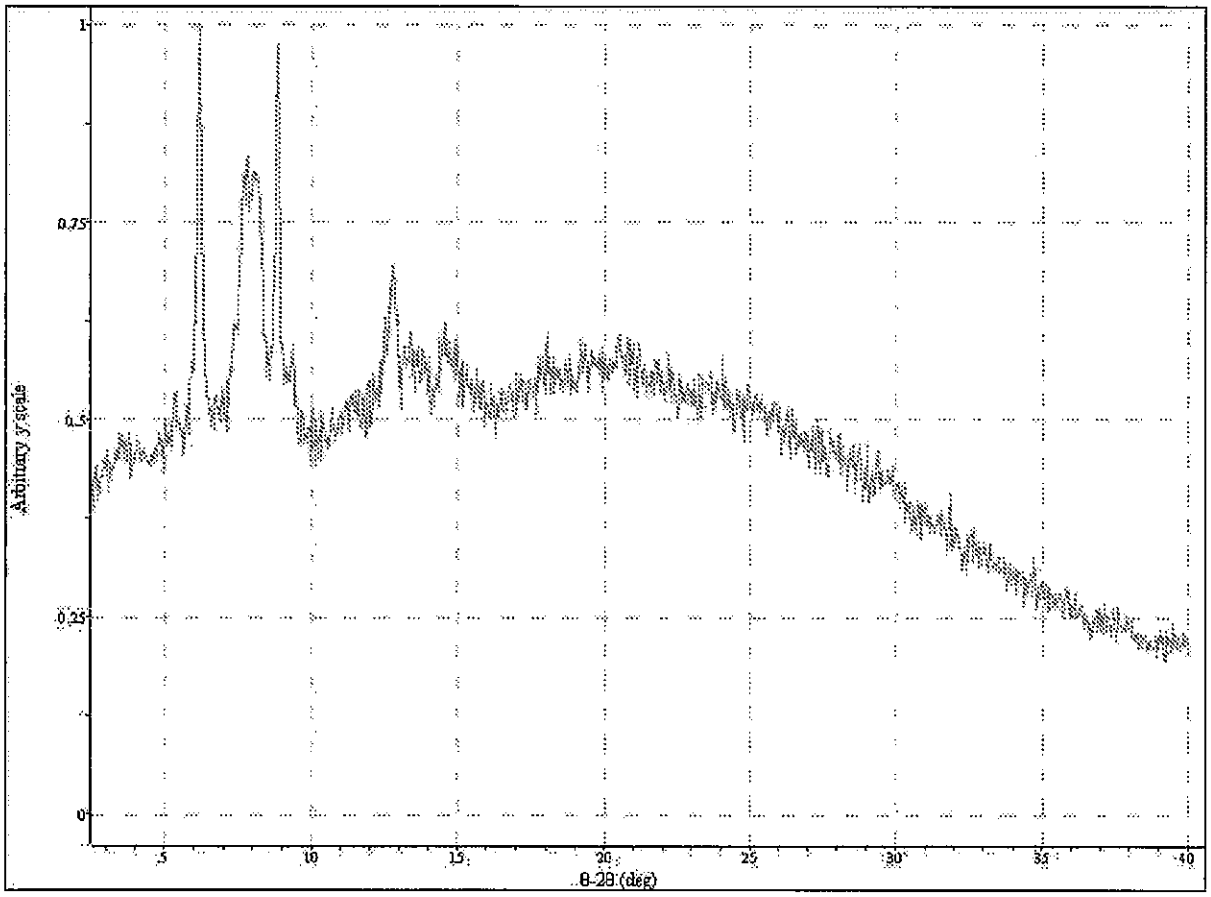


**FIGURE 4**

**XRPD Pattern of Rifaximin Form Amorphous**

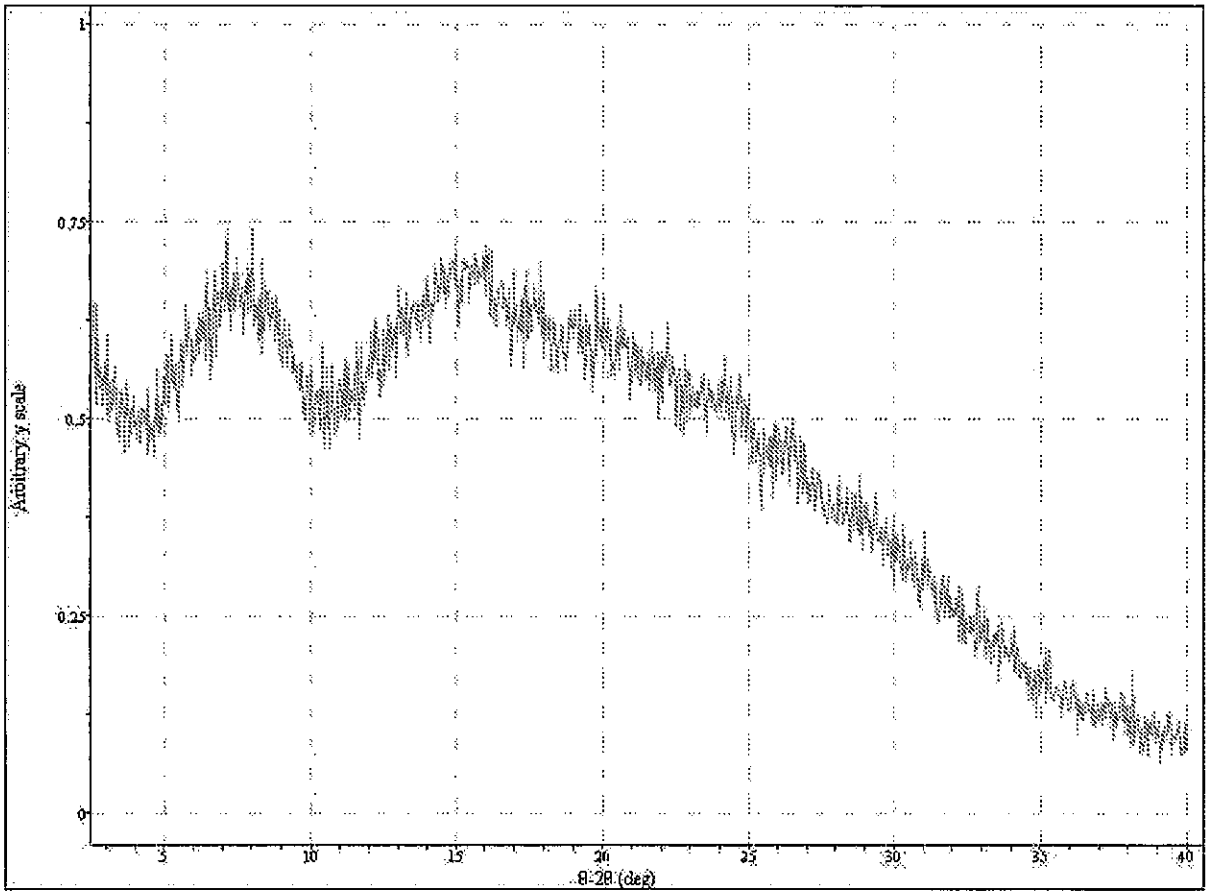
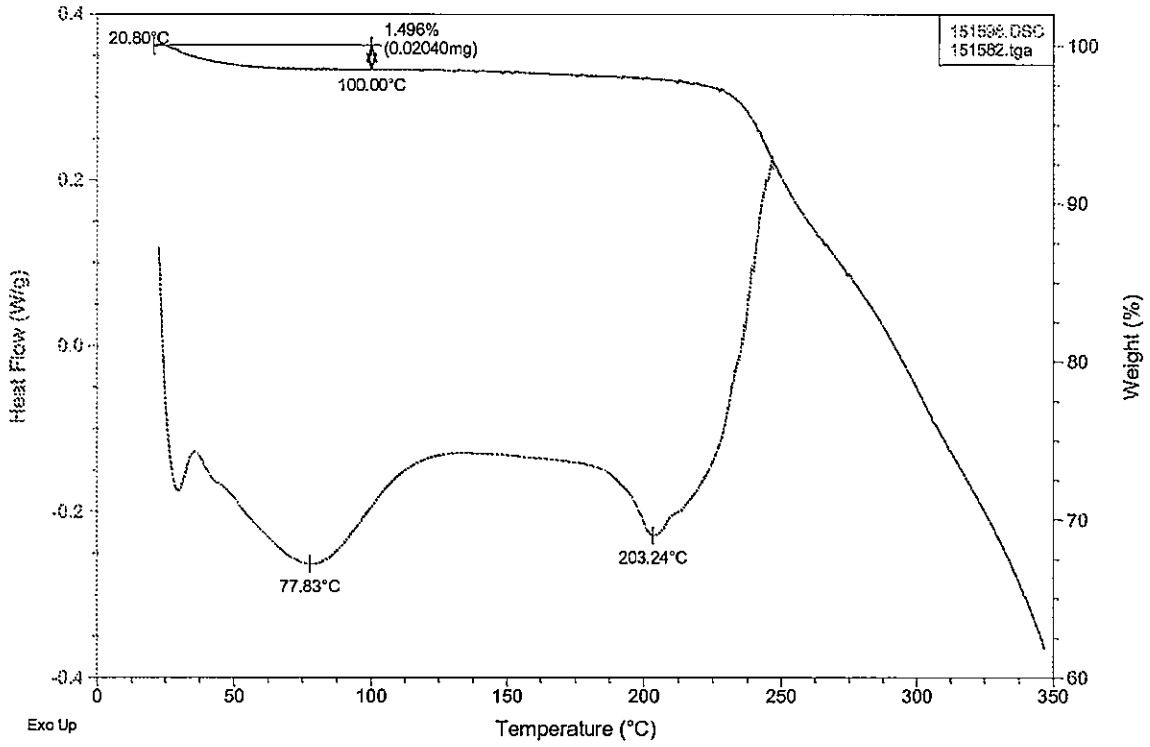


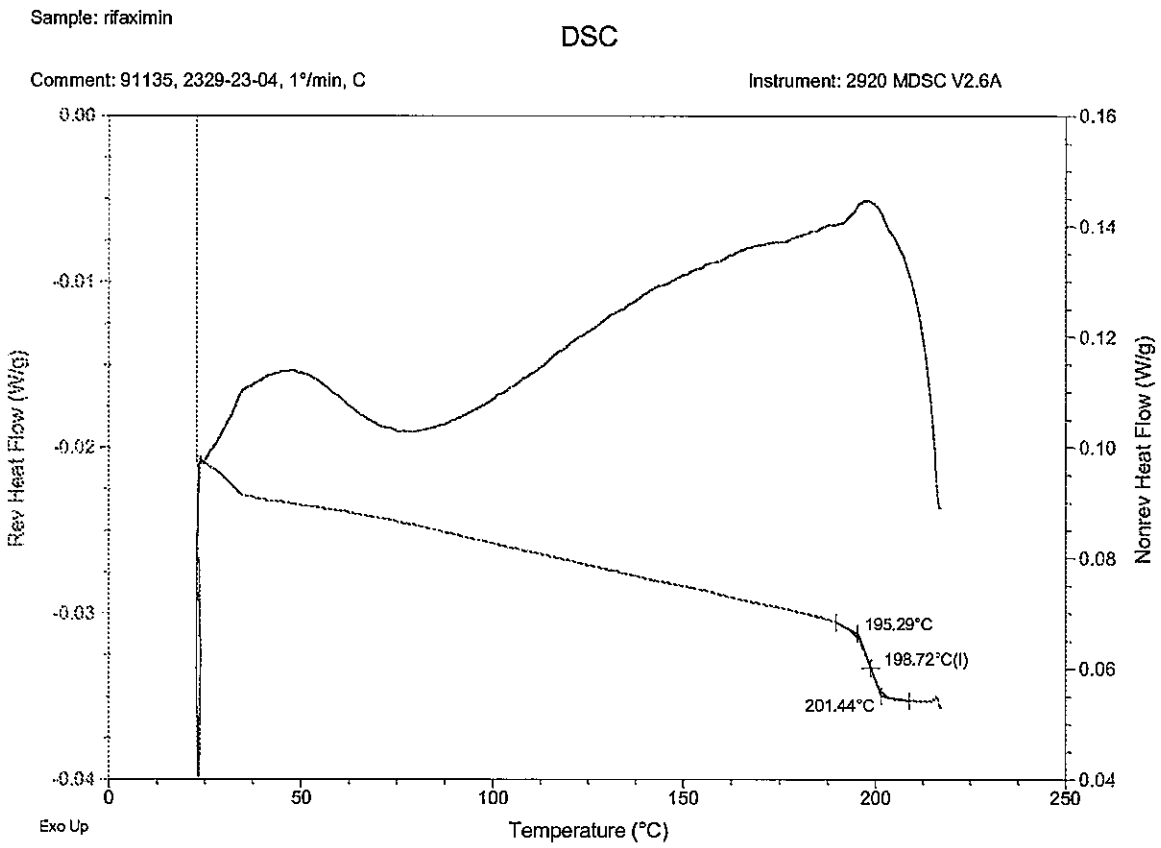
**FIGURE 5**

**TGA and DSC of Rifaximin Amorphous**



## FIGURE 6

**MDSC Rifaximin Form Amorphous**



**TGA and DSC of Rifaximin form β–2**

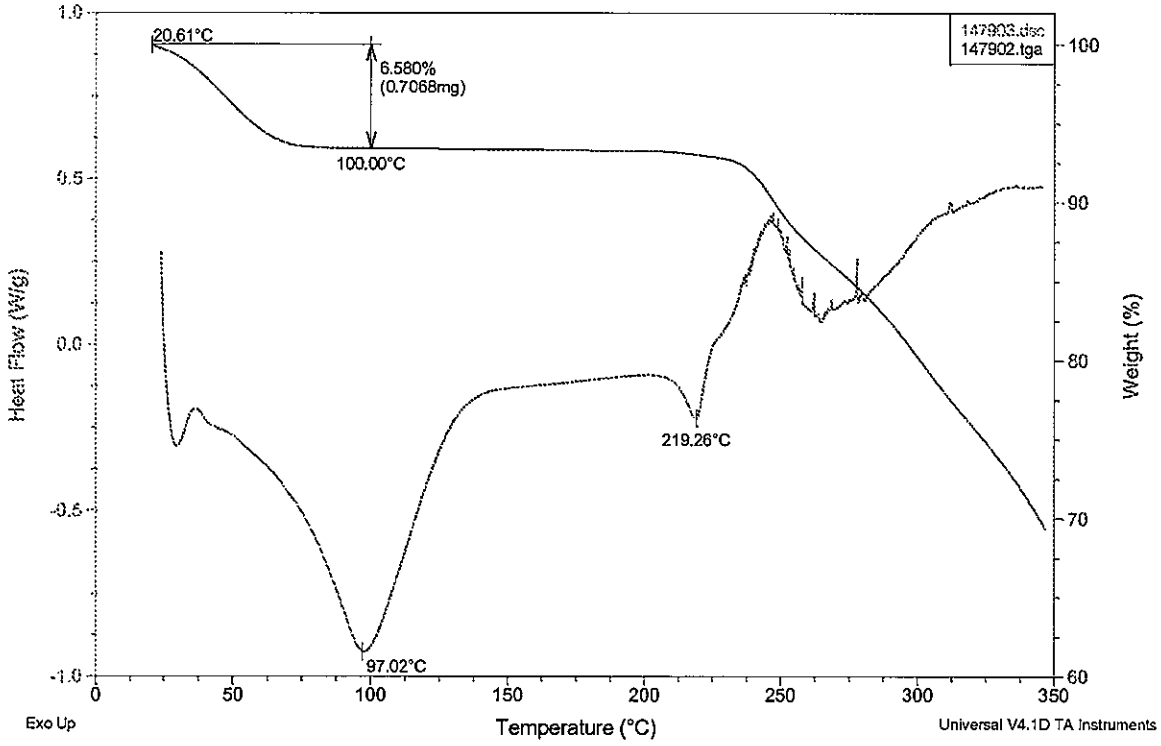



**FIGURE 7**

**FIGURE 8**

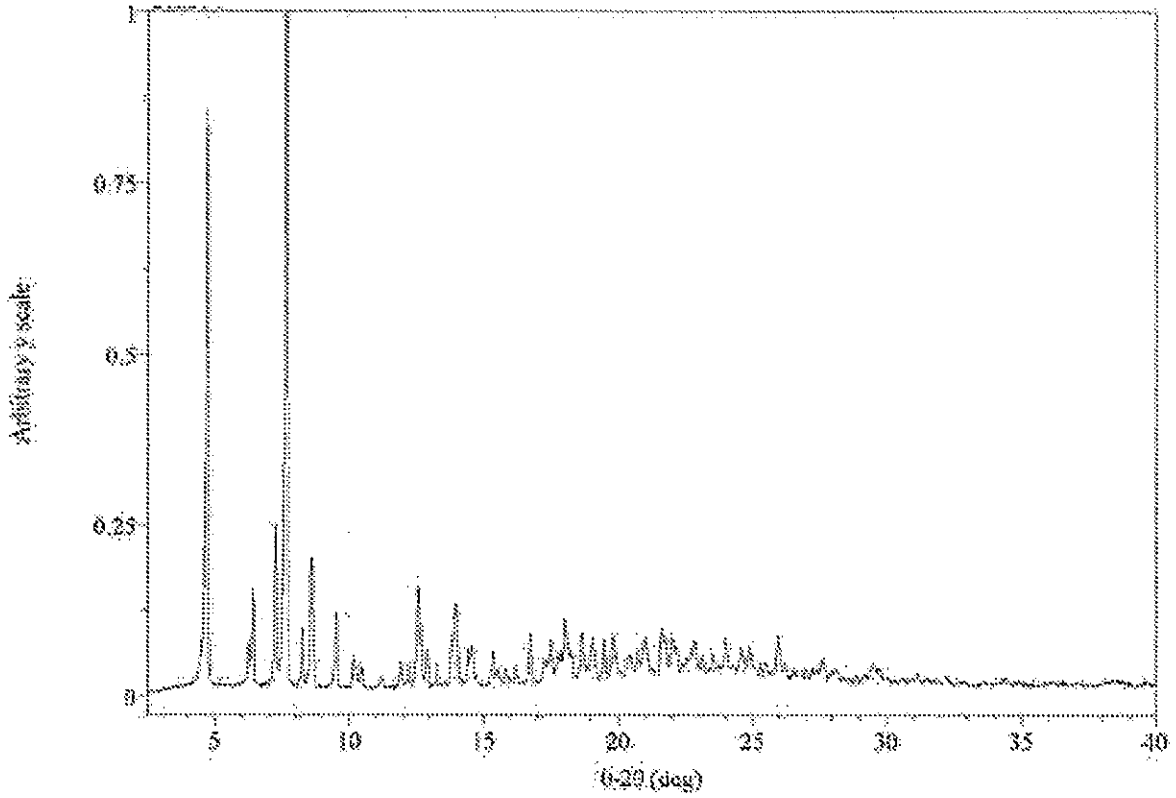


**FIGURE 9**

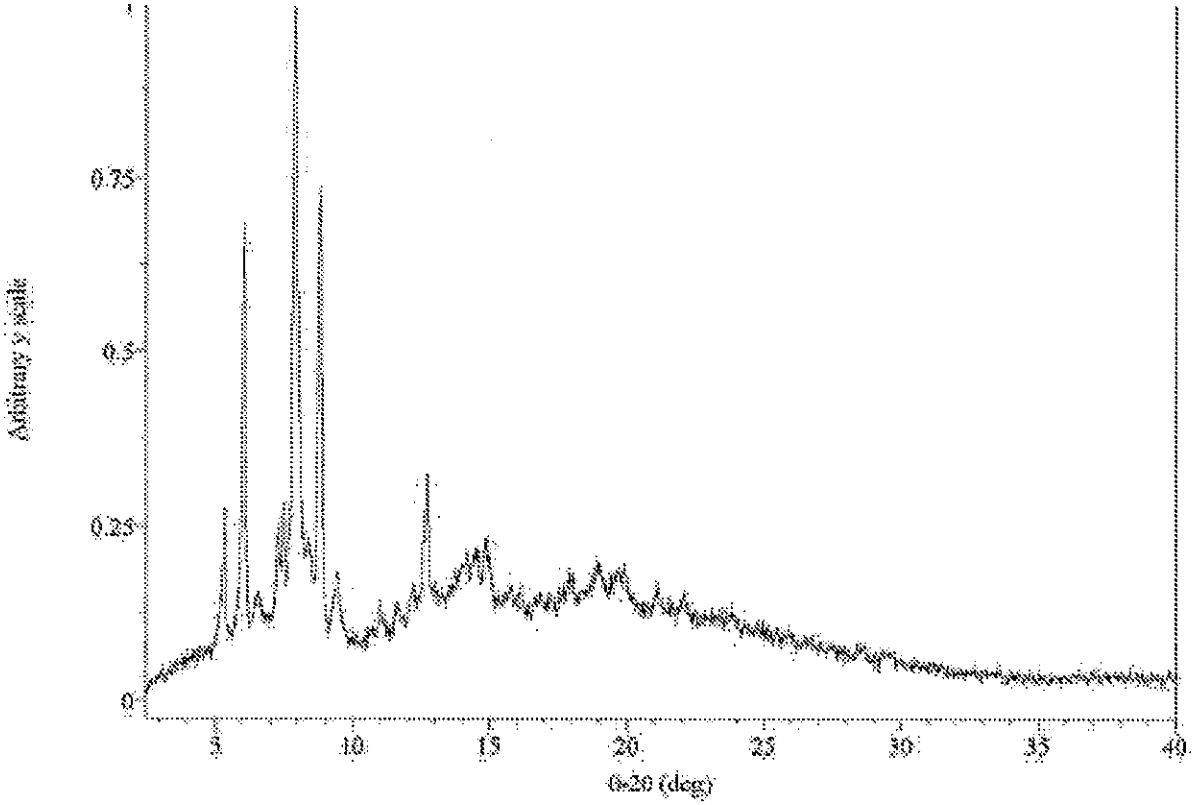


**FIGURE 10**

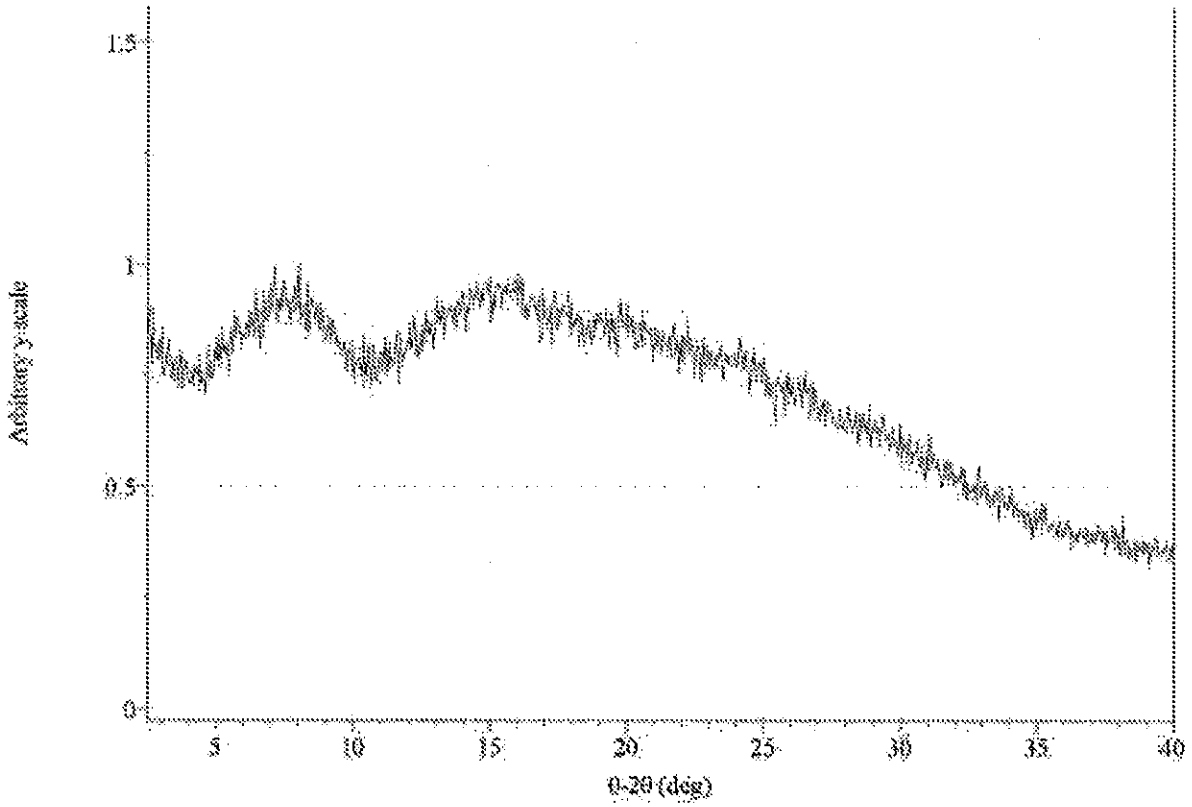
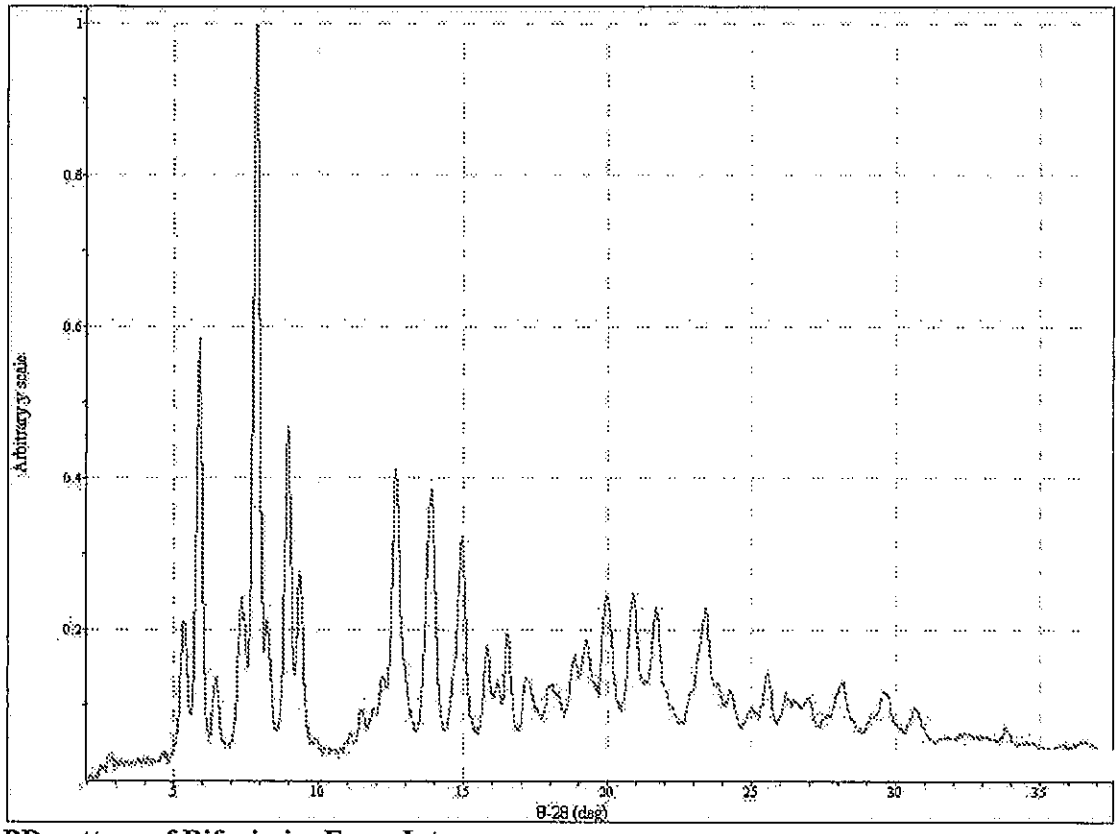
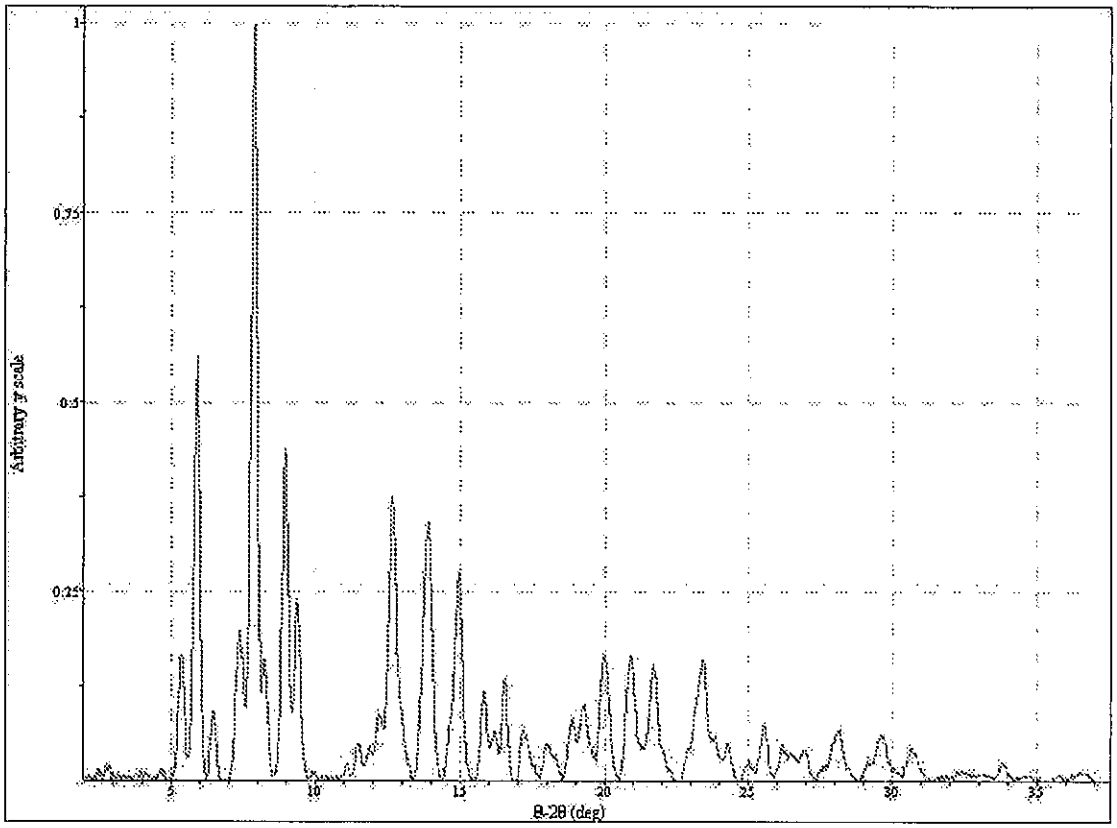


**Figure 11**



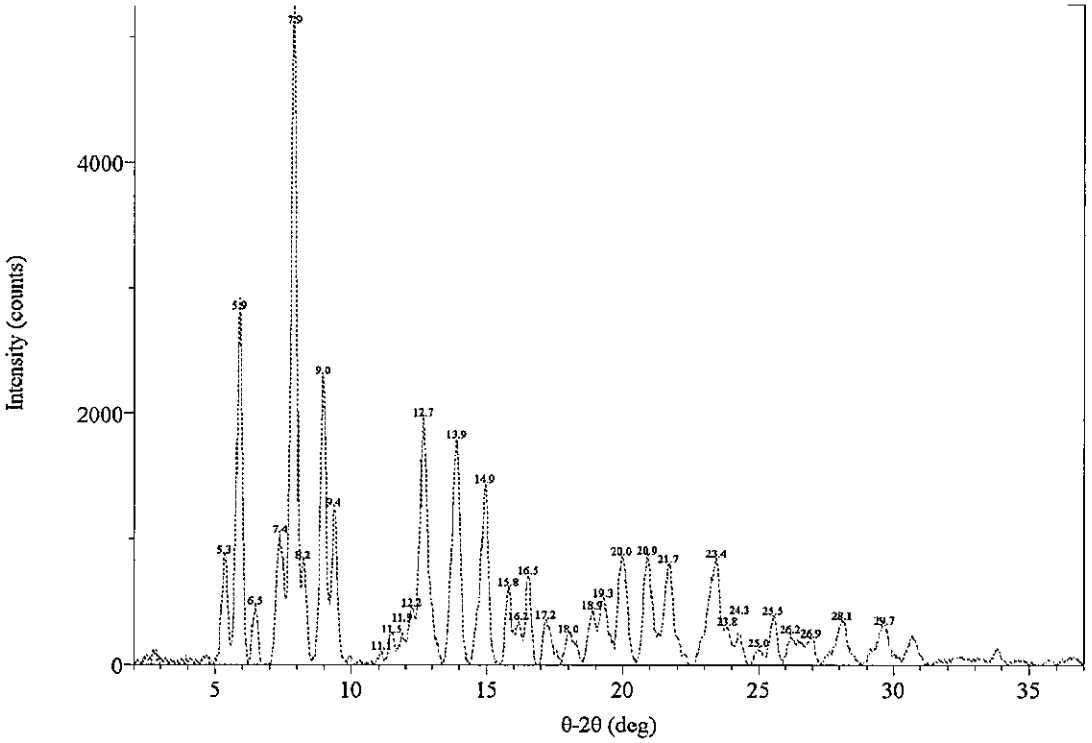

**XRPD pattern of Rifaximin, Form Iota.**

**Figure 12**




**Background subtracted XRPD pattern of Rifaximin, Form Iota.**

**Figure 13**




**List of observed peaks for Rifaximin, Form Iota. Note that the peak labels in this image are meant as a visual aid.**

**Figure 14**

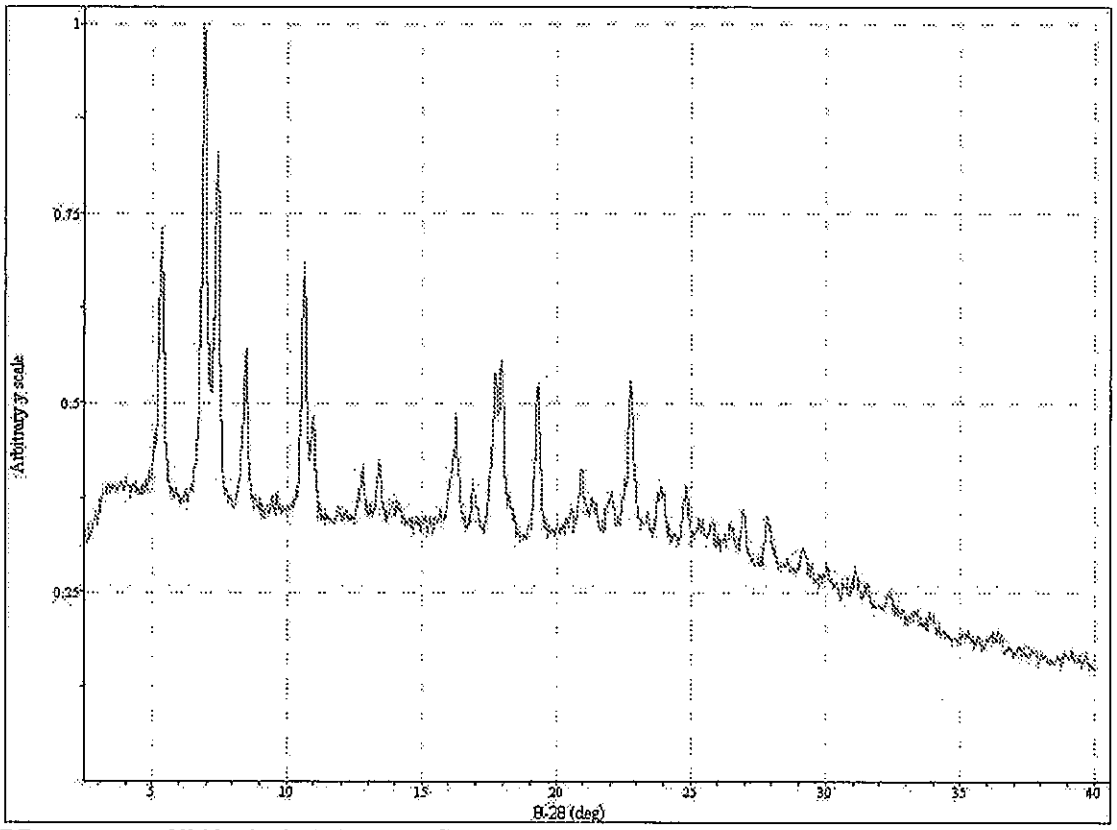
**A.** Observed peaks for Rifaximin, Form Iota

| °2θ | *d* space (Å) | Intensity (%) |
|---|---|---|
| 5.3 ± 0.1 | 16.550 ± 0.316 | 17 |
| 5.9 ± 0.1 | 15.031 ± 0.260 | 54 |
| 6.5 ± 0.1 | 13.683 ± 0.215 | 9 |
| 7.4 ± 0.1 | 12.011 ± 0.165 | 20 |
| 7.9 ± 0.1 | 11.220 ± 0.144 | 100 |
| 8.2 ± 0.1 | 10.757 ± 0.132 | 16 |
| 9.0 ± 0.1 | 9.870 ± 0.111 | 44 |
| 9.4 ± 0.1 | 9.449 ± 0.102 | 24 |
| 11.1 ± 0.1 | 7.957 ± 0.072 | 2 |
| 11.5 ± 0.1 | 7.695 ± 0.067 | 5 |
| 11.9 ± 0.1 | 7.450 ± 0.063 | 5 |
| 12.2 ± 0.1 | 7.231 ± 0.059 | 9 |
| 12.7 ± 0.1 | 6.992 ± 0.055 | 37 |
| 13.9 ± 0.1 | 6.371 ± 0.046 | 34 |
| 14.9 ± 0.1 | 5.930 ± 0.040 | 27 |
| 15.8 ± 0.1 | 5.602 ± 0.035 | 12 |
| 16.2 ± 0.1 | 5.478 ± 0.034 | 7 |
| 16.5 ± 0.1 | 5.360 ± 0.032 | 14 |
| 17.2 ± 0.1 | 5.162 ± 0.030 | 7 |
| 18.0 ± 0.1 | 4.928 ± 0.027 | 5 |
| 18.9 ± 0.1 | 4.700 ± 0.025 | 8 |
| 19.3 ± 0.1 | 4.604 ± 0.024 | 10 |
| 20.0 ± 0.1 | 4.448 ± 0.022 | 17 |
| 20.9 ± 0.1 | 4.250 ± 0.020 | 17 |
| 21.7 ± 0.1 | 4.099 ± 0.019 | 15 |
| 23.4 ± 0.1 | 3.795 ± 0.016 | 16 |
| 23.8 ± 0.1 | 3.733 ± 0.015 | 6 |
| 24.3 ± 0.1 | 3.663 ± 0.015 | 5 |
| 25.0 ± 0.1 | 3.559 ± 0.014 | 3 |
| 25.5 ± 0.1 | 3.488 ± 0.013 | 8 |
| 26.2 ± 0.1 | 3.401 ± 0.013 | 5 |
| 26.9 ± 0.1 | 3.310 ± 0.012 | 4 |
| 28.1 ± 0.1 | 3.176 ± 0.011 | 7 |
| 29.7 ± 0.1 | 3.010 ± 0.010 | 6 |

**B.** Prominent peaks for Rifaximin, Form Iota

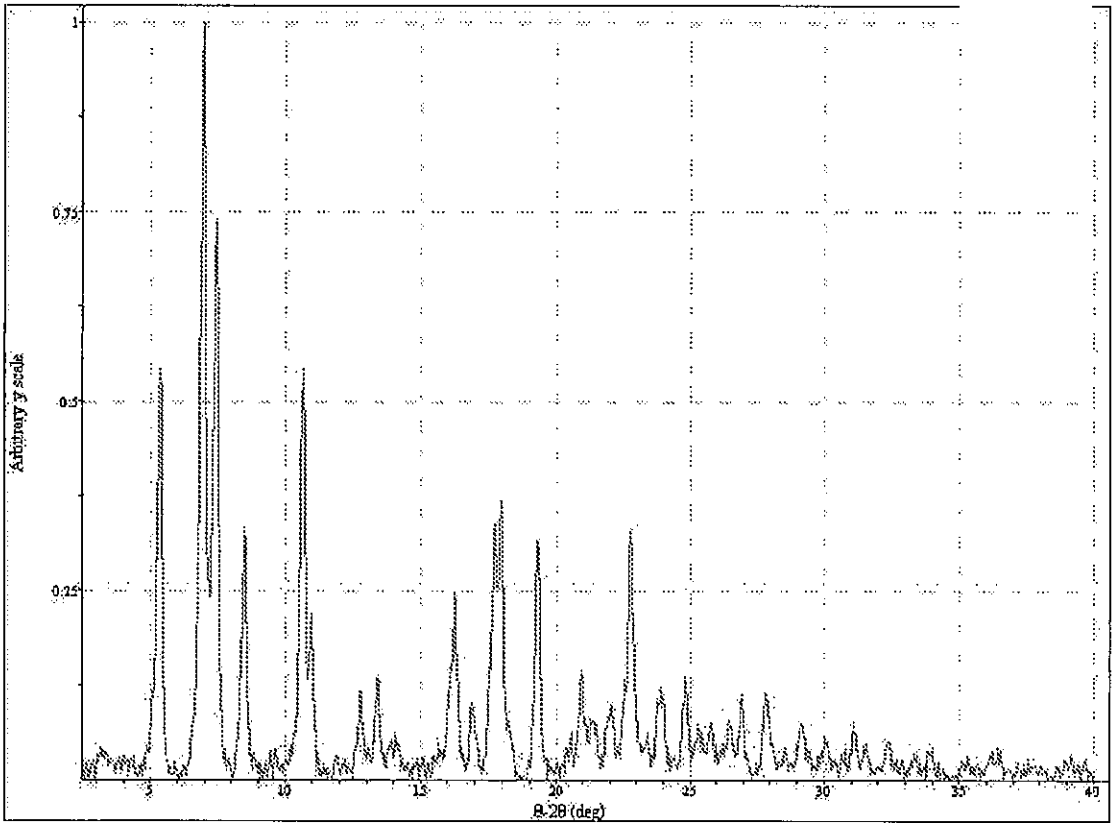
| °2θ | *d* space (Å) | Intensity (%) |
|---|---|---|
| 5.9 ± 0.1 | 15.031 ± 0.260 | 54 |
| 7.9 ± 0.1 | 11.220 ± 0.144 | 100 |
| 9.0 ± 0.1 | 9.870 ± 0.111 | 44 |
| 12.7 ± 0.1 | 6.992 ± 0.055 | 37 |
| 13.9 ± 0.1 | 6.371 ± 0.046 | 34 |
| 14.9 ± 0.1 | 5.930 ± 0.040 | 27 |

**Figure 15**



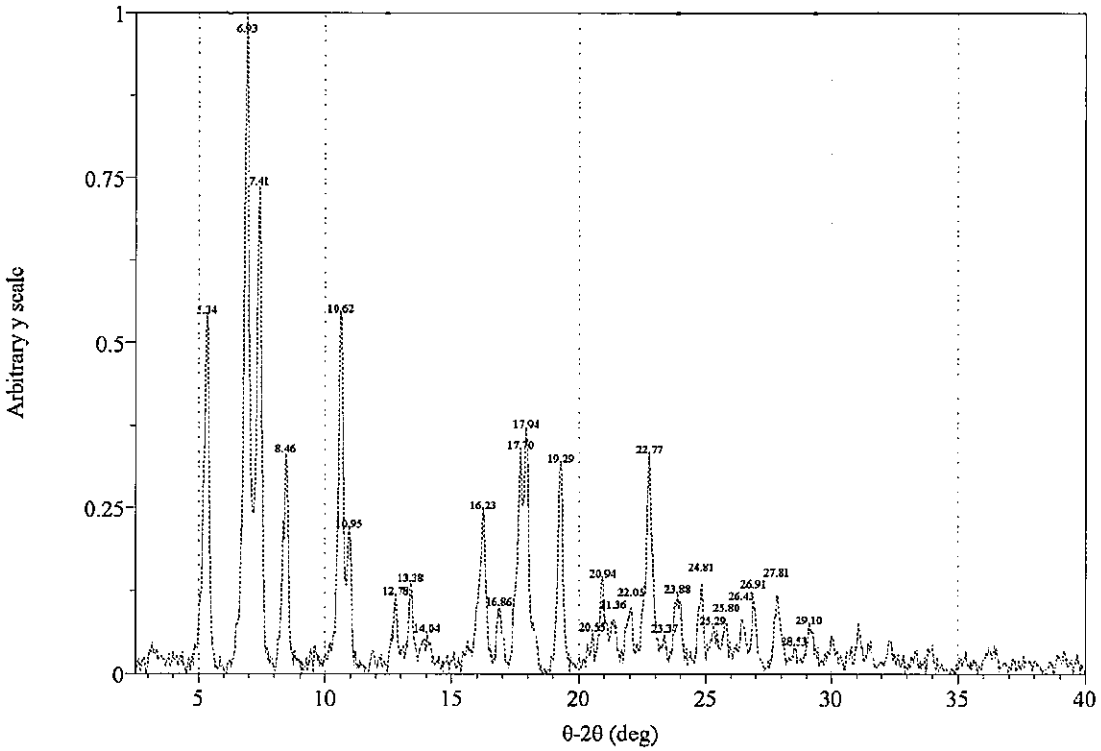

**XRPD pattern of Rifaximin Mesylate Salt.**

Figure 16




**Background subtracted XRPD pattern of Rifaximin Mesylate Salt.**

**Figure 17**




**List of observed peaks for Rifaximin Mesylate Salt. Note that the peak labels in this image are meant as a visual aid.**

**Figure 18**

**A.** Observed peaks for Rifaximin Mesylate Salt

| °2θ | *d* space (Å) | Intensity (%) |
|---|---|---|
| 5.34 ± 0.10 | 16.550 ± 0.316 | 54 |
| 6.93 ± 0.10 | 12.756 ± 0.187 | 100 |
| 7.41 ± 0.10 | 11.930 ± 0.163 | 74 |
| 8.46 ± 0.10 | 10.452 ± 0.125 | 33 |
| 10.62 ± 0.10 | 8.330 ± 0.079 | 55 |
| 10.95 ± 0.10 | 8.080 ± 0.074 | 22 |
| 12.78 ± 0.10 | 6.927 ± 0.054 | 12 |
| 13.38 ± 0.10 | 6.618 ± 0.050 | 14 |
| 14.04 ± 0.10 | 6.308 ± 0.045 | 6 |
| 16.23 ± 0.10 | 5.461 ± 0.034 | 25 |
| 16.86 ± 0.10 | 5.259 ± 0.031 | 10 |
| 17.70 ± 0.10 | 5.011 ± 0.028 | 34 |
| 17.94 ± 0.10 | 4.945 ± 0.027 | 37 |
| 19.29 ± 0.10 | 4.601 ± 0.024 | 32 |
| 20.55 ± 0.10 | 4.322 ± 0.021 | 6 |
| 20.94 ± 0.10 | 4.242 ± 0.020 | 15 |
| 21.36 ± 0.10 | 4.160 ± 0.019 | 8 |
| 22.05 ± 0.10 | 4.031 ± 0.018 | 10 |
| 22.77 ± 0.10 | 3.905 ± 0.017 | 33 |
| 23.37 ± 0.10 | 3.807 ± 0.016 | 6 |
| 23.88 ± 0.10 | 3.726 ± 0.015 | 12 |
| 24.81 ± 0.10 | 3.589 ± 0.014 | 14 |
| 25.29 ± 0.10 | 3.522 ± 0.014 | 7 |
| 25.80 ± 0.10 | 3.453 ± 0.013 | 8 |
| 26.43 ± 0.10 | 3.372 ± 0.013 | 8 |
| 26.91 ± 0.10 | 3.313 ± 0.012 | 11 |
| 27.81 ± 0.10 | 3.208 ± 0.011 | 12 |
| 28.53 ± 0.10 | 3.129 ± 0.011 | 4 |
| 29.10 ± 0.10 | 3.069 ± 0.010 | 7 |

**B.** Prominent peaks for Rifaximin Mesylate Salt

| °2θ | *d* space (Å) | Intensity (%) |
|---|---|---|
| 5.34 ± 0.10 | 16.550 ± 0.316 | 54 |
| 6.93 ± 0.10 | 12.756 ± 0.187 | 100 |
| 7.41 ± 0.10 | 11.930 ± 0.163 | 74 |
| 8.46 ± 0.10 | 10.452 ± 0.125 | 33 |
| 10.62 ± 0.10 | 8.330 ± 0.079 | 55 |
| 10.95 ± 0.10 | 8.080 ± 0.074 | 22 |
| 16.23 ± 0.10 | 5.461 ± 0.034 | 25 |
| 17.70 ± 0.10 | 5.011 ± 0.028 | 34 |
| 17.94 ± 0.10 | 4.945 ± 0.027 | 37 |
| 19.29 ± 0.10 | 4.601 ± 0.024 | 32 |
| 22.77 ± 0.10 | 3.905 ± 0.017 | 33 |

**Figure 19**

XRPD overlay of rifaximin amorphous attempts (top to bottom):
Lyophilization (p-dioxane:water)
Crash precipitation (ethyl acetate with hexanes)
Fast evaporation (acetone)

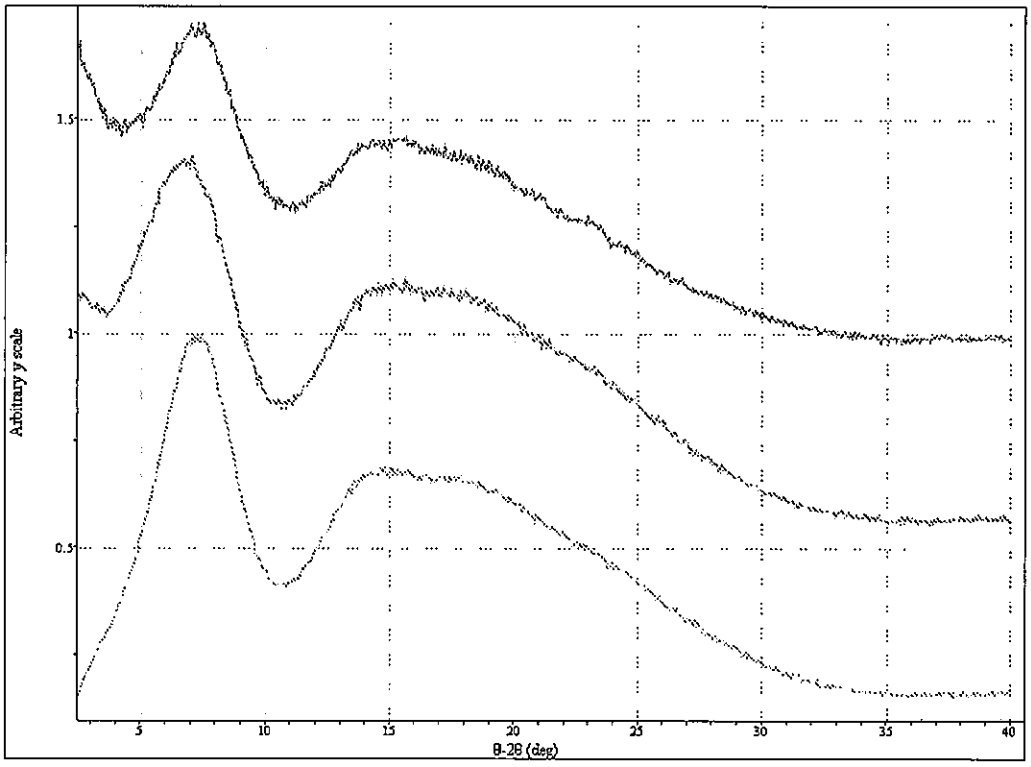


**Figure 20**

**DSC of Rifaximin, amorphous (crash precipitation from ethyl acetate with heptane)**

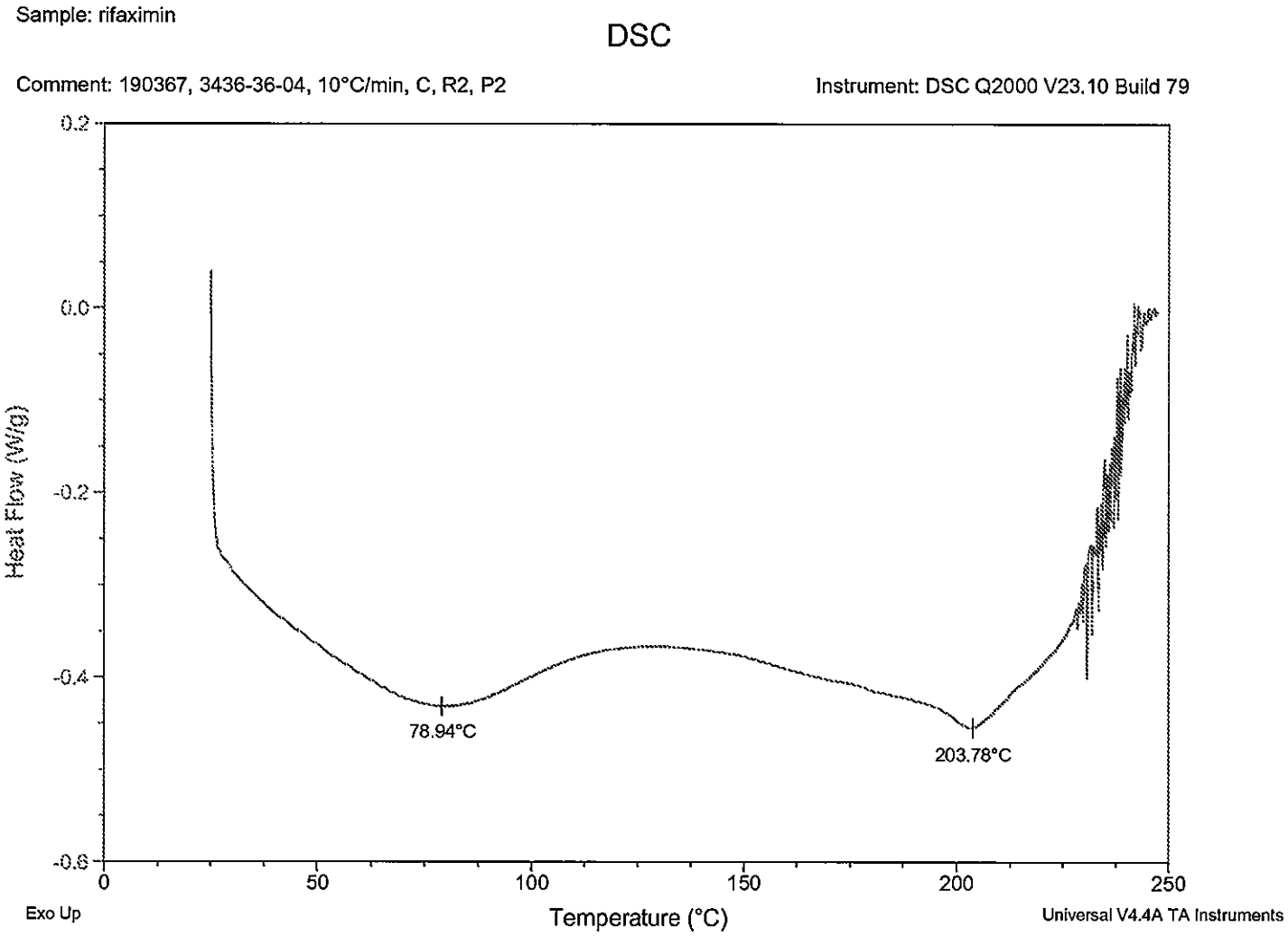


**Figure 21**
**Cycling DSC of Rifaximin, amorphous (crash precipitation from ethyl acetate with heptane)**

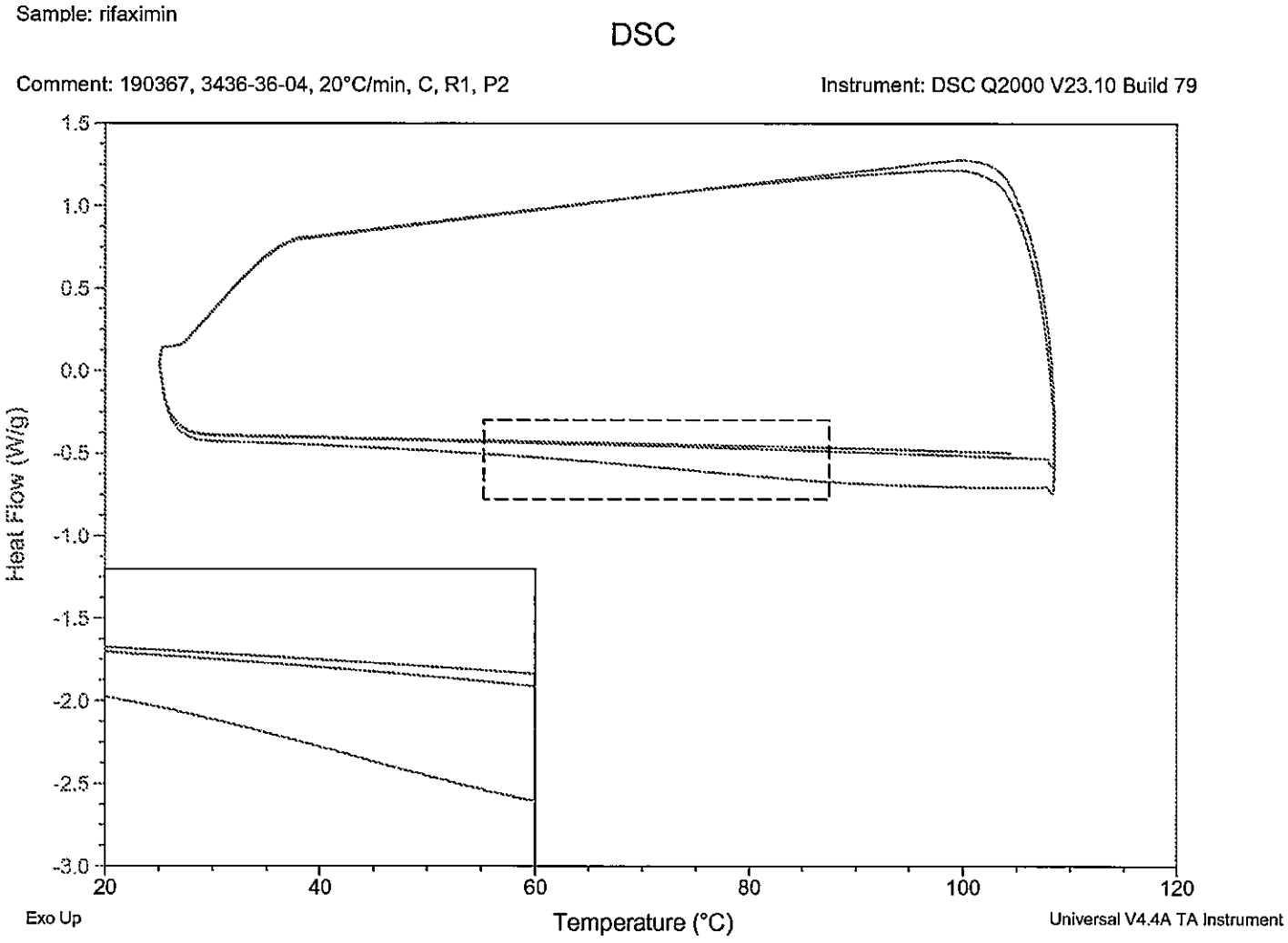


**Figure 22**

**TG of Rifaximin, amorphous (crash precipitation from ethyl acetate with heptane)**

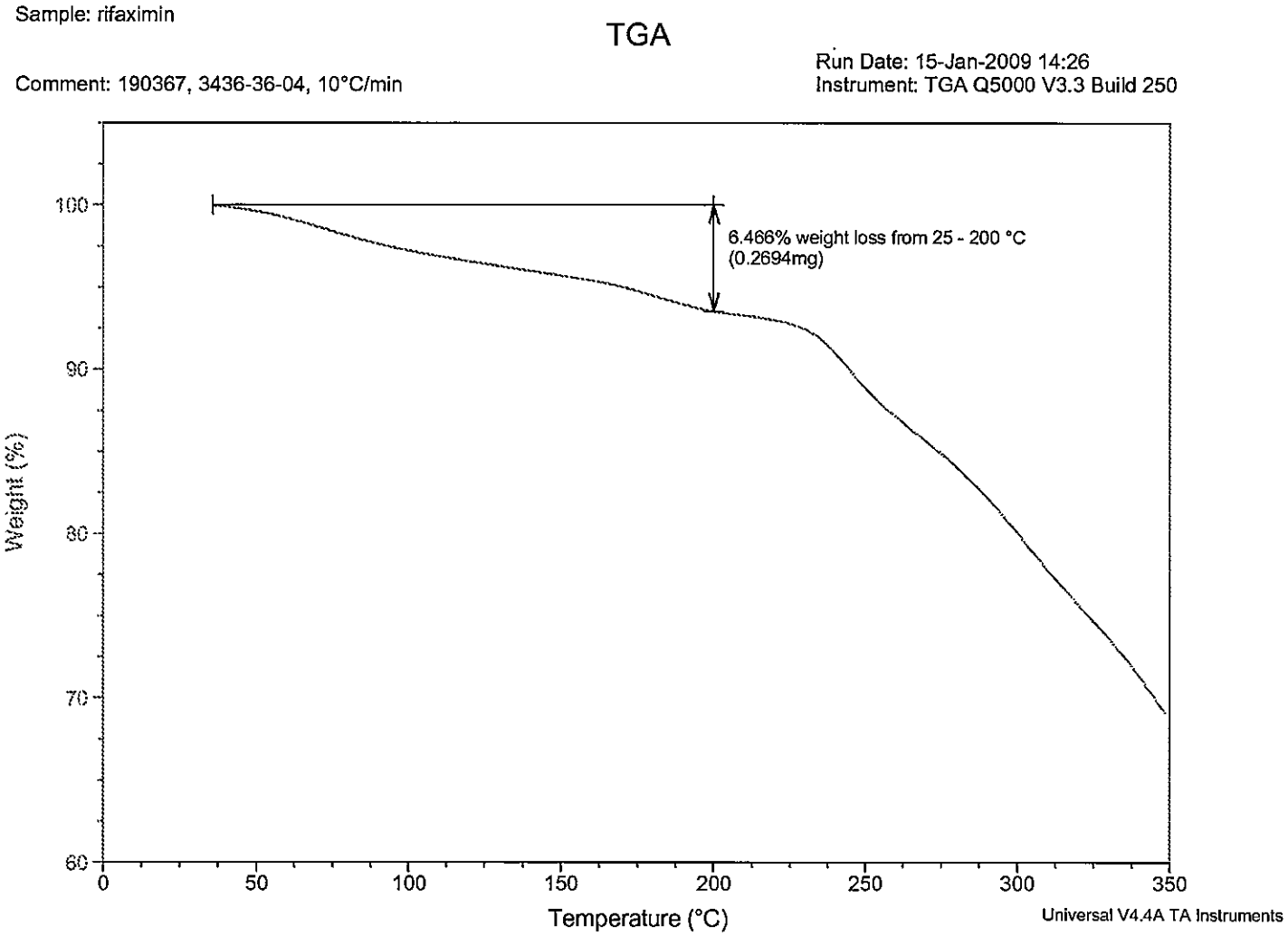


**Figure 23**

**XRPD overlay of Rifaximin, amorphous (top to bottom):**
Amorphous (crash precipitation from ethyl acetate with heptane)
Likely amorphous

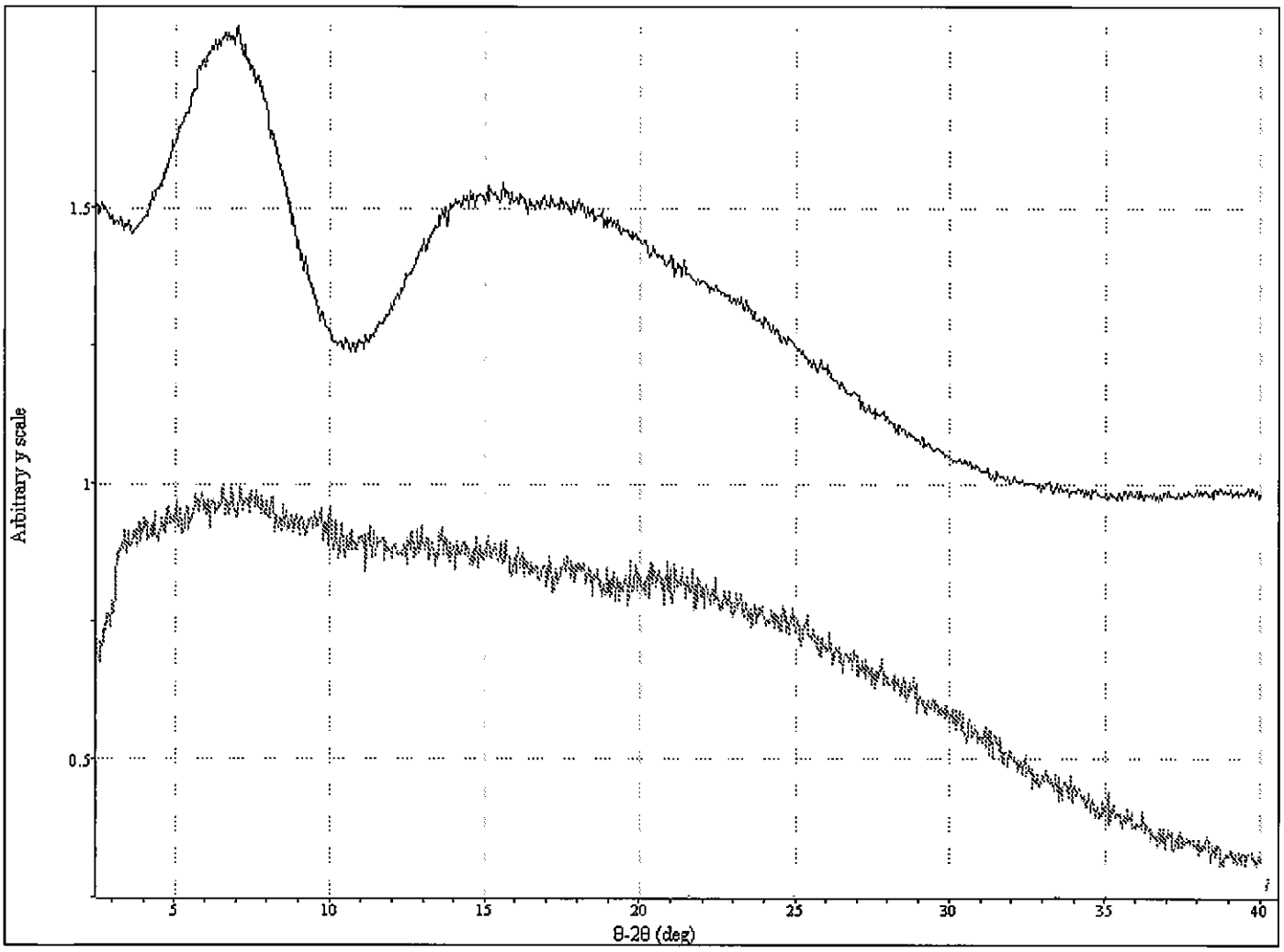


**Figure 24**

**Cycling DSC of Rifaximin, amorphous (lyophilization in p-dioxane: water 1:1)**

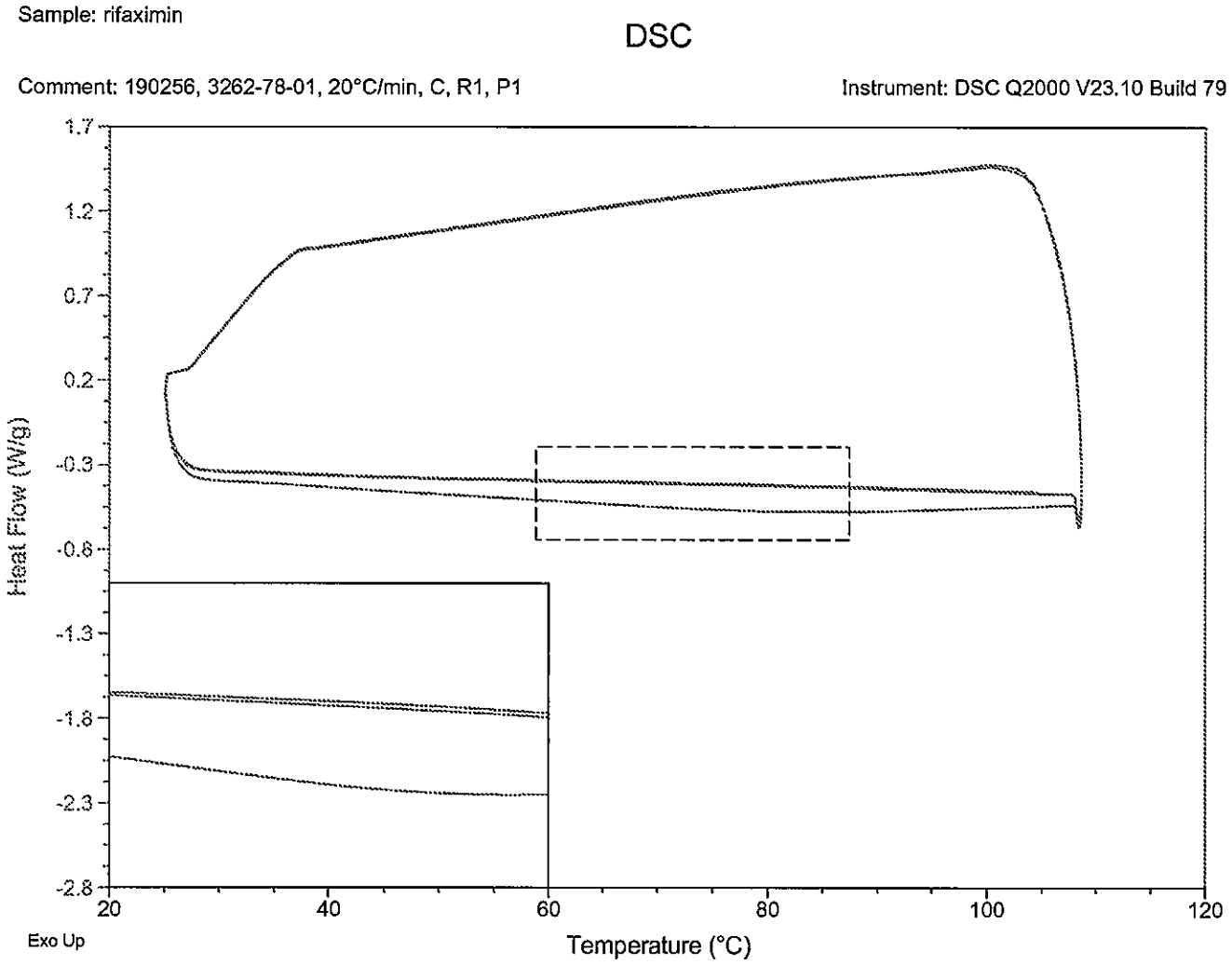


**Figure 25**

**TG of Rifaximin, amorphous (lyophilization in p-dioxane: water 1:1)**

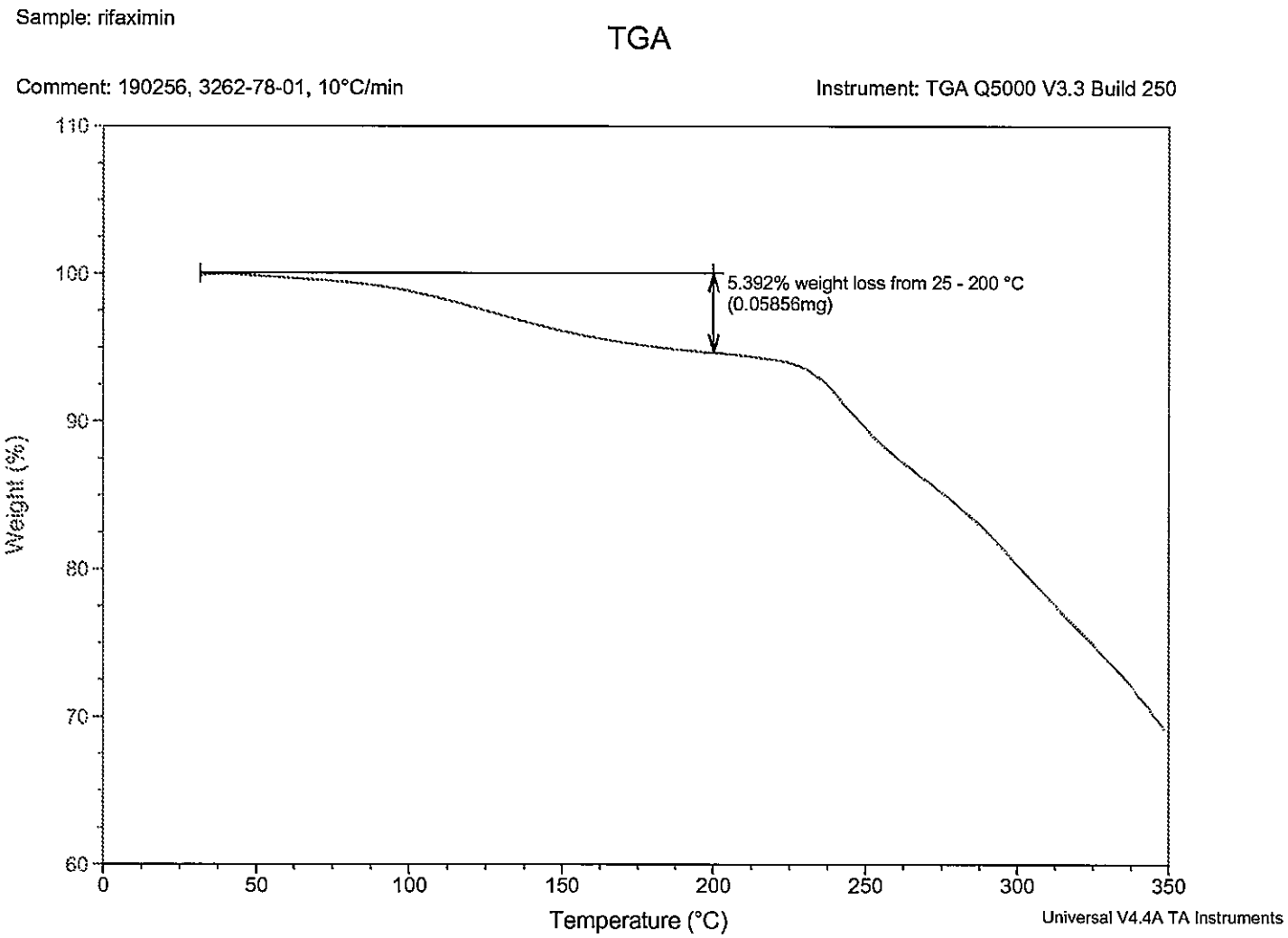


**Figure 26**

**XRPD of Rifaximin, amorphous (top to bottom):**
Amorphous (lyophilization in p-dioxane: water 1:1)
Likely amorphous,

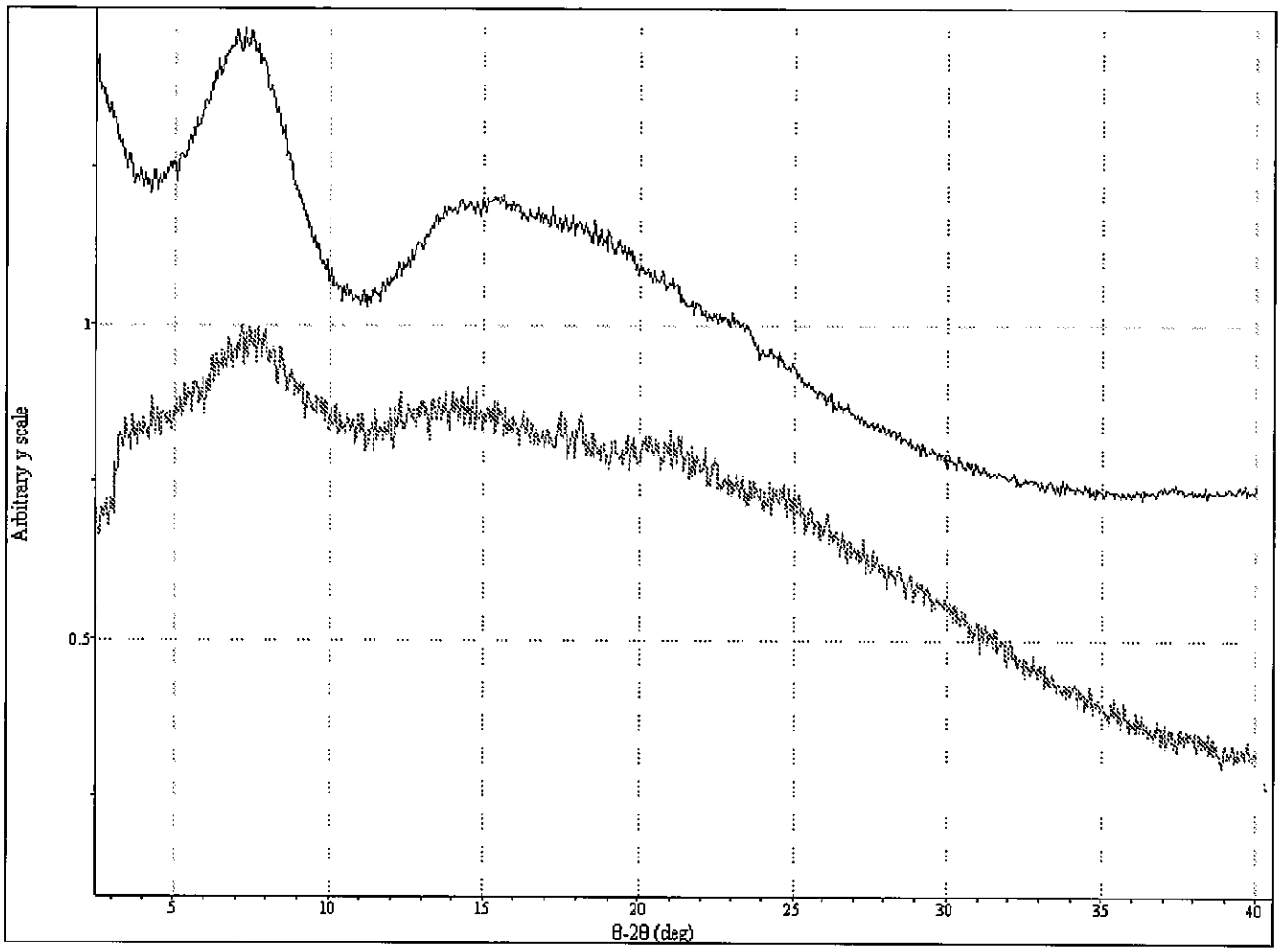


**Figure 27**

**Cycling DSC of Rifaximin, amorphous (fast evaporation from acetone)**

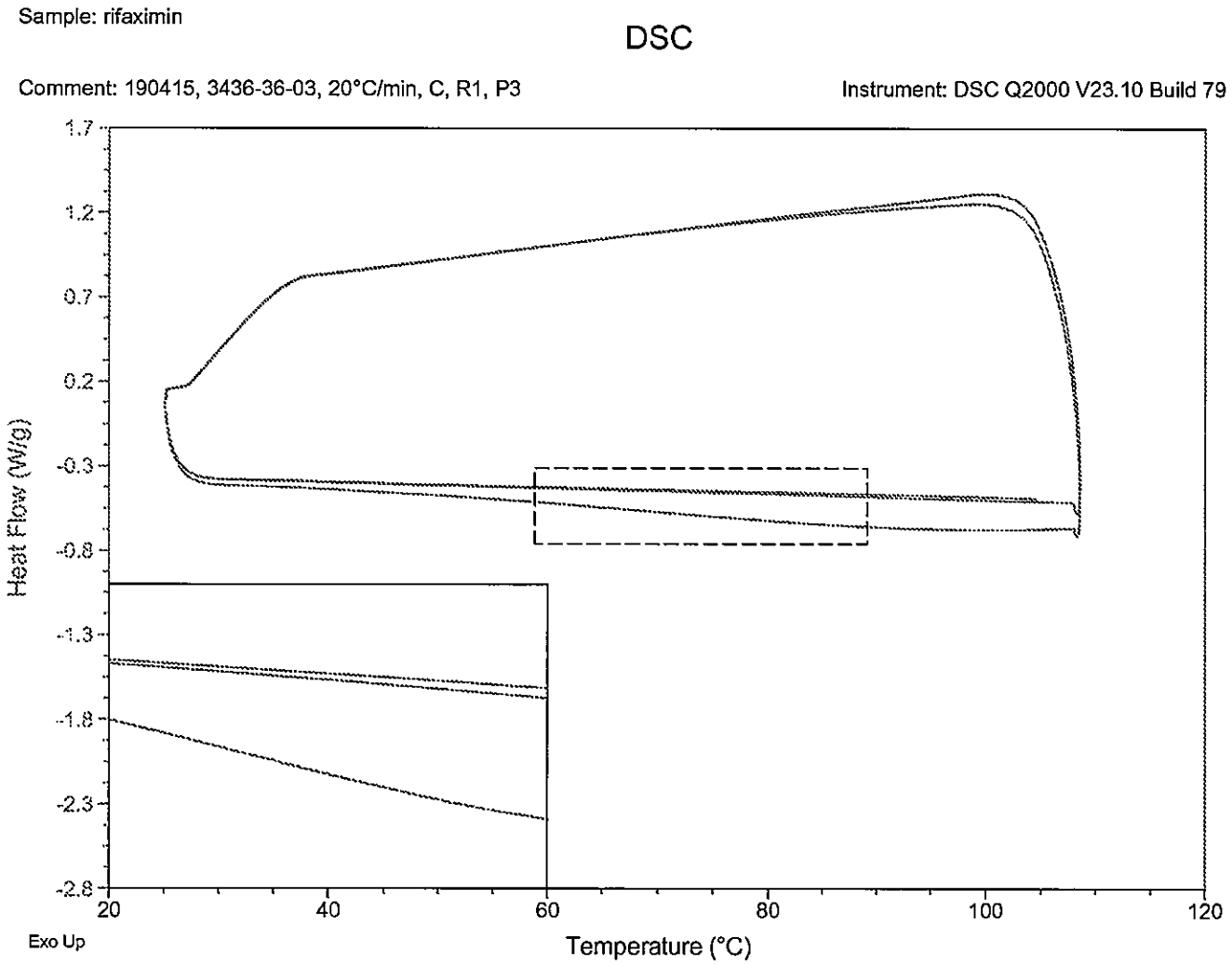


**Figure 28**

**TG of Rifaximin, amorphous (fast evaporation from acetone)**

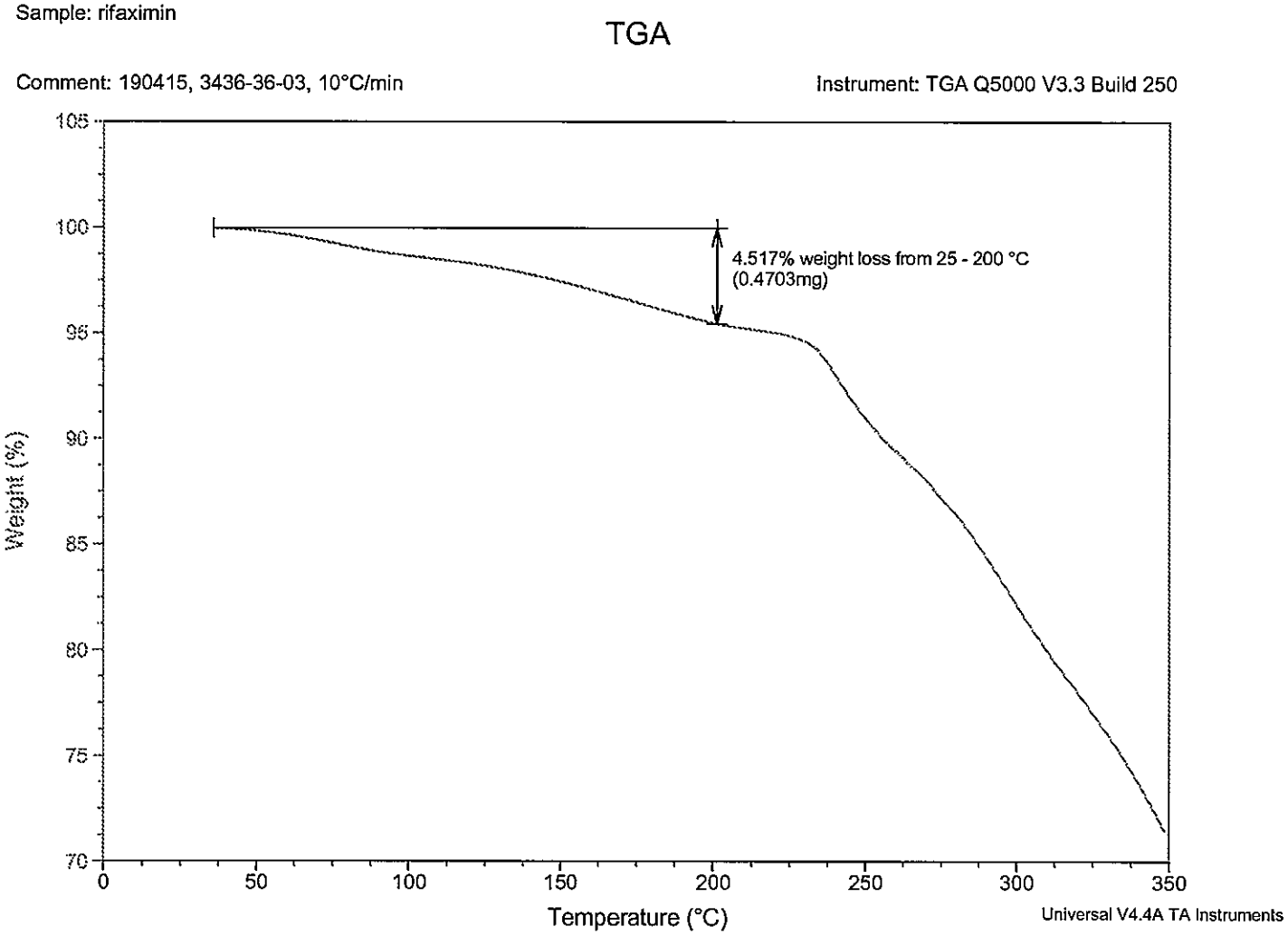


**Figure 29**
**Modulated DSC of Rifaximin, amorphous (crash precipitation from ethyl acetate with heptane)**

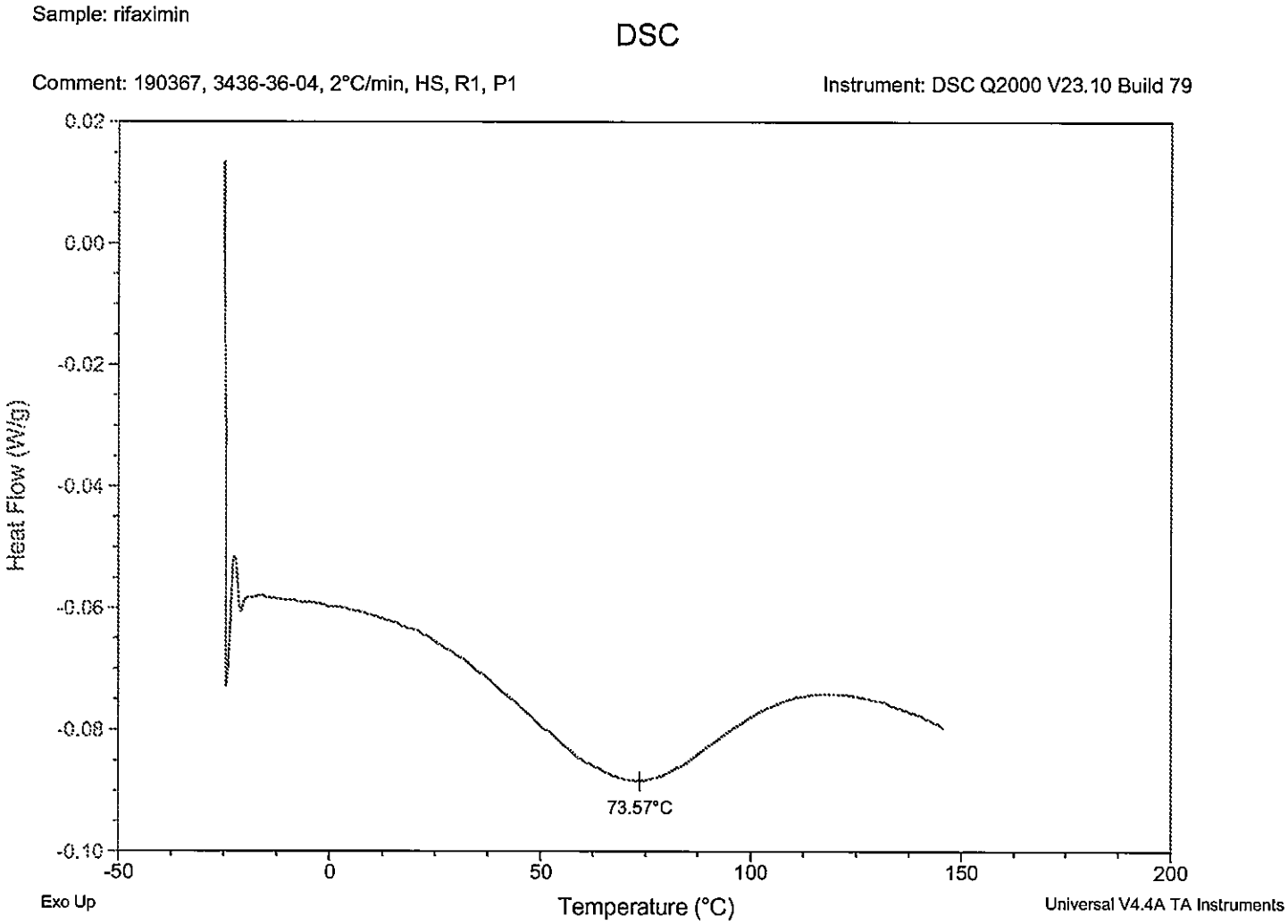


**Figure 30**

**Modulated DSC of Rifaximin, amorphous (crash precipitation from ethyl acetate with heptane)**

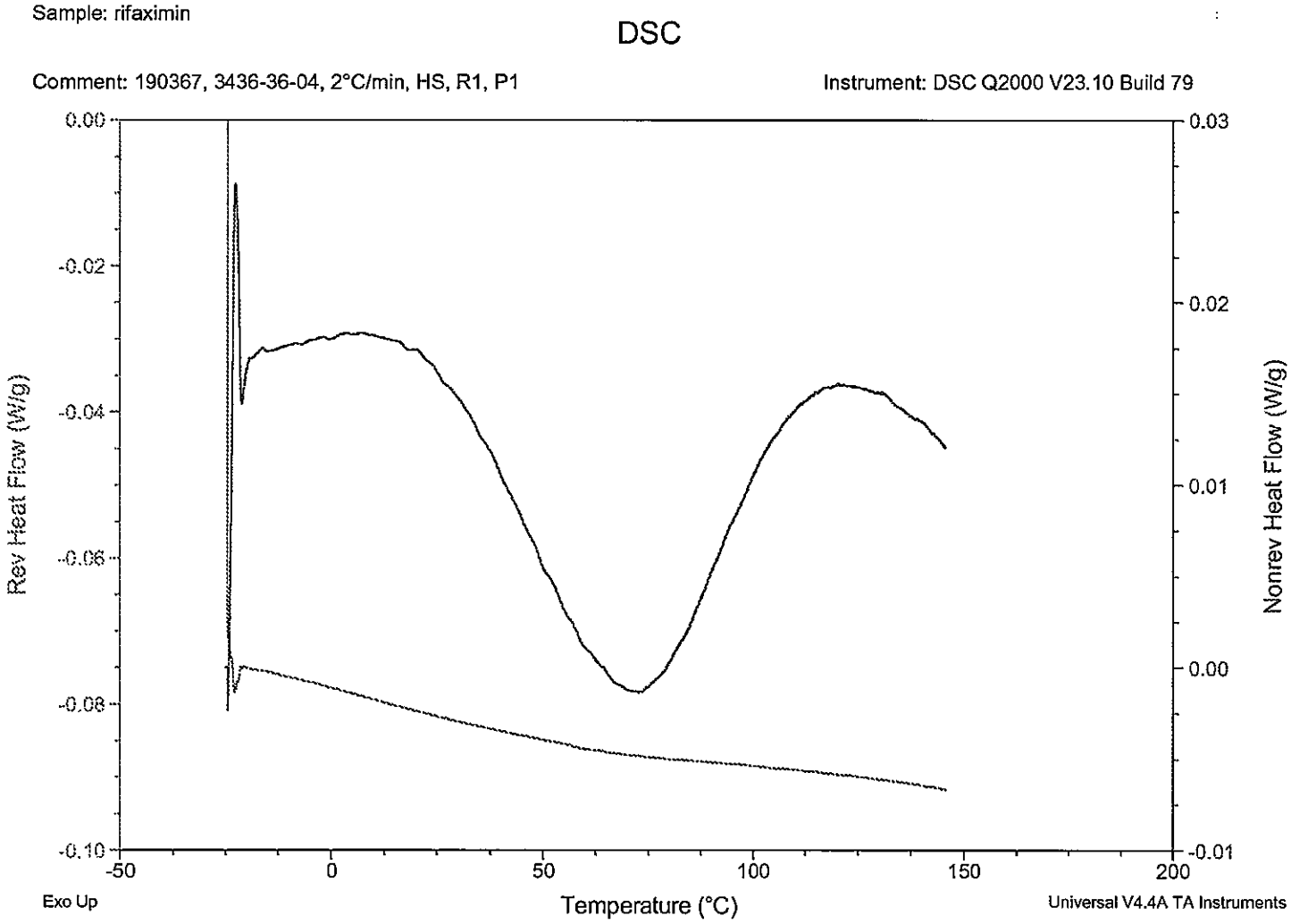


**Figure 31**

**Thermal data for Rifaximin, Form ι**

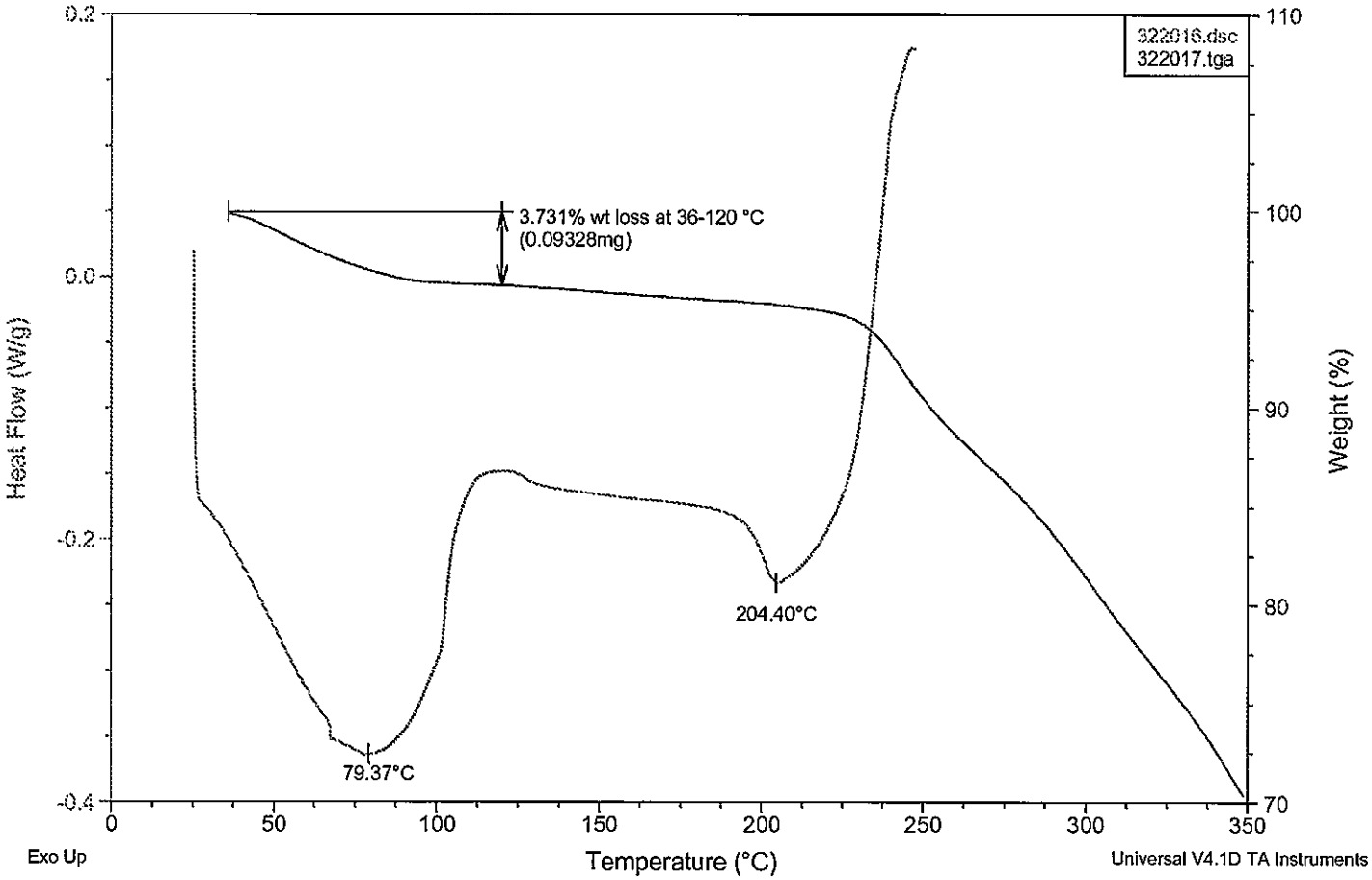
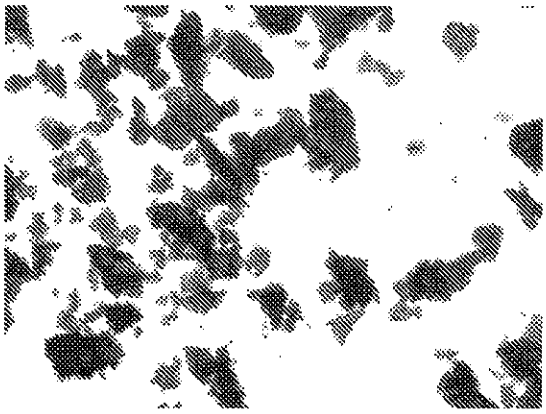
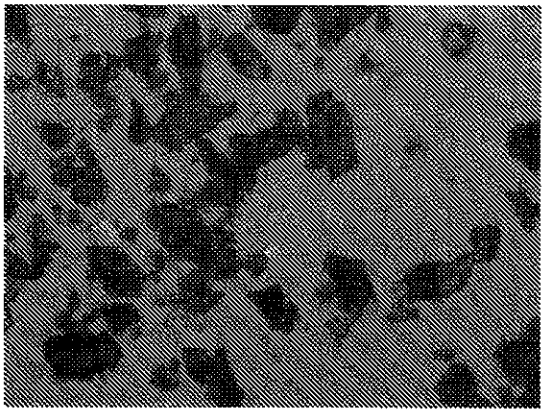


Figure 32

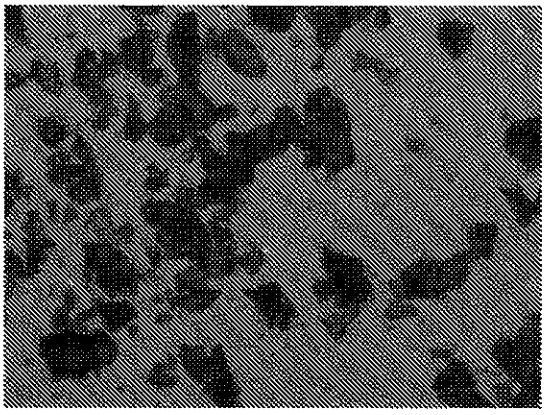
**Hot stage microscopy of Rifaximin, Form ι.**



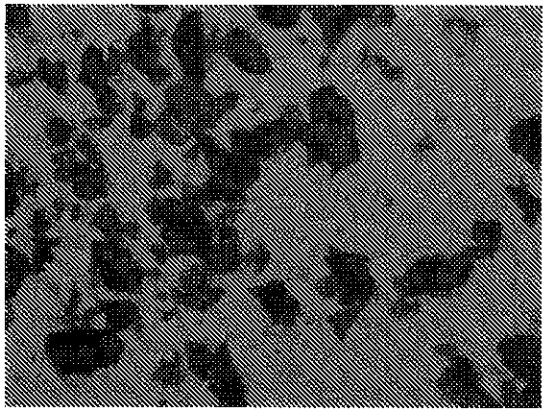
T = 30 °C



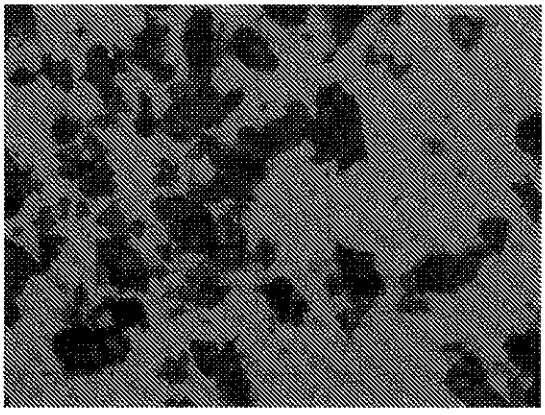
T = 30 °C



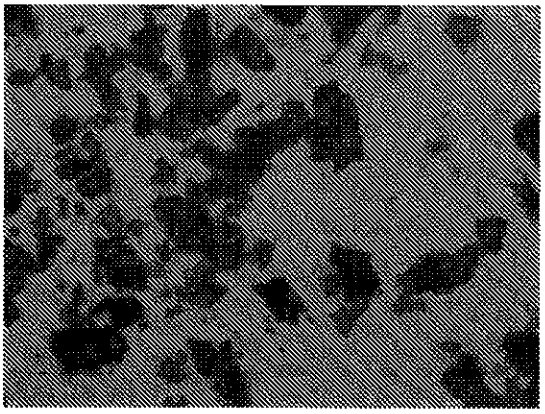
T = 80 °C



T = 120 °C

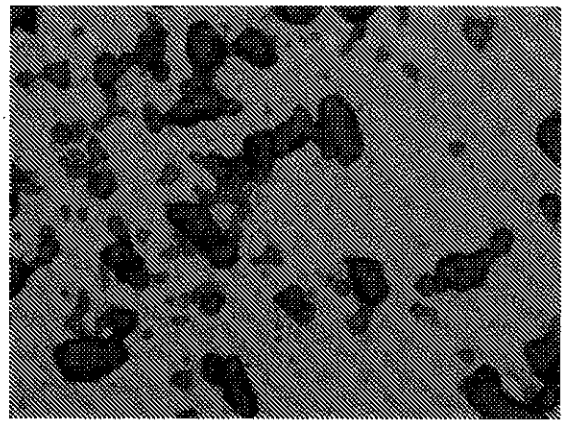


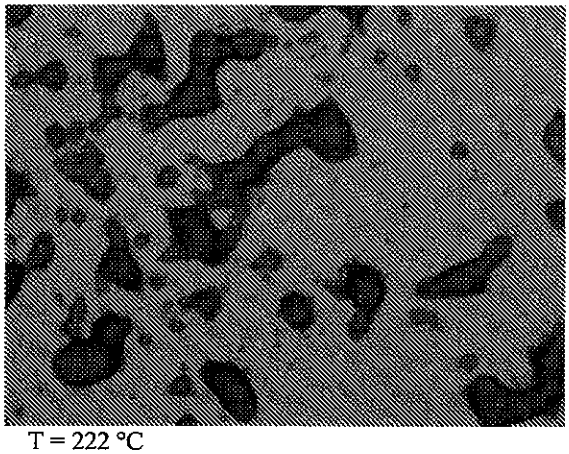
T = 190 °C



T = 204 °C

Figure 32 (Cont.)
Hot stage microscopy of Rifaximin, Form ι


T = 218 °C


T = 222 °C

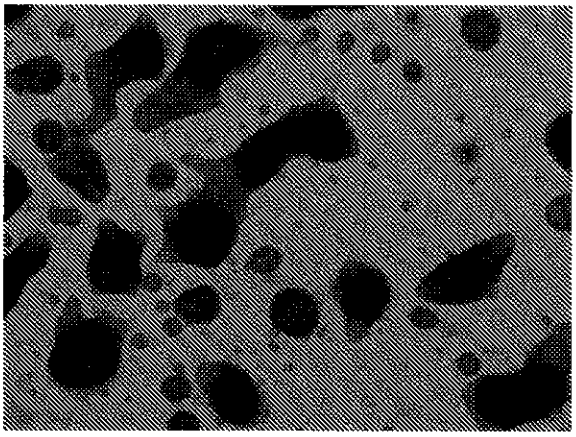
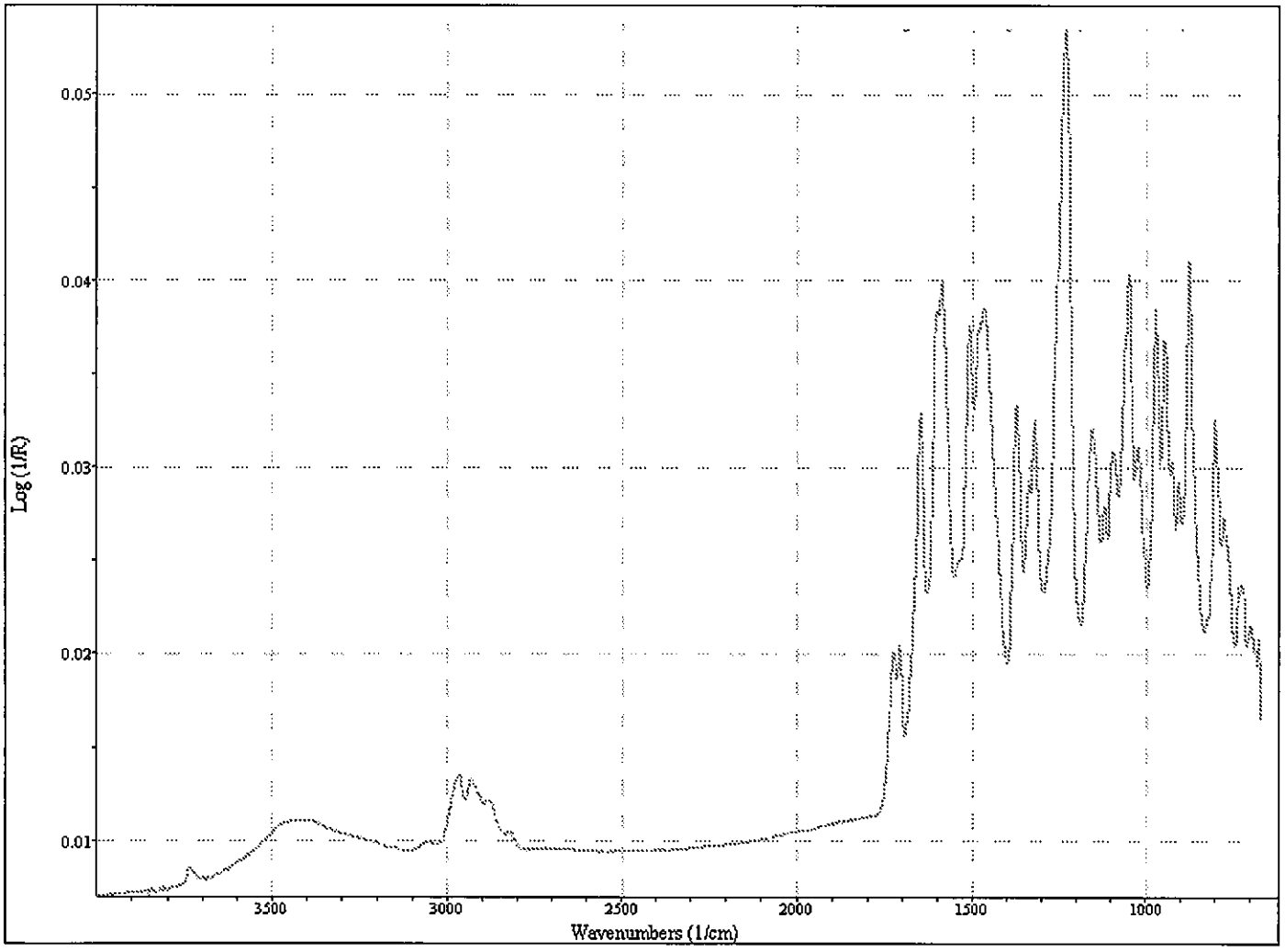

T = 250 °C

Figure 33

FT-IR spectrum of Rifaximin, Form ι



## Figure 34

**Proton NMR spectrum of Rifaximin, Form ι**

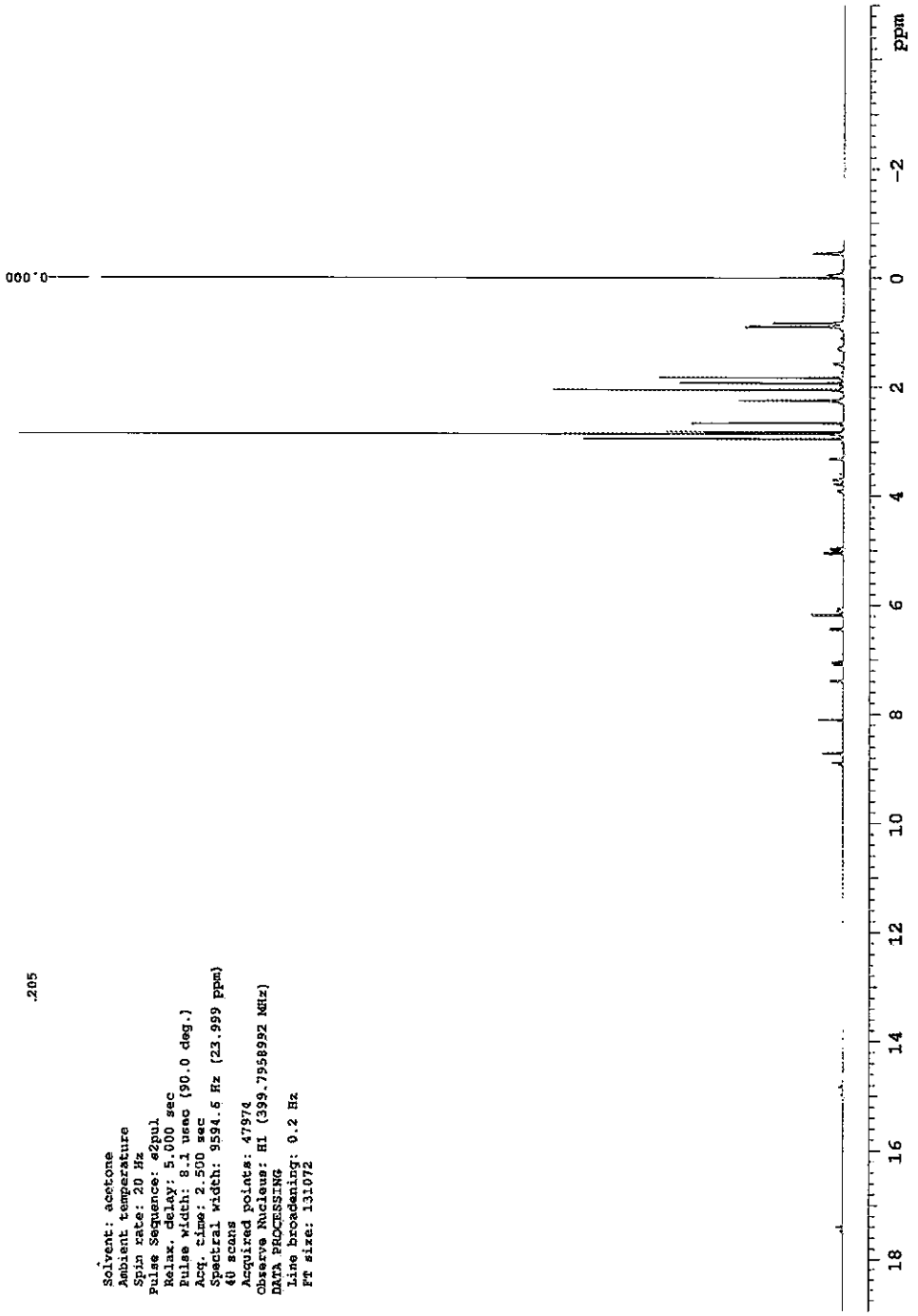


Figure 34 (cont.)

Proton NMR spectrum of Rifaximin, Form ι

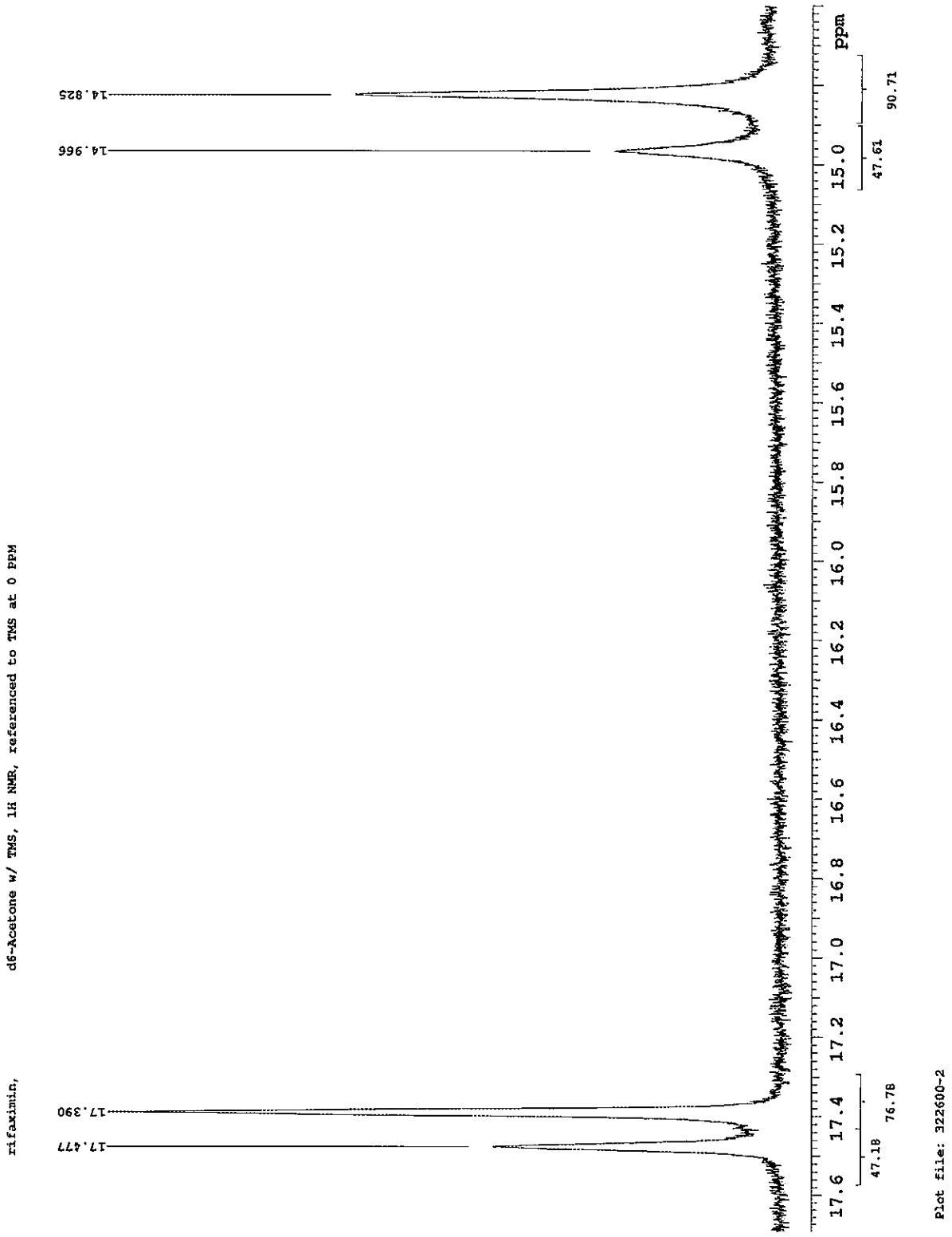


**Figure 34 (cont.)**

**Proton NMR spectrum of Rifaximin, Form ι**

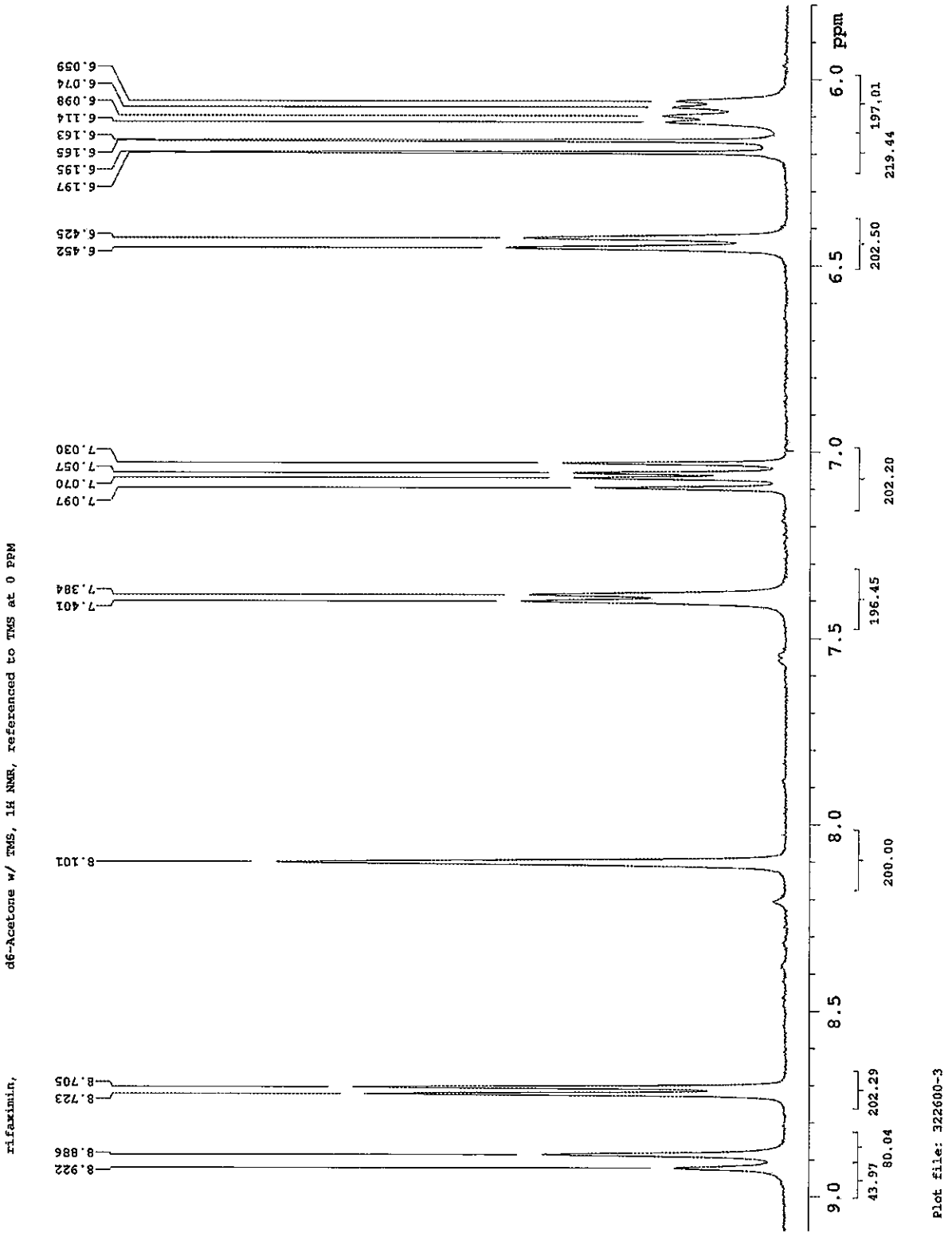


Figure 34 (cont.)

Proton NMR spectrum of Rifaximin, Form

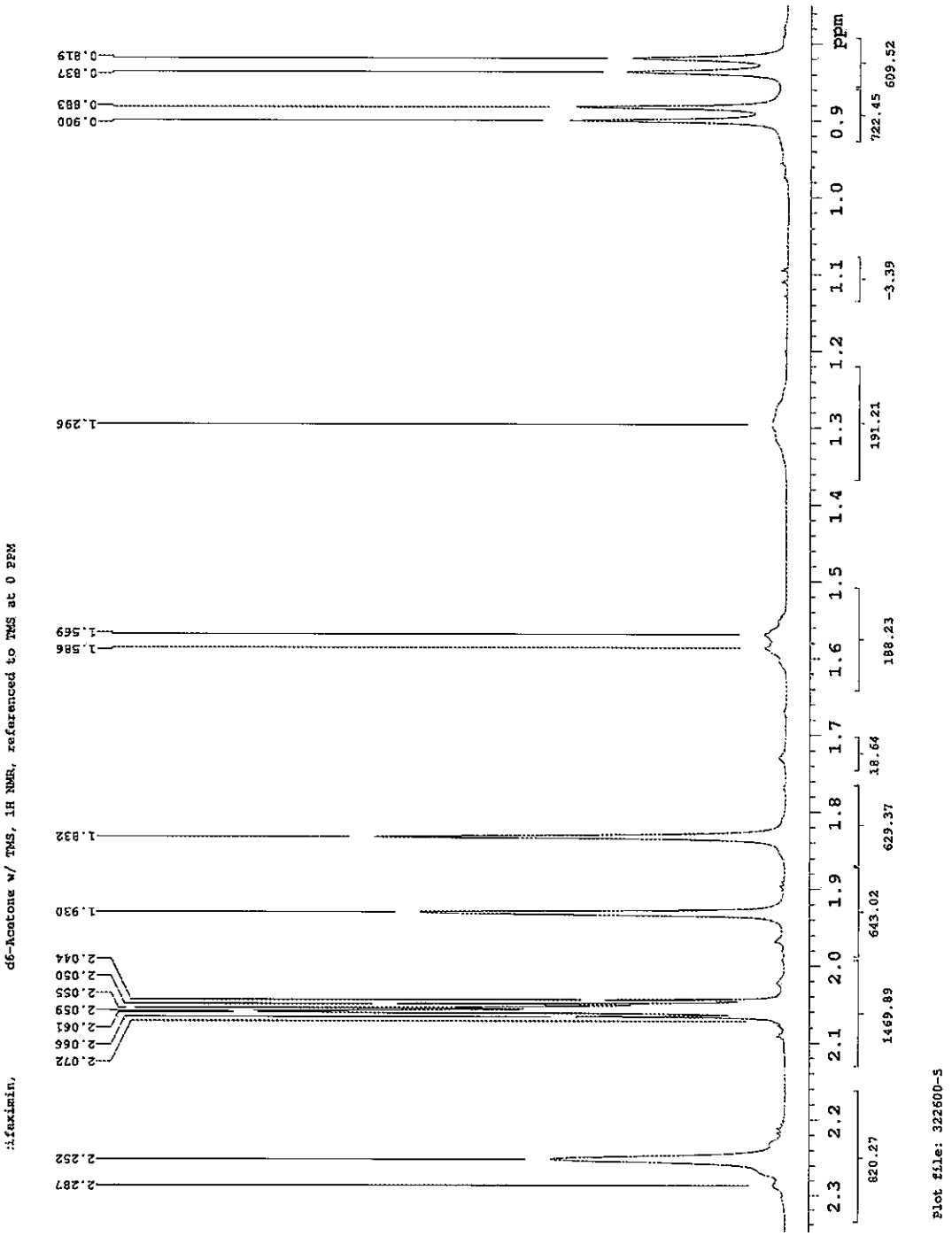
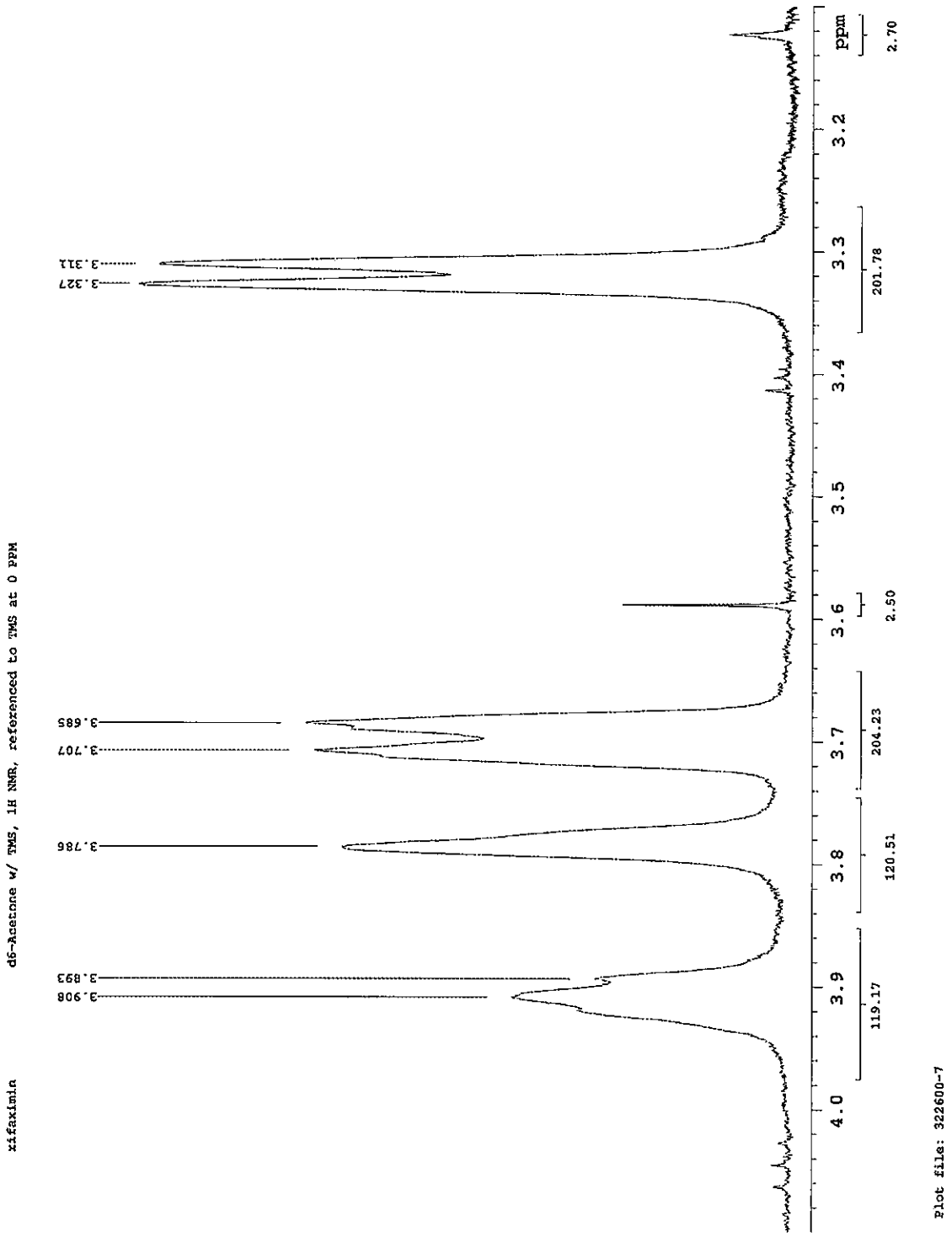


Figure 34 (cont.)

Proton NMR spectrum of Rifaximin, Form ι



## Figure 35

**Rifaximin – Overlay of FT-IR Spectra – expanded from 3730 to 2663 $cm^{-1}$**

Top to bottom:

| | |
|---|---|
| First | Form α |
| Second | Form α dry |
| Third | Form β |
| Fourth | Form γ |
| Fifth | Formδ |
| Sixth | Form ε |
| Seventh | Form amorphous |

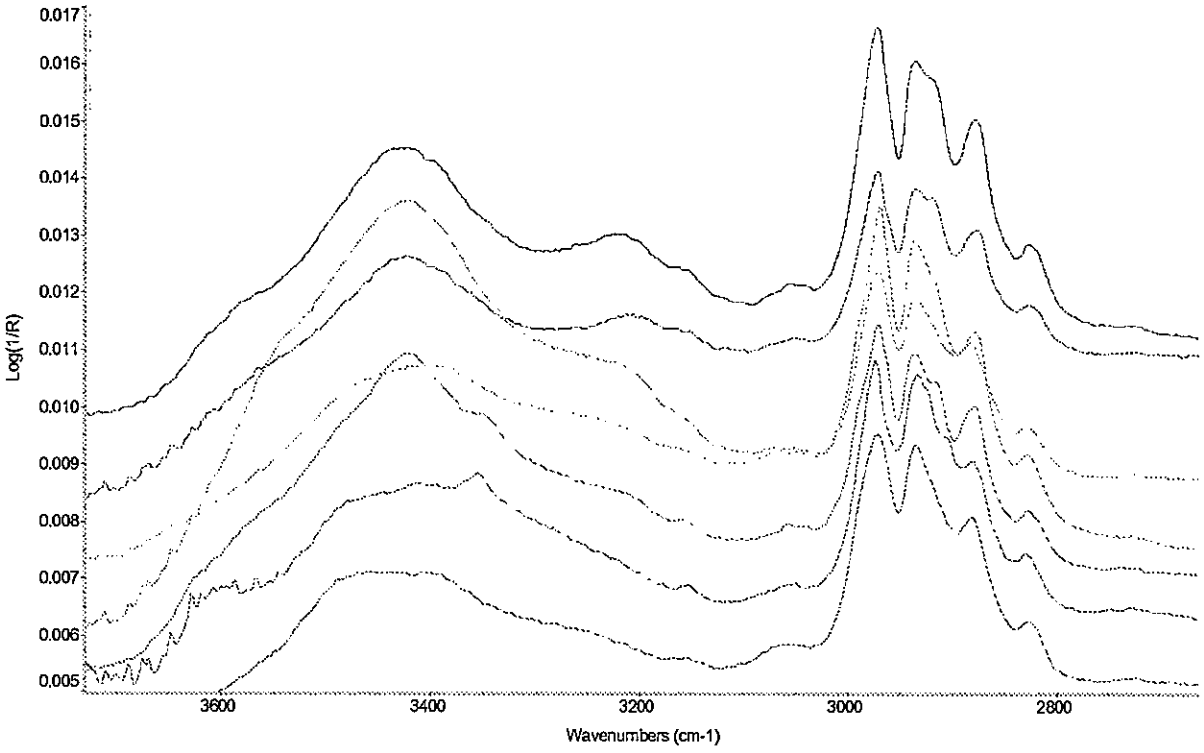


Figure 36

XRPD pattern comparison of Rifaximin form α dry (top), form α (middle), and form α reference (bottom)

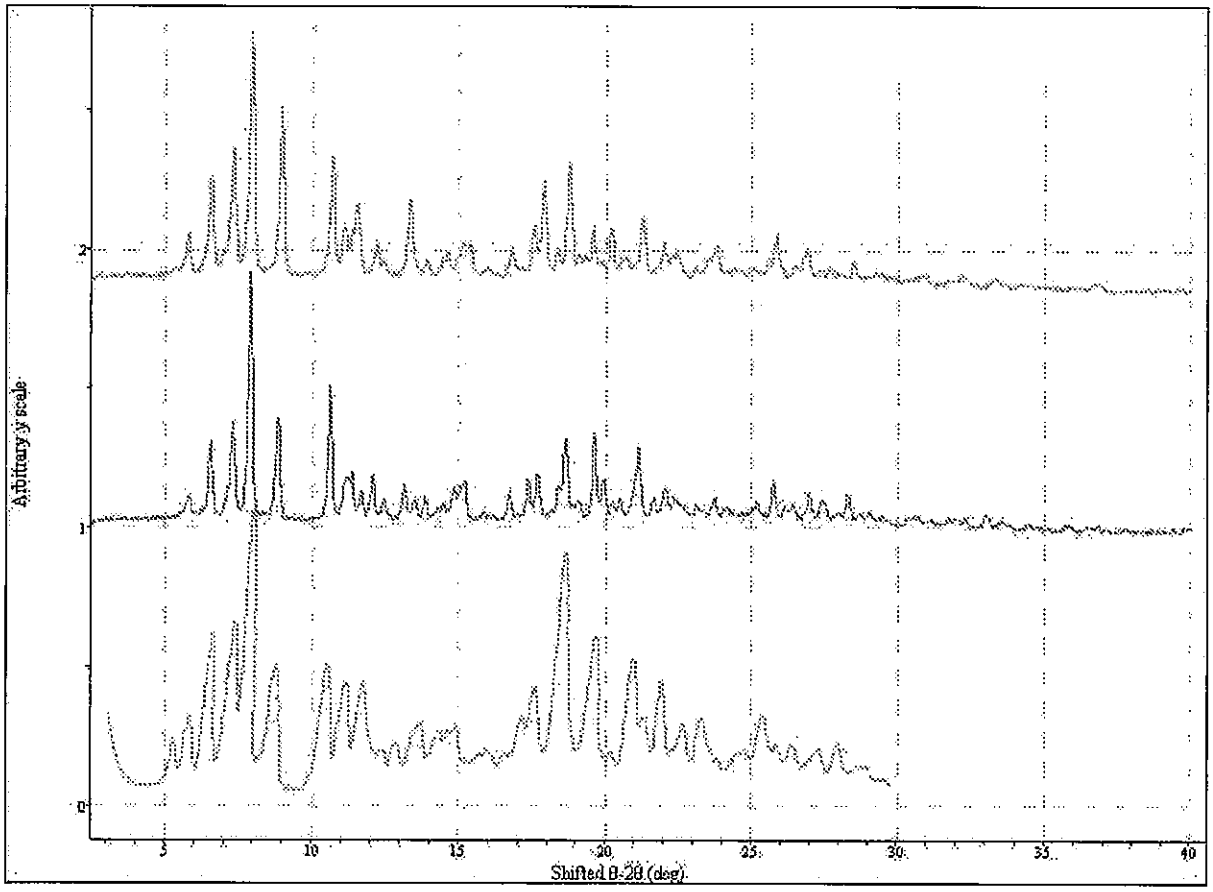
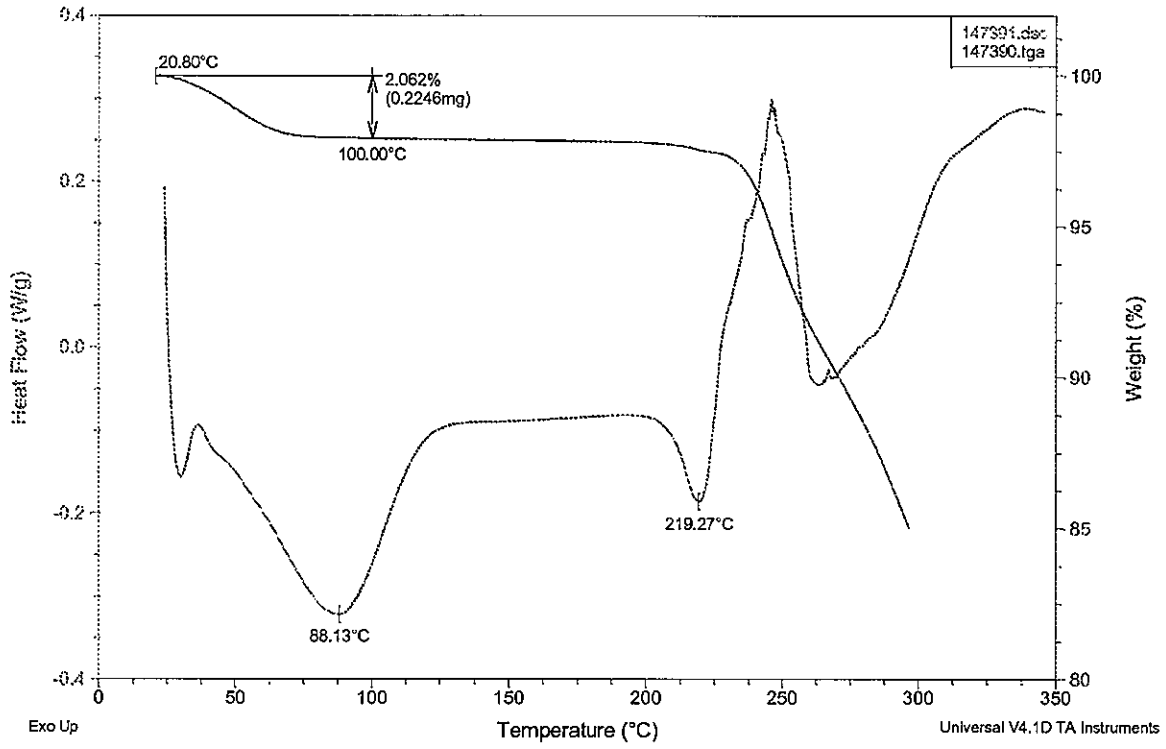


Figure 37

**TGA and DSC of Rifaximin form α dry**



## Figure 38

**XRPD Comparison of Rifaximin Form β-1, β-2, β and Reference Form β**

Top to Bottom:
First: Rifaximin Form β-1
Second: Rifaximin Form β-2
Third: Rifaximin Form β
Fourth: Rifaximin Reference Form β (US Patent Application US 2005/0272754 A1. Dated Dec. 8, 2005)

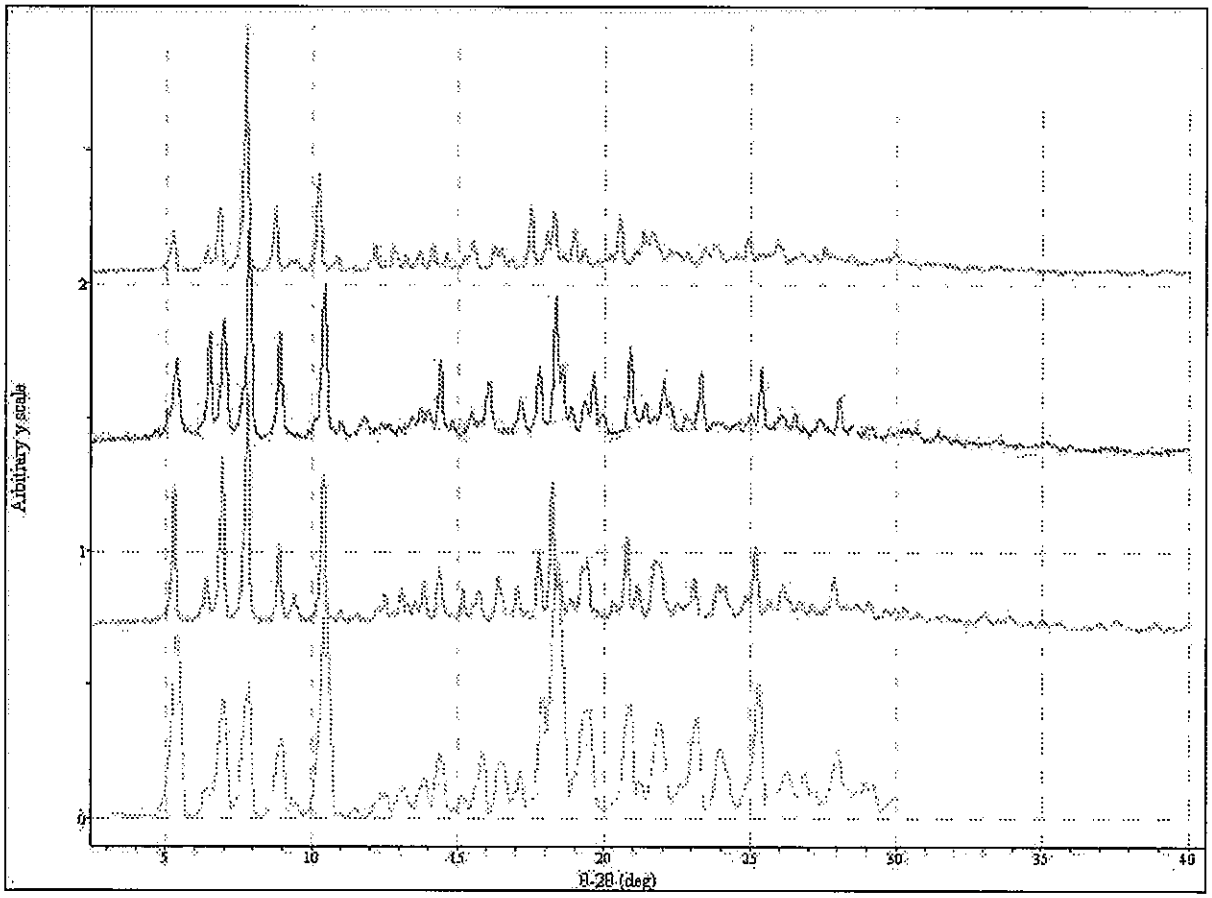


Figure 39

TGA and DSC of Rifaximin form β–2

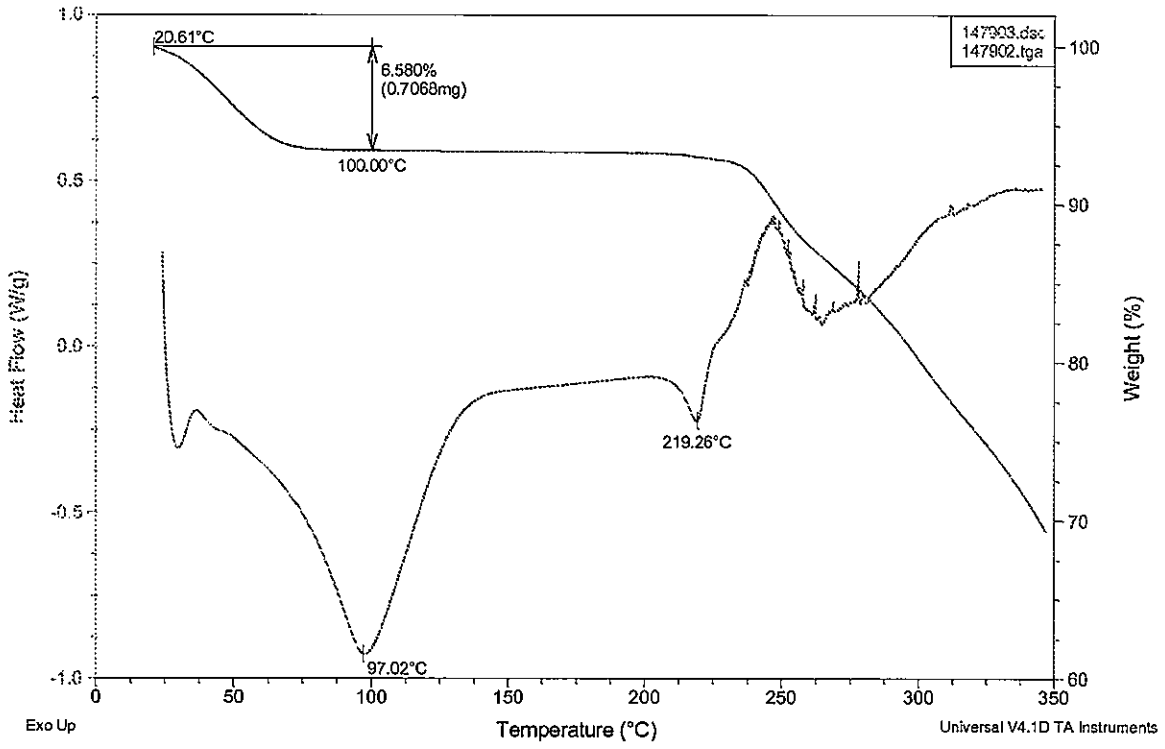
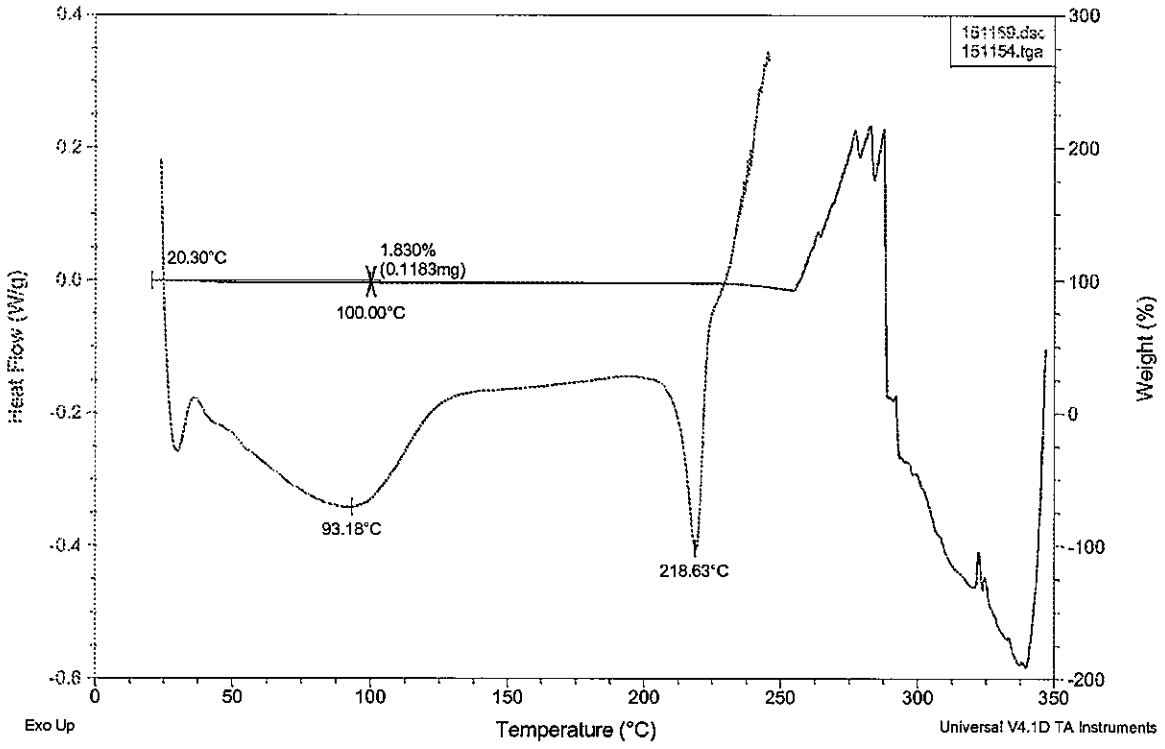


**Figure 40**

**TGA and DSC of Rifaximin form ε dry**



## Figure 41

**Comparison of XRPD Patterns of Rifaximin Form ε dry, ε, and Reference Pattern ε**

Top to bottom:
First: Form ε dry
Second: Form ε
Third: Form ε reference, European Patent Application No. 05 004 695.2, dated March 3, 2005.

