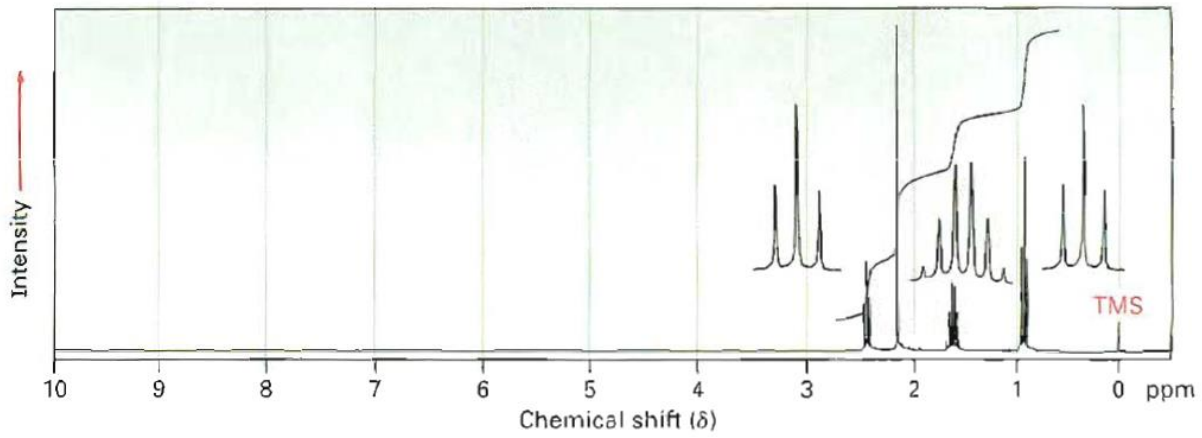
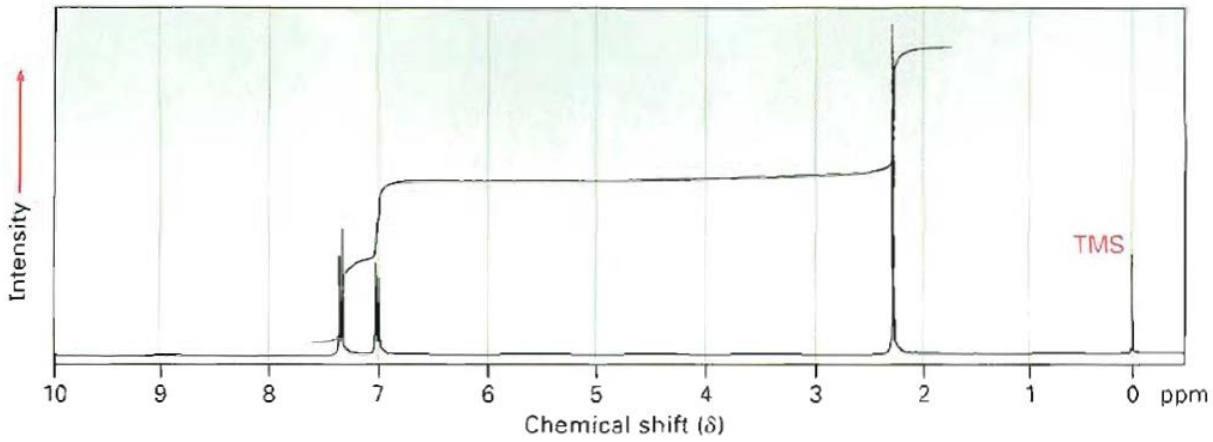
TAKE HOME EXAM

1. Propose structures for the three com pounds whose ^{1}HNMR spectr·a are shown.

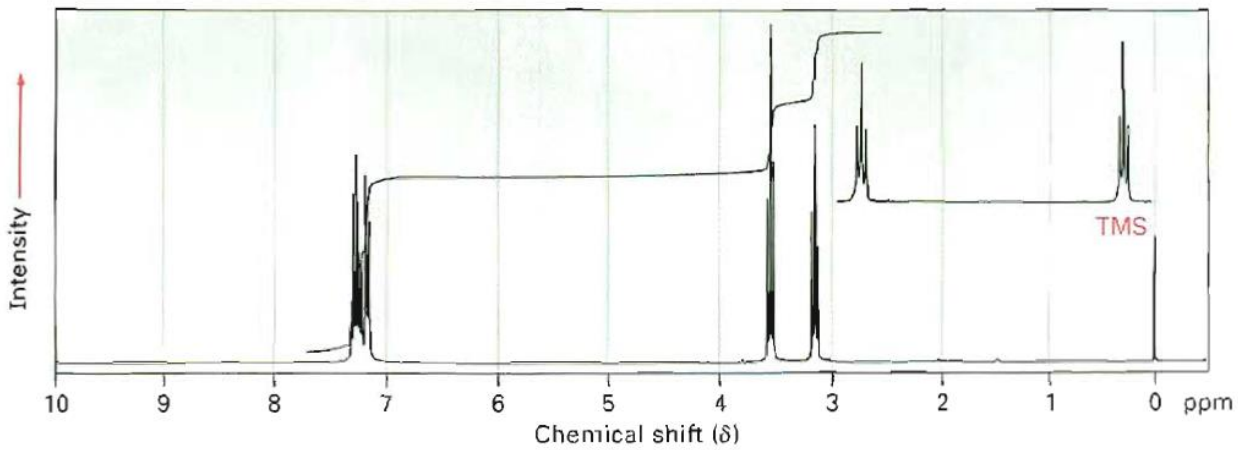
(a) $C_5H_{10}O$



(b) C_7H_7Br

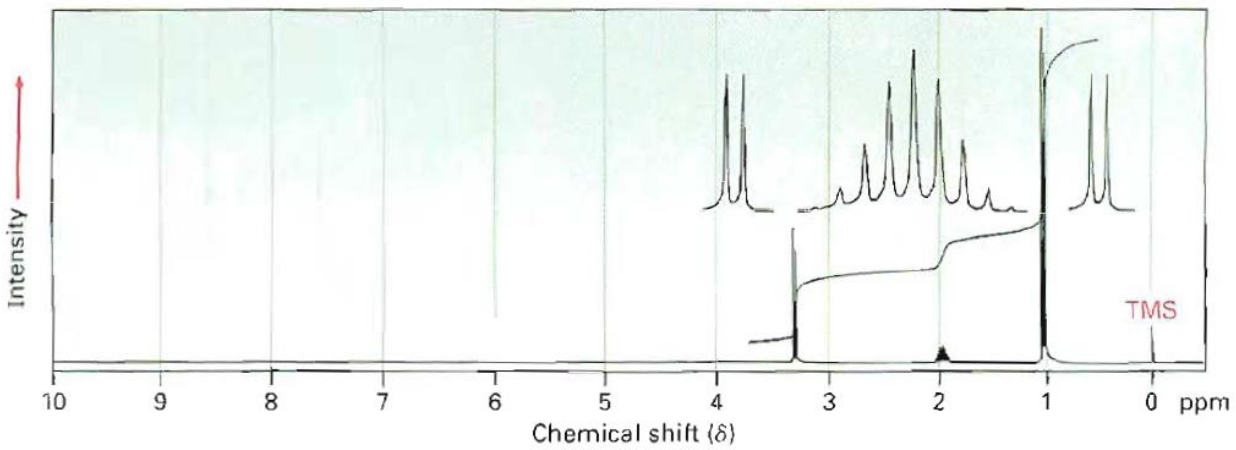


(c) C_8H_9Br

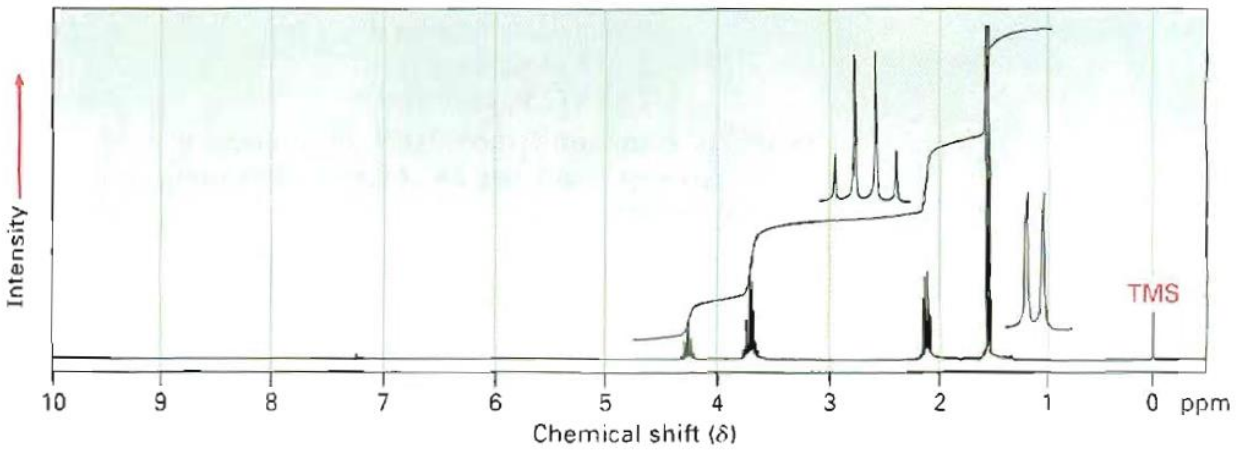


2. Propose structures for the *tvvo* compounds \Vhose ^{1}H NMR spectra are shown.

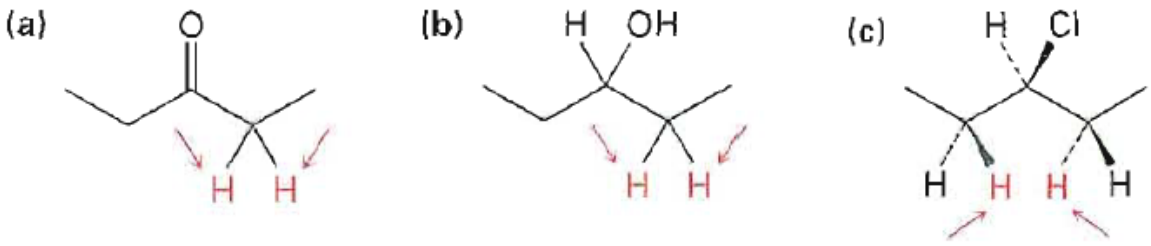
(a) C_4H_9Br



(b) $C_4H_8Cl_2$



3- Identify the indicated sets of protons as unrelated, homotopic, enantiotopic, or diastereotopic:



4- The following ^{1}H NMR absorptions were obtained on a spectrometer operating at 300 MHz. Convert the chemical shifts from δ units to hertz downfield from TMS.

(a) 2.1 δ (b) 3.45 δ (c) 6.30 δ (d) 7.70 δ

5- When measured on a spectrometer operating at 200 MHz, chloroform ($CHCl_3$) shows a single sharp absorption at 7.3 δ.

(a) How many parts per million downfield from TMS does chloroform absorb?

(b) How many hertz downfield from TlvfS would chloroform absorb if the measurement were carried out on a spectrometer operating at 360 MHz?

(c) What would be the position of the chloroform absorption in δ units when measured on a 360 MHz spectrometer"?

6- An unknown compound has the molecular formula $C_9H_{11}Br$. Its proton NMR spectrum shows the following absorptions:

singlet, δ 7.1, integral 4.4 cm
singlet, δ 2.3, integral 13.0 cm
singlet, δ 2.2, integral 6.7 cm

Propose a structure for this compound.