

Name \_\_\_\_\_ Date \_\_\_\_\_

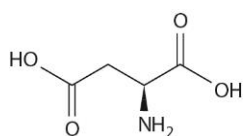
# Worksheet 11.1: Introduction to organic chemistry and analytical techniques

1 Draw the structural formulas for the following compounds:

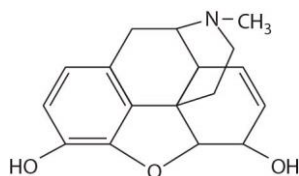
- a 2-bromo-2-methylbutane
- b 3-methylbutan-2-ol
- c pentan-3-one
- d ethanedioic acid
- e cyclopentene
- f 1,3-diaminobenzene

2 Identify as many functional groups as you can in the following compounds:

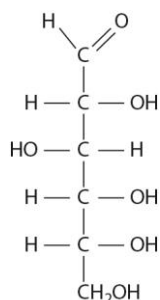
a



b

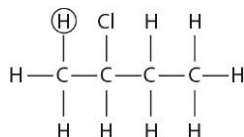


c

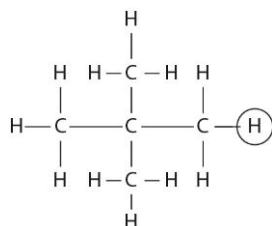


3 State the splitting pattern for H circled in each of the following molecules:

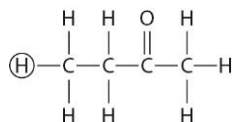
a



**b**



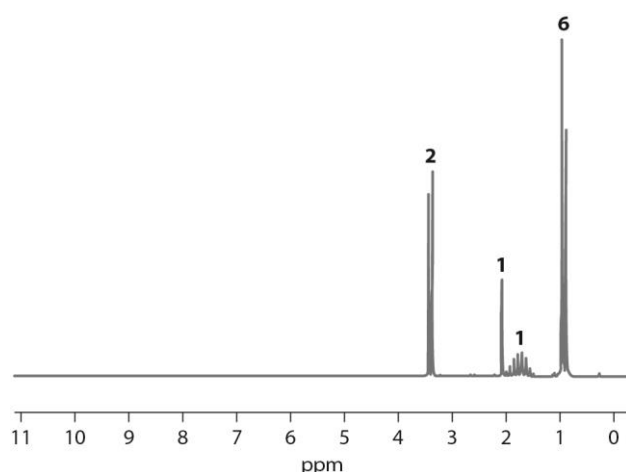
**c**



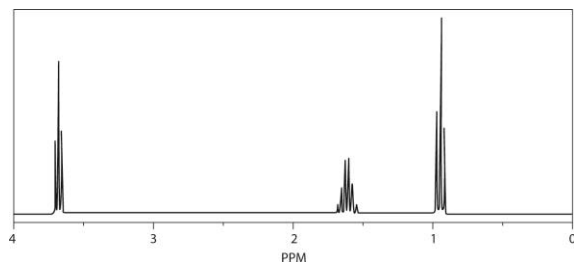
- 4 Identify the organic compounds shown in the following  $^1\text{H}$  NMR spectra. Explain how you arrived at your answers by referencing to i) the number of H environments in the molecule; ii) the types of H environments; iii) the relative numbers of H in each environment; and iv) the numbers of H on adjacent C atoms. You may use the table to help organise the information from each spectrum.

What to look for in the NMR spectrum	Information on the compound
Number of different H environments (= number of peaks)	
Types of H environments (using the chemical shift of each peak and check with the data book; remember some of the ranges are broad and the value of chemical shift can change sometimes, depending on the adjacent chemical environments)	
Relative numbers of H in each environment (using the integration traces)	
Number of H atoms on adjacent C atoms (look at splitting pattern, number of peaks = number of adjacent H + 1)	

- a** This molecule is an alcohol.



- b** This molecule can be formed in a free radical substitution reaction using chlorine.



- c** This molecule can be formed in a condensation reaction between an alcohol and a carboxylic acid.

