

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced Subsidiary GCE (H033)

Advanced GCE (H433)

Data Sheet for Chemistry B

MODIFIED ENLARGED

The information in this sheet is for the use of candidates following the Advanced Subsidiary GCE in Chemistry B (H033) course and Advanced GCE in Chemistry B (H433) course.

The data in this sheet will be printed for distribution with the examination papers.

Copies of this sheet may be used for teaching.

INSTRUCTIONS TO EXAMS OFFICER/INVIGILATOR

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GENERAL INFORMATION

Molar gas volume = $24.0 \text{ dm}^3 \text{ mol}^{-1}$ at RTP

Avogadro constant, $N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$

Specific heat capacity of water, $c = 4.18 \text{ J g}^{-1} \text{ K}^{-1}$

Planck constant, $h = 6.63 \times 10^{-34} \text{ J Hz}^{-1}$

Speed of light in a vacuum, $c = 3.00 \times 10^8 \text{ m s}^{-1}$

Ionic product of water, $K_w = 1.00 \times 10^{-14} \text{ mol}^2 \text{ dm}^{-6}$ at 298 K

1 tonne = 10^6 g

Arrhenius equation: $k = Ae^{-E_a/RT}$ or $\ln k = -E_a/RT + \ln A$

Gas constant, $R = 8.314 \text{ J mol}^{-1} \text{ K}^{-1}$

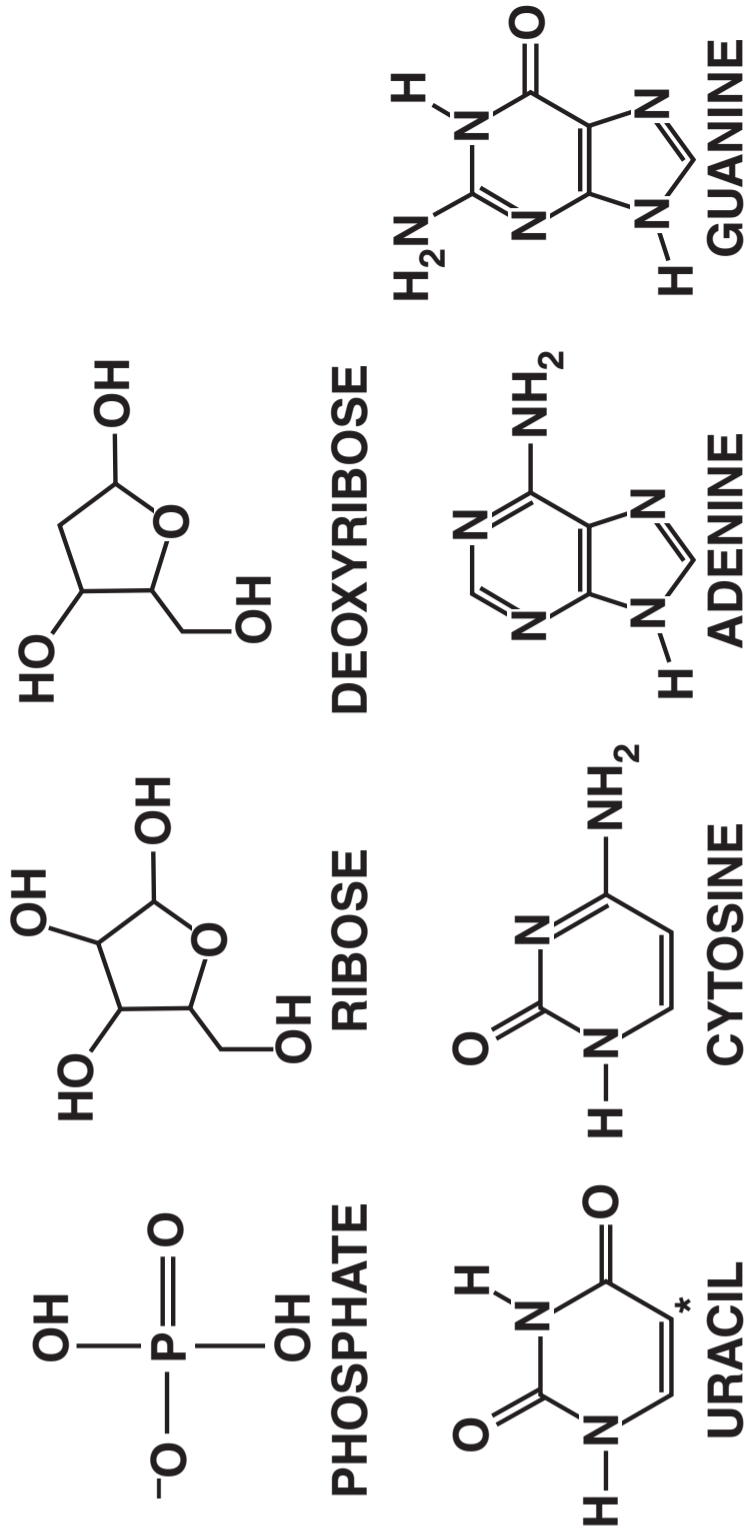
TRIPLET BASE CODES (CODONS) FOR SOME AMINO ACIDS USED IN mRNA

Glycine	GGU
Alanine	GCC
Leucine	CUG
Serine	UCG
Aspartic acid	GAU
Glutamine	CAA
Valine	GUC

CHARACTERISTIC INFRARED ABSORPTIONS IN ORGANIC MOLECULES

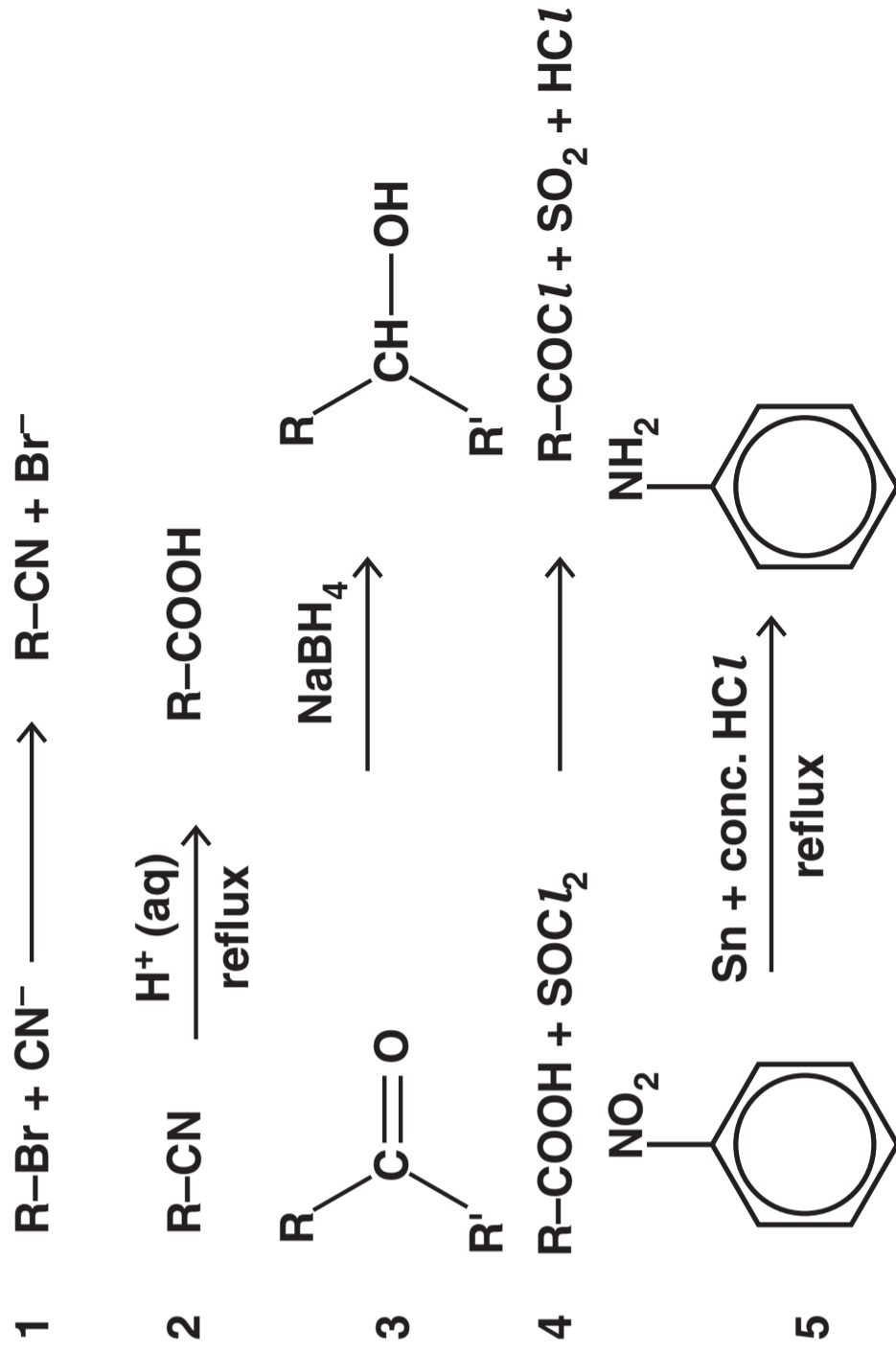
BOND	LOCATION	WAVENUMBER/cm ⁻¹
C–H	Alkanes Alkenes, arenes	2850–2950 3000–3100
C–C	Alkanes	750–1100
C=C	Alkenes	1620–1680
aromatic C=C	Arenes	Several peaks in range 1450–1650 (variable)
C=O	Aldehydes Ketones Carboxylic acids Esters Amides Acyl chlorides and acid anhydrides	1720–1740 1705–1725 1700–1725 1735–1750 1630–1700 1750–1820
C–O	Alcohols, ethers, esters and carboxylic acids	1000–1300
C≡N	Nitriles	2220–2260
C–X	Fluoroalkanes Chloroalkanes Bromoalkanes	1000–1350 600–800 500–600
O–H	Alcohols, phenols Carboxylic acids	3200–3600 (broad) 2500–3300 (broad)
N–H	Primary amines Amides	3300–3500 ca. 3500

MONOMERS OF DNA AND RNA

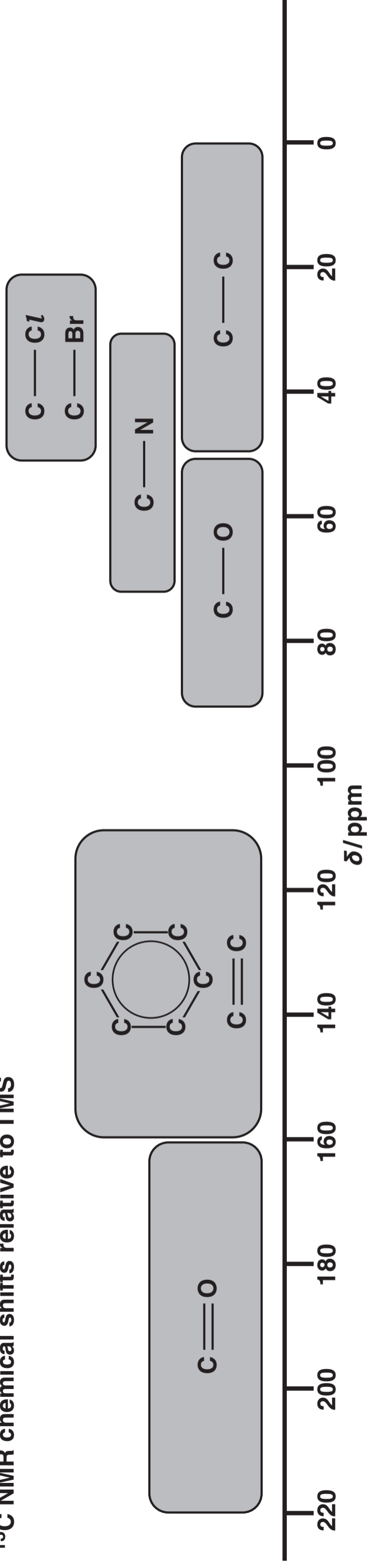


(thymine has a CH₃ at position *)

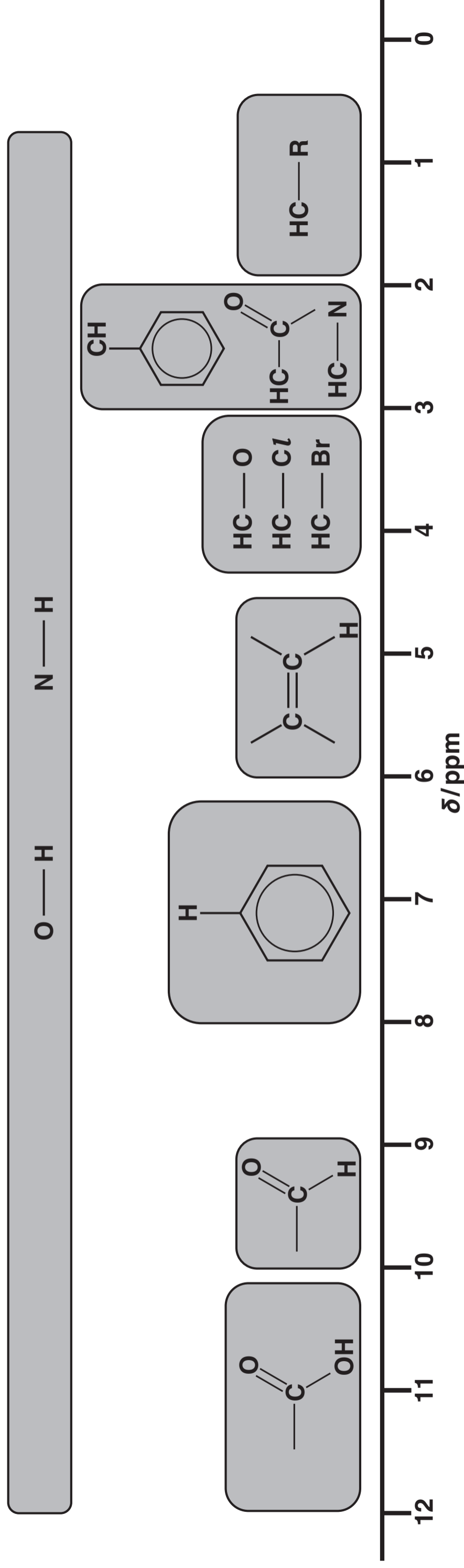
SOME USEFUL ORGANIC REACTIONS



¹³C NMR chemical shifts relative to TMS



¹H NMR chemical shifts relative to TMS



Chemical shifts are variable and can vary depending on the solvent, concentration and substituents. As a result, shifts may be outside the ranges indicated above.

OH and NH chemical shifts are very variable and are often broad. Signals are not usually seen as split peaks.

Note that CH bonded to 'shifting groups' on either side, e.g. O—CH₂—C=O, may be shifted more than indicated above.

The Periodic Table of the Elements

(1)

(2)

(3)

(4)

(5)

(6)

(7)

(0)

Key			atomic number																		18	
Symbol			name																		2	He
relative atomic mass																					4.0	

