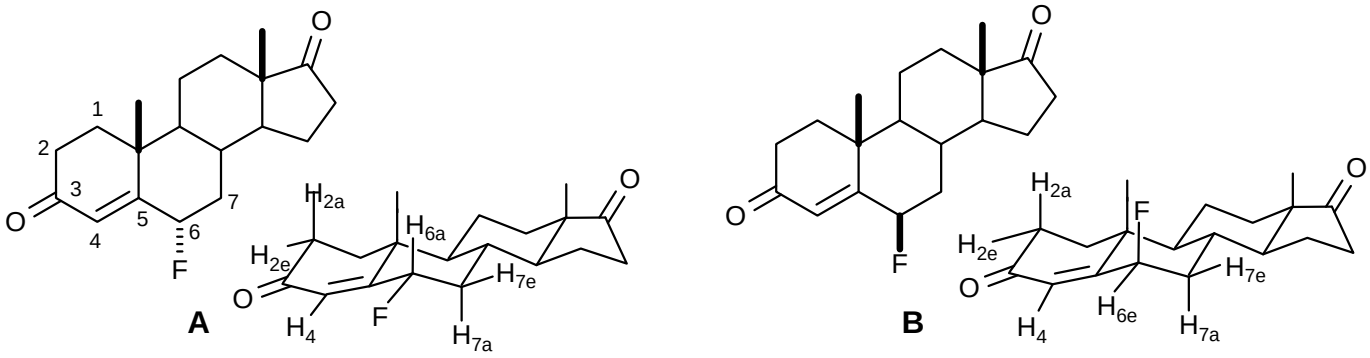
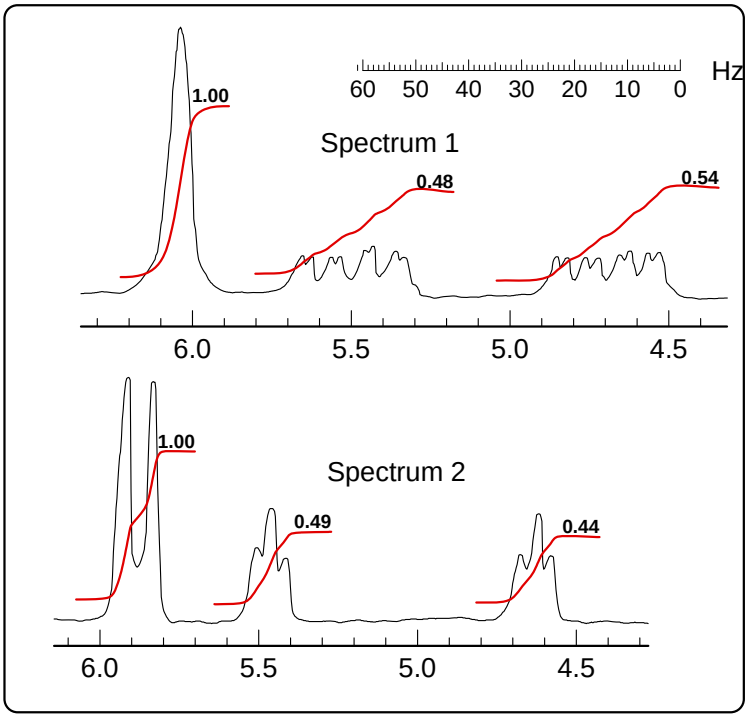
Problem R-11T ($C_{19}H_{25}FO_2$). Below are part of the 60 MHz ^{1}H NMR spectra of two stereoisomers (**A** and **B**) of the fluorinated steroids shown. To aid in your analysis, a conformational drawing is also provided (*J. Am. Chem. Soc.* **1963**, *85*, 3038; DOI: 10.1021/ja00902a046).





(a) Which protons are being shown here? Analyze the coupling, and report them in the standard format (give δ and identify any couplings you found).

Spectrum 1:

Spectrum 2:

(b) Which isomer corresponds to Spectrum 1 ____, which to Spectrum 2____. Explain briefly.

20

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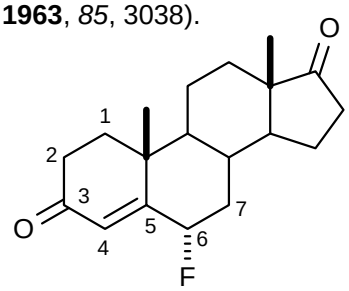
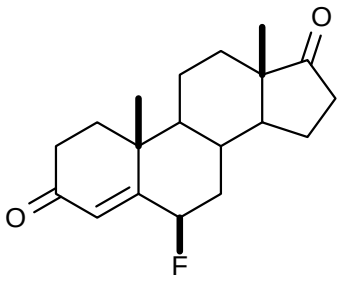
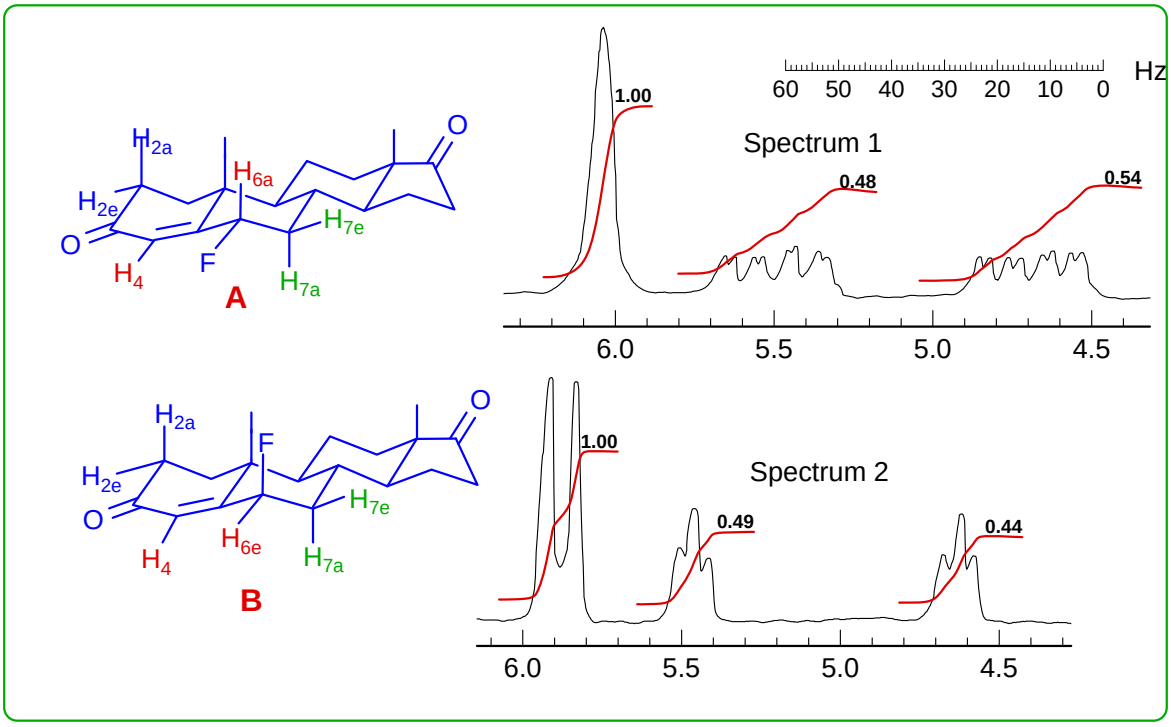


A



B



(a) Which protons are being shown here? Analyze the coupling, and report them in the standard format (give δ and identify any couplings you found).

Spectrum 1:

6

δ 6.05, broad s, H^4

δ 5.1, dddd, J = 48, 11, 6, 2 Hz

$^2J_{H6a\text{-}F}$ = 48 Hz
$^3J_{H6a\text{-}7a}$ = 11 Hz
$^3J_{H6a\text{-}7e}$ = 6 Hz
$^4J_{H6a\text{-}4}$ = 2 Hz

Spectrum 2:

7

δ 5.89, d, J = 5 Hz

δ 5.05, dt, J = 51, 3 Hz

$^2J_{H6e\text{-}F}$ = 51 Hz
$^3J_{H6e\text{-}7a}$ = 3 Hz
$^3J_{H6e\text{-}7e}$ = 3 Hz
$^4J_{H6e\text{-}4}$ < 2 Hz

(b) Which isomer corresponds to Spectrum 1 **A**, which to Spectrum 2 **B**. Explain briefly.

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The large H-H coupling in Spectrum 1 ($^3J_{H6a\text{-}7a}$ = 11 Hz) requires that the proton at H^6 be axial, to get one large ax-ax coupling. The vicinal couplings in Spectrum 2 are all small (3 Hz) so only eq-eq and eq-ax coupling, hence H^6 must be equatorial.