



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

QUALIFY FOR THE FUTURE WORLD
KIA NOHO TAKATŪ KI TŌ ĀMUA AO!

Scholarship 2017 Chemistry

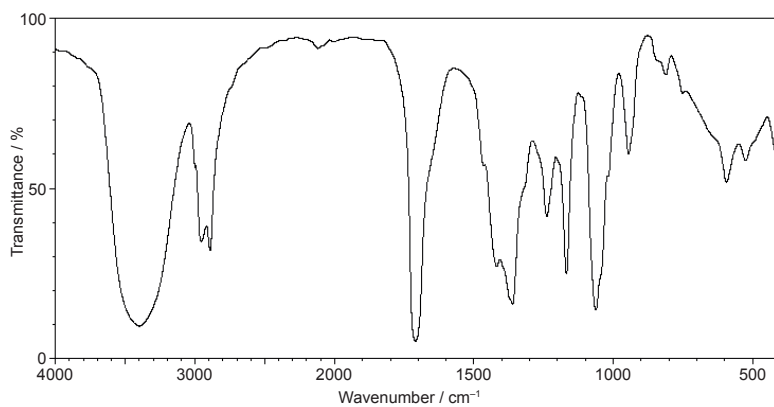
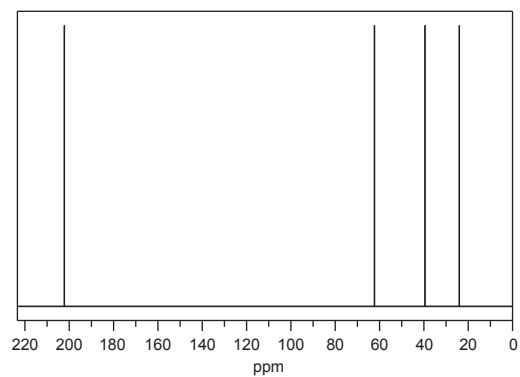
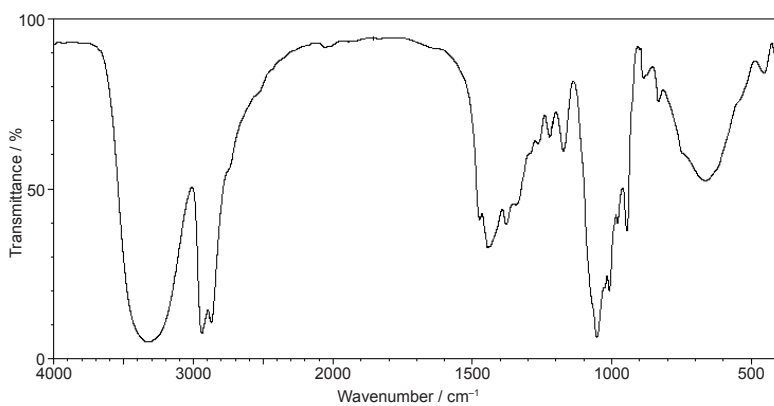
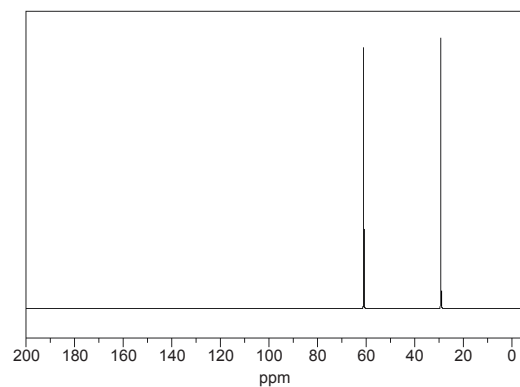
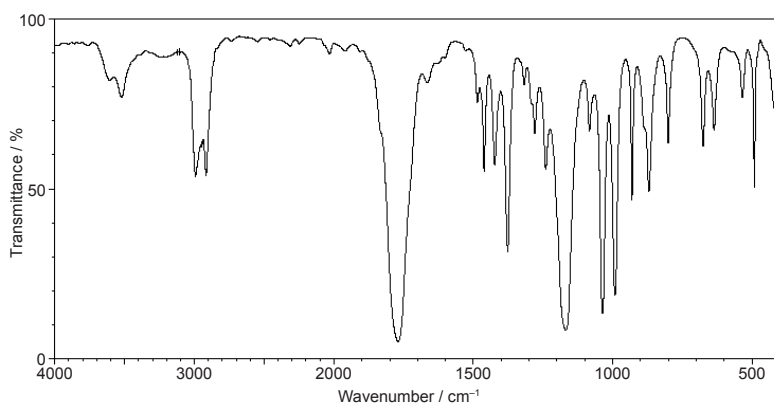
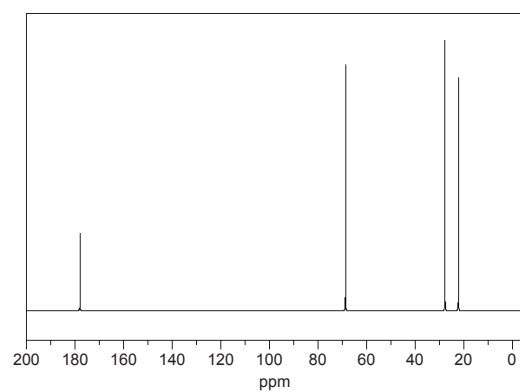
9.30 a.m. Friday 24 November 2017

RESOURCE BOOKLET

Refer to this booklet to answer the questions for Scholarship Chemistry 93102.

Check that this booklet has pages 2–5 in the correct order and that none of these pages is blank.

YOU MAY KEEP THIS BOOKLET AT THE END OF THE EXAMINATION.

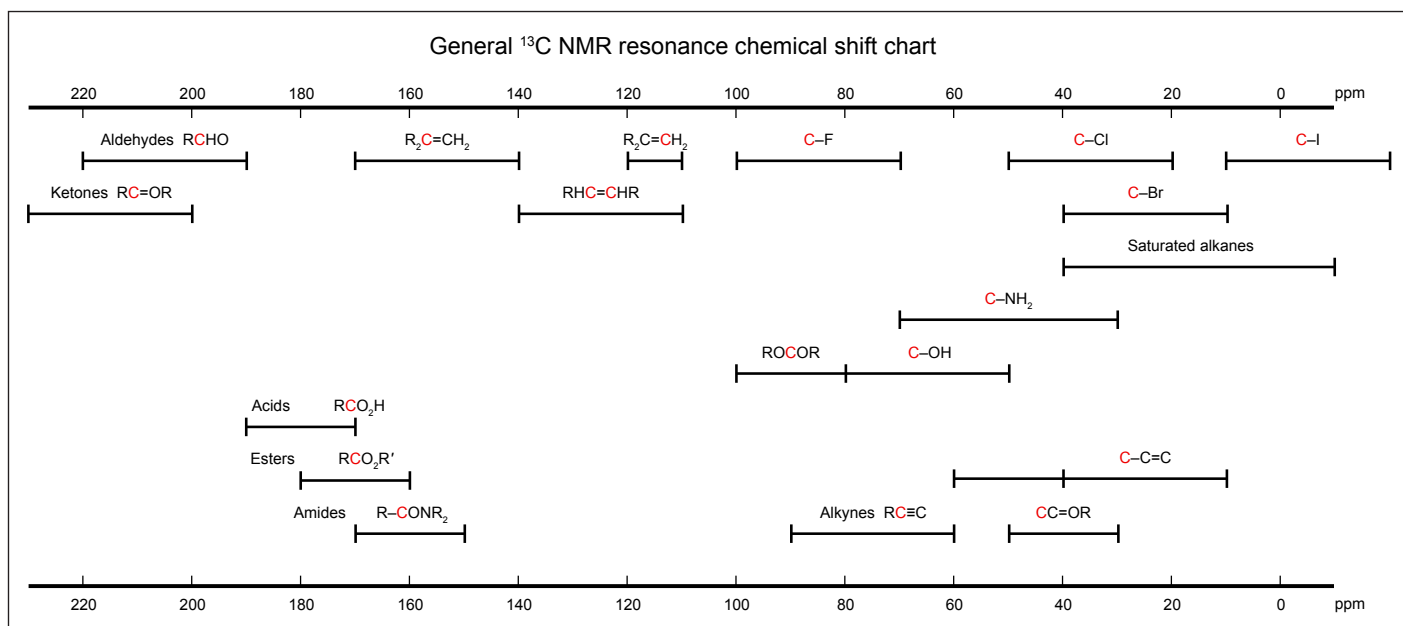
^{13}C NMR AND IR SPECTRA FOR QUESTION ONE (b)**Compound Q:****Compound R:****Compound S:**

SPECTROSCOPY DATA SHEET

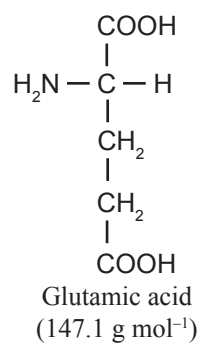
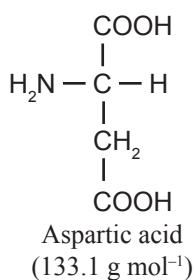
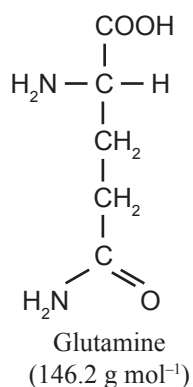
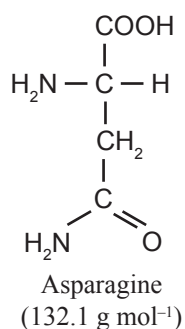
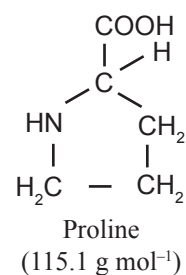
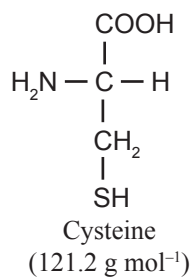
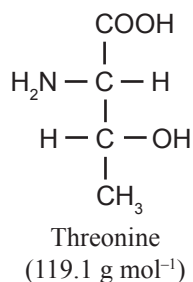
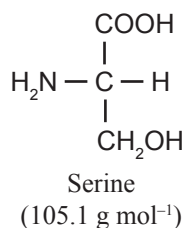
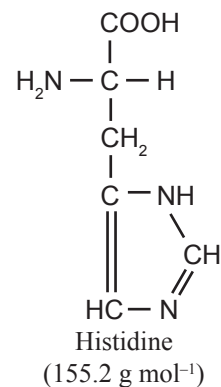
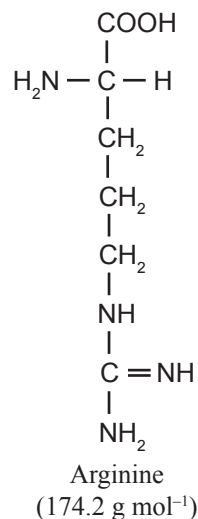
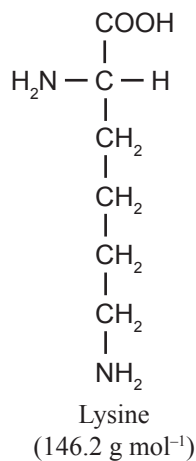
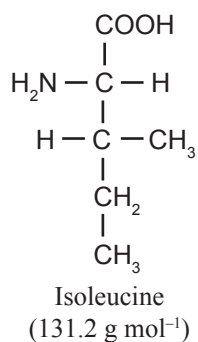
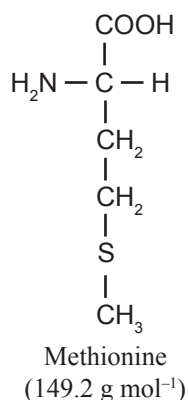
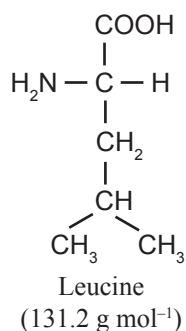
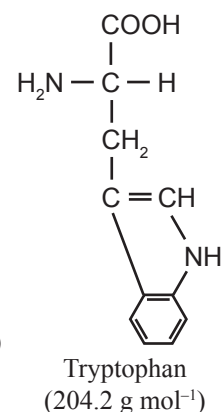
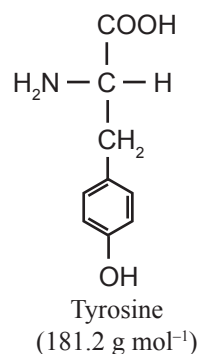
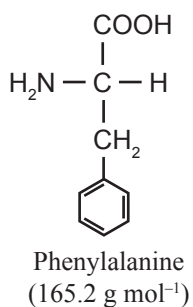
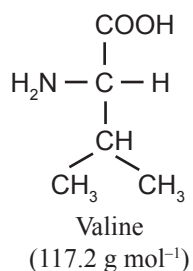
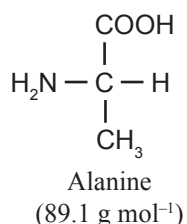
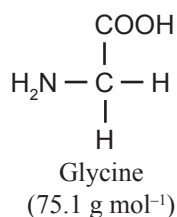
INFRARED SPECTROSCOPY

Functional group	Vibration	Wavenumber / cm^{-1}	Functional group	Vibration	Wave number / cm^{-1}
Alkane	C–H stretch	2950–2800 (s)	Aldehyde	C=O stretch	1725 (s)
Alkene	C=C–H stretch	3100–3010 (s)	Ketone	C=O stretch	1715 (s)
	C=C stretch	1690–1630 (m)	Carboxylic acid	O–H stretch	3400 (s)
Alkyl halide	C–F stretch	1400–1000 (s)		C=O stretch	1730–1700 (s)
	C–Cl stretch	785–540 (m-w)		C–O stretch	1320–1210 (s)
	C–Br stretch	650–510 (s-m)	Acid chloride	C=O stretch	1810–1775 (s)
	C–I stretch	600–485 (s-m)		C–Cl stretch	730–550 (s-m)
Alcohol	O–H stretch	3600–3300 (s)	Ester	C=O stretch	1750–1735 (s)
	C–O stretch	1260–1000 (s)		C–O stretch	1260–1160 (s)
Amine	N–H stretch (1 per bond)	3500–3300 (s-w)	Amide	N–H stretch	3500–3200 (s)
	N–H bend	1640–1500 (s)		C=O stretch	1680–1630 (s)
	C–N stretch	1200–1025 (s)			

^{13}C NMR RESONANCE SHIFTS



AMINO ACID STRUCTURES AND MOLAR MASSES FOR QUESTION TWO



PERIODIC TABLE OF THE ELEMENTS

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