

Modified Enlarged 36pt
OXFORD CAMBRIDGE AND RSA EXAMINATIONS
AS Level Chemistry B (H033)
A Level Chemistry B (H433)

Data Sheet

INSTRUCTIONS

Do NOT send this Data Sheet for marking. Keep it in the centre or recycle it.

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

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

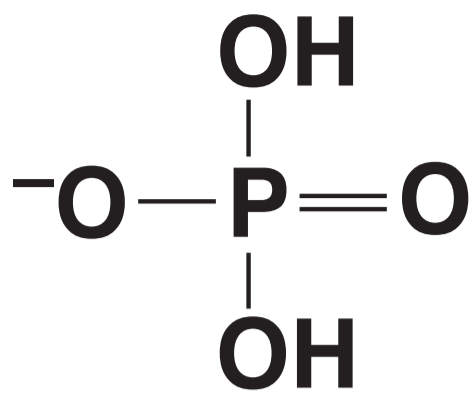
Glycine	GGU
Alanine	GCC
Leucine	CUG
Serine	UCG
Aspartic acid	GAU
Glutamine	CAA
Valine	GUC

CHARACTERISTIC INFRARED ABSORPTIONS IN ORGANIC MOLECULES

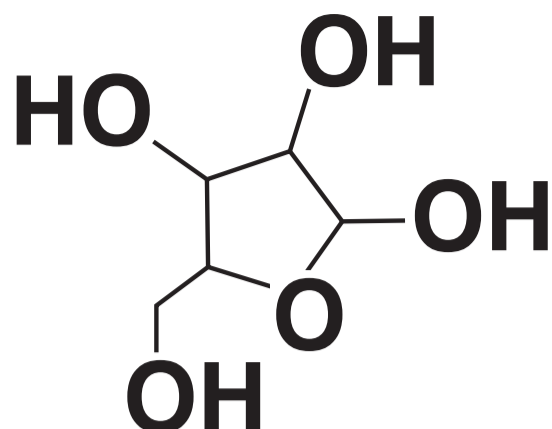
BOND	LOCATION	WAVENUMBER/ cm ⁻¹
C-H	Alkanes Alkenes, arenes	2850–2950 3000–3100
C-C	Alkanes	750–1100
C=C	Alkenes	1620–1680
aromatic C=C	Arenes	Several peaks in range 1450–1650 (variable)
C=O	Aldehydes Ketones Carboxylic acids Esters Amides Acyl chlorides and acid anhydrides	1720–1740 1705–1725 1700–1725 1735–1750 1630–1700 1750–1820

BOND	LOCATION	WAVENUMBER / cm⁻¹
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

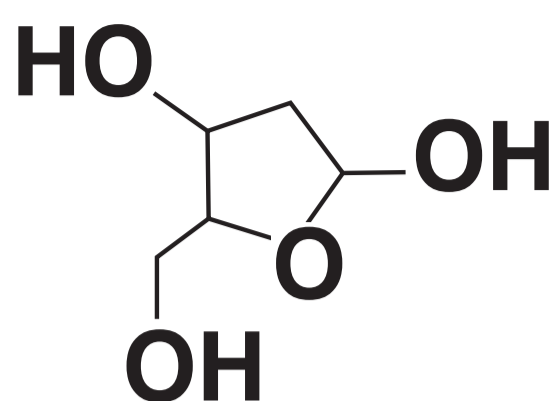
MONOMERS OF DNA AND RNA



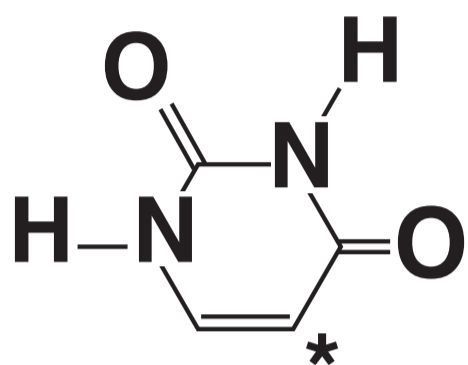
PHOSPHATE



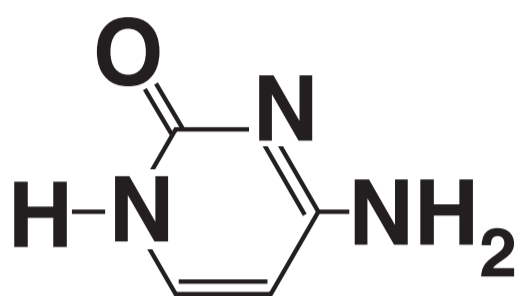
RIBOSE



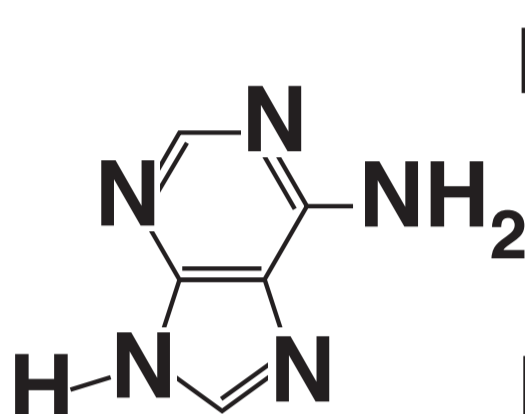
DEOXYRIBOSE



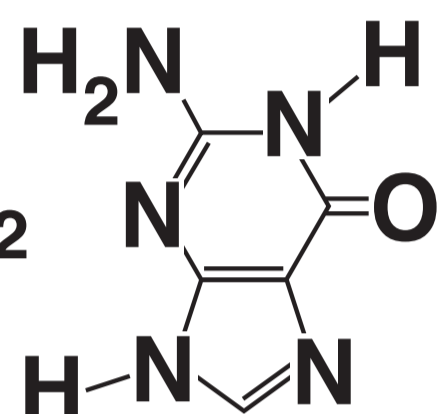
URACIL



CYTOSINE



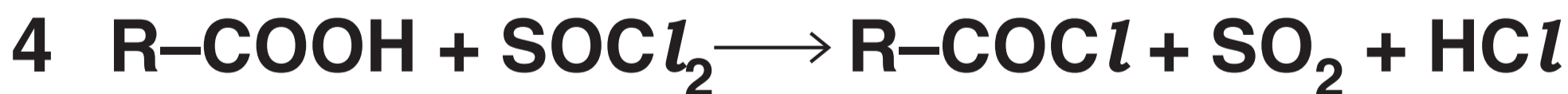
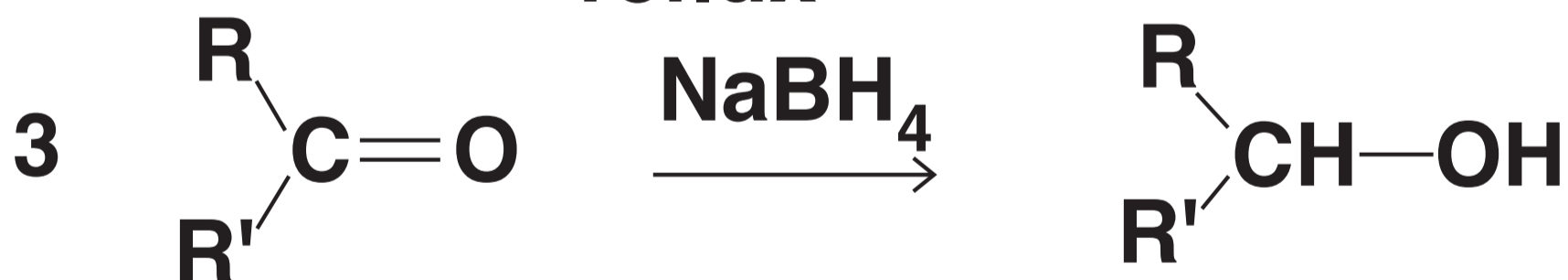
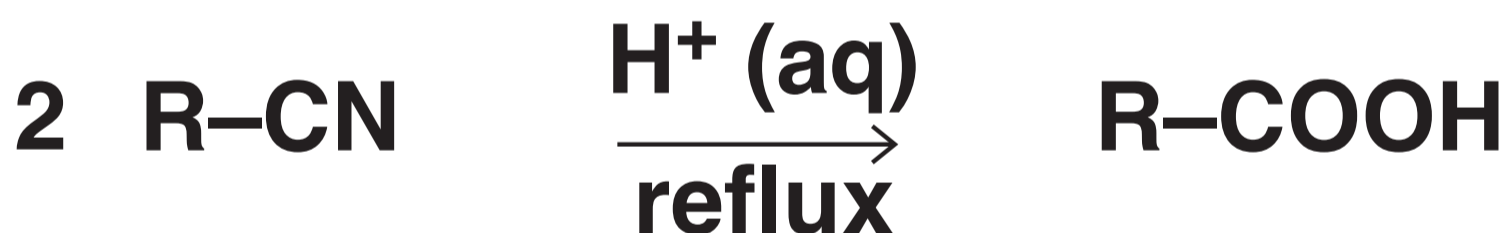
ADENINE



GUANINE

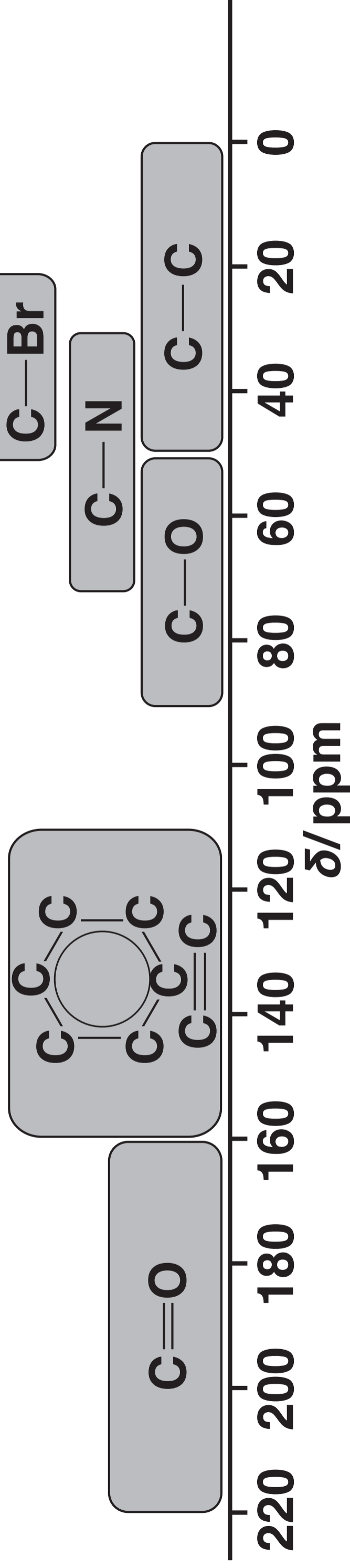
(thymine has a CH₃ at position *)

SOME USEFUL ORGANIC REACTIONS

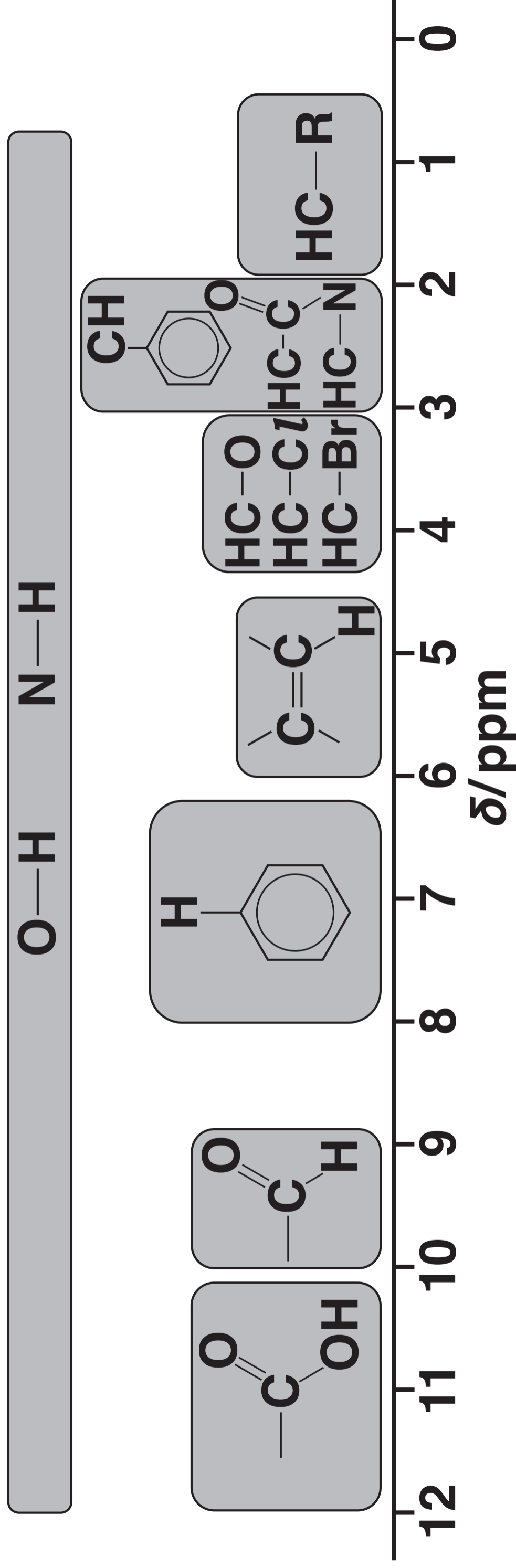


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¹³C NMR chemical shifts relative to TMS



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. $\text{O}-\text{CH}_2-\text{C}=\text{O}$, may be shifted more than indicated above.

The Periodic Table of the Elements

(1)

(2)

(3)

(4)

(5)

(6)

(7)

(0)

1		Key atomic number Symbol name relative atomic mass										18						
1	H hydrogen 1.0											2	He helium 4.0					
2																		
3	Li lithium 6.9	4	Be beryllium 9.0									9	F fluorine 19.0					
11	Na sodium 23.0	12	Mg magnesium 24.3									17	Cl chlorine 35.5					
19	K potassium 39.1	20	Ca calcium 40.1	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
37	Rb rubidium 85.5	38	Sr strontium 87.6	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
55	Cs caesium 132.9	56	Ba barium 137.3	57–71 lanthanoids	72	73	74	75	76	77	78	79	80	81	82	83	84	85
87	Fr francium	88	Ra radium	89–103 actinoids	104	105	106	107	108	109	110	111	112		114		116	