



93102R



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New Zealand Qualifications Authority

Scholarship 2024 Chemistry

RESOURCE BOOKLET

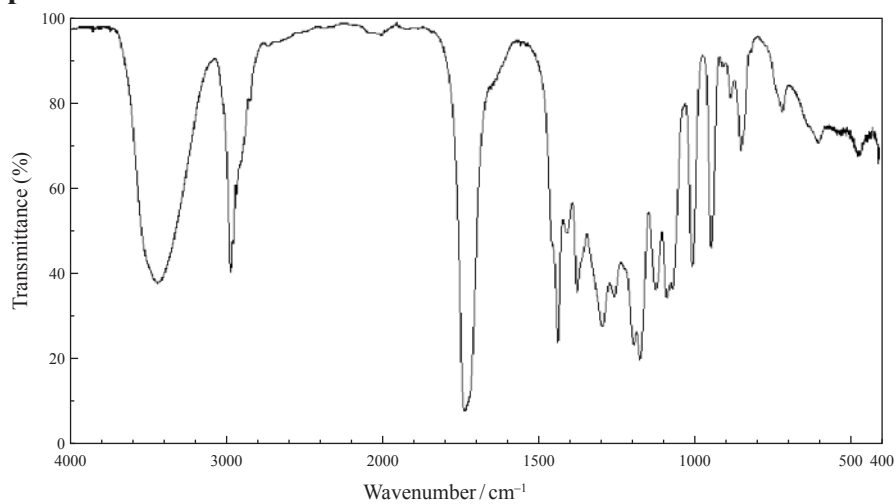
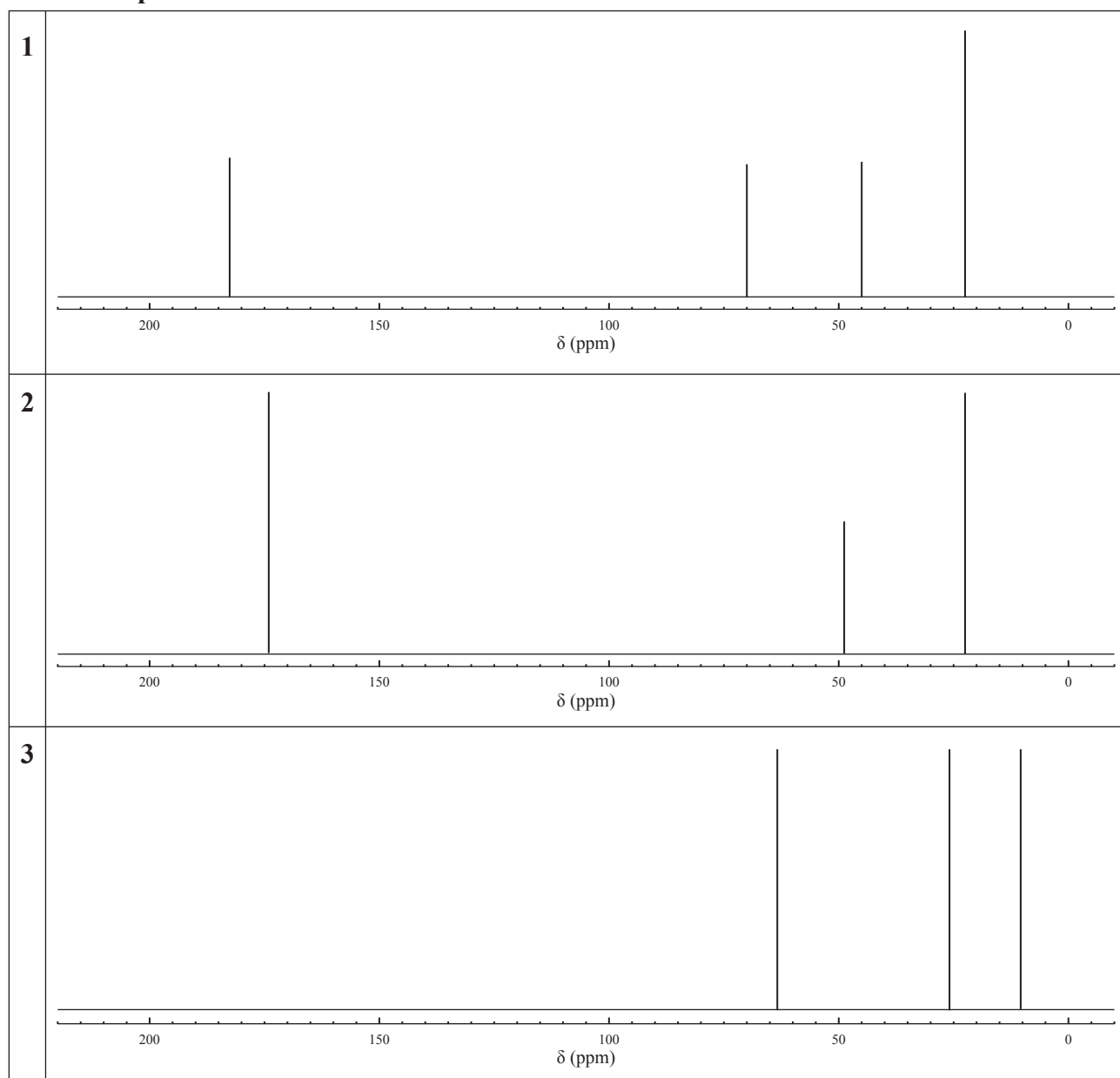
Refer to this booklet to answer the questions for Scholarship Chemistry.

Check that this booklet has pages 2–4 in the correct order and that none of these pages is blank.

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

IR AND ^{13}C NMR SPECTRA FOR QUESTION ONE (b)

IR spectra – Compound A

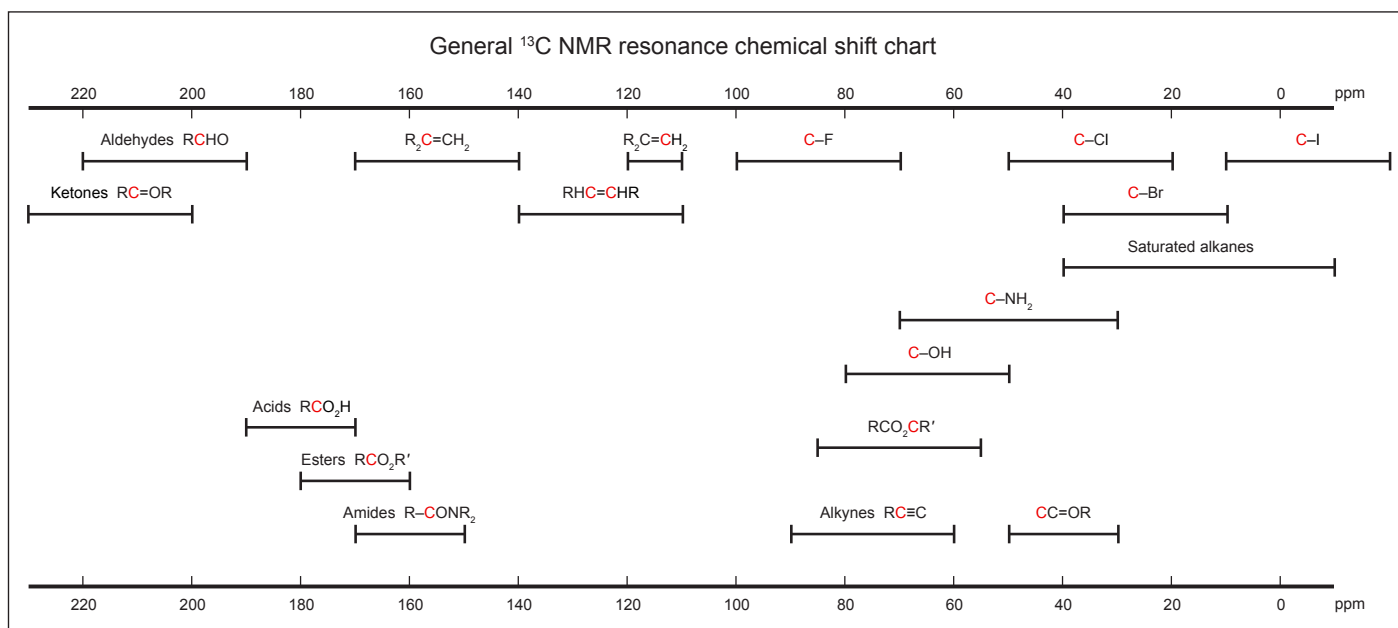
 ^{13}C NMR spectra

SPECTROSCOPY DATA SHEET

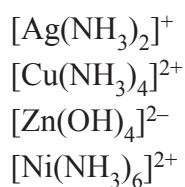
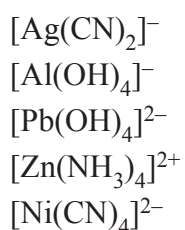
INFRARED SPECTROSCOPY

Functional group	Vibration	Wavenumber/ cm ⁻¹	Functional group	Vibration	Wavenumber/ 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)			

¹³C NMR RESONANCE SHIFTS



COMPLEX IONS



PERIODIC TABLE OF THE ELEMENTS

[illegible]

Lanthanide Series	57	La	139	58	Ce	140	59	Pr	141	60	Nd	144	61	Pm	147	62	Sm	150	63	Eu	152	64	Gd	157	65	Tb	159	66	Dy	163	67	Ho	165	68	Er	167	69	Tm	169	70	Yb	173
	89	Ac	227	90	Th	232	91	Pa	231	92	U	238	93	Np	237	94	Pu	239	95	Am	241	96	Cm	244	97	Bk	249	98	Cf	251	99	Es	252	100	Fm	257	101	Md	258	102	No	259