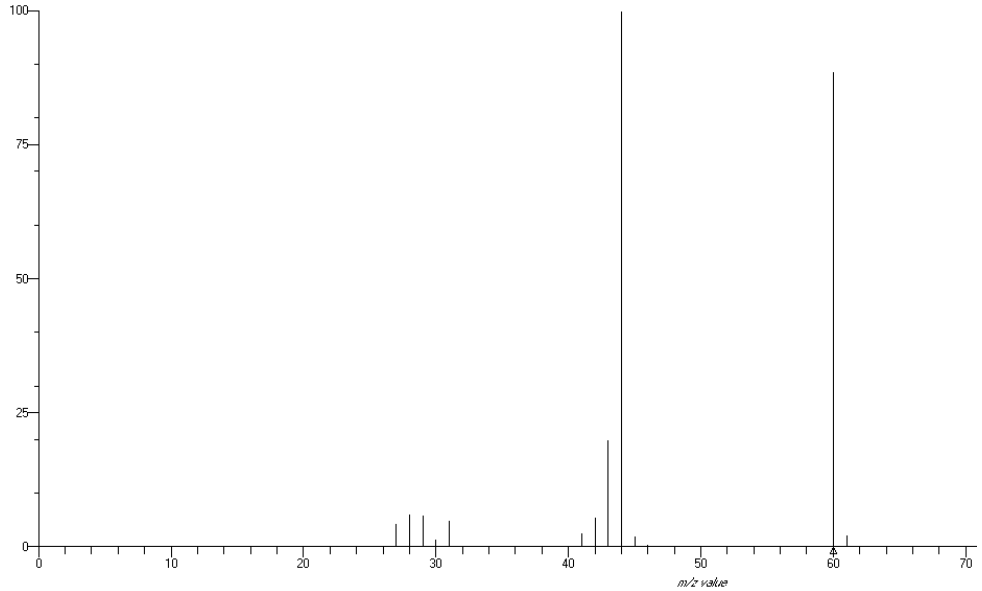
"Don't be pushed by your problems, be led by your dreams"

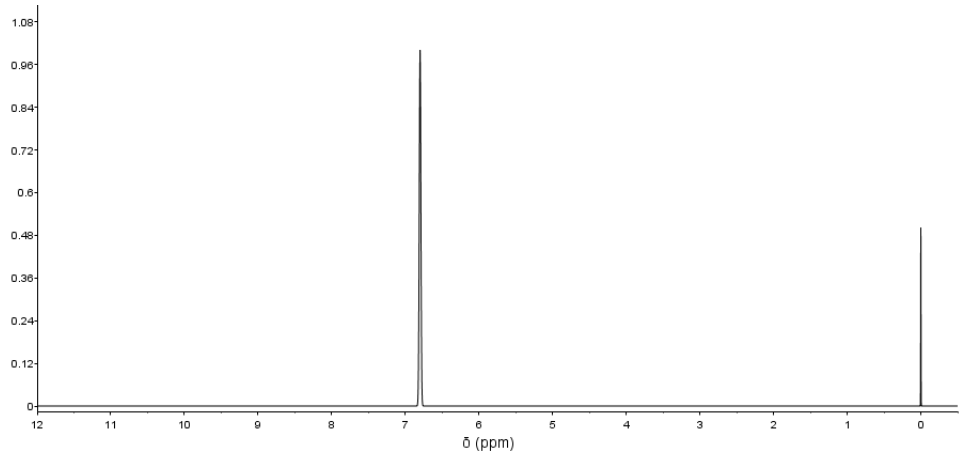
VCE Chemistry: Unit 3 **Worksheet 8** – NMR/MS/IR Spectroscopy

An organic molecule, chemical X, was known to contain carbon, hydrogen and nitrogen only was analysed. The molecule was analysed using IR spectroscopy, mass spectrometry and ^{1}H NMR. The following results were obtained from this analysis.

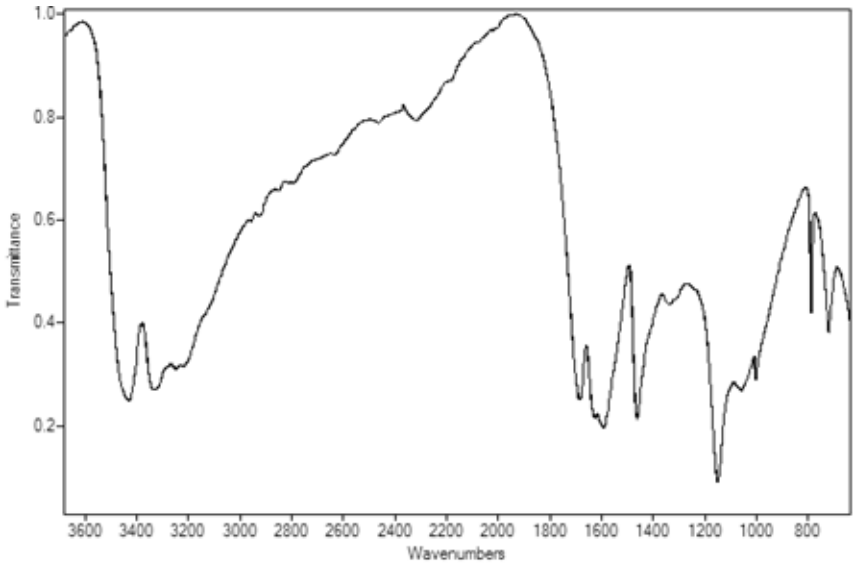
Mass Spectrum of chemical X:



High Resolution ^{1}H NMR Spectrum of chemical X:



IR Spectrum of chemical X:



a) What is the molar mass of this compound? ___/ 1 marks

b) Identify the functional groups in this molecule. Use the relevant spectrum to support your argument.

___/ 2 marks

c) Explain what information the ^{1}H NMR spectrum gives us about the molecule. ___/ 2 marks

d) Why is it not useful to analyse the wavenumbers less than 1500cm^{-1} in this analysis? ___/2 marks

e) Assuming that the molecule contains two amino groups, identify the structure of this compound.

Draw the structural formula of this compound. ___/2 marks

f) Using the mass spectrum provided, write an equation for the generation of the base peak.

___/ 2marks

g) What is the purpose of the signal at 0 ppm on the ^{1}H NMR spectrum. ___/ 2 marks