

Modified Enlarged 24pt
OXFORD CAMBRIDGE AND RSA EXAMINATIONS
AS Level Chemistry A (H032)
A Level Chemistry A (H432)

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 room temperature and pressure, RTP

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

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

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

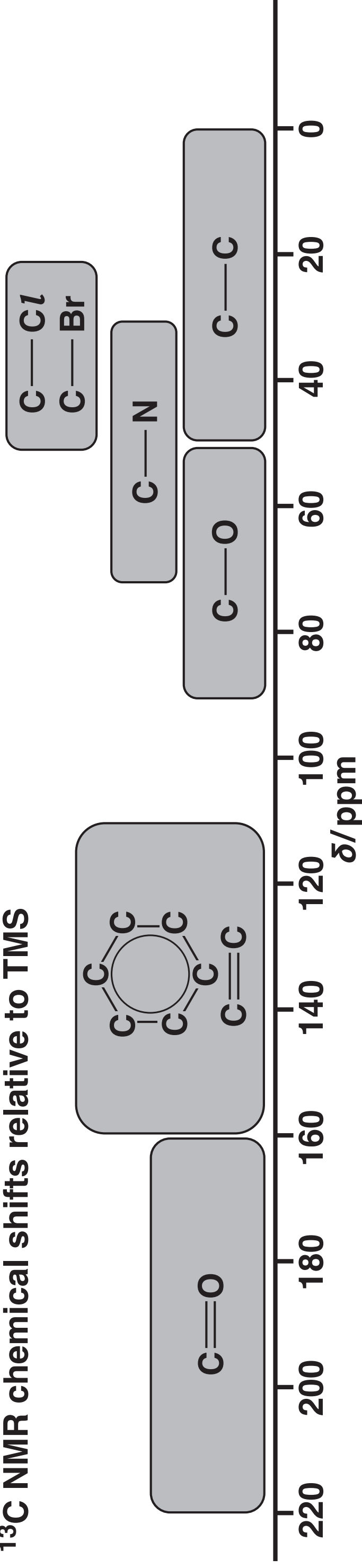
Arrhenius equation: $k = Ae^{-E_a/RT}$ or $\ln k = -E_a/RT + \ln A$

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

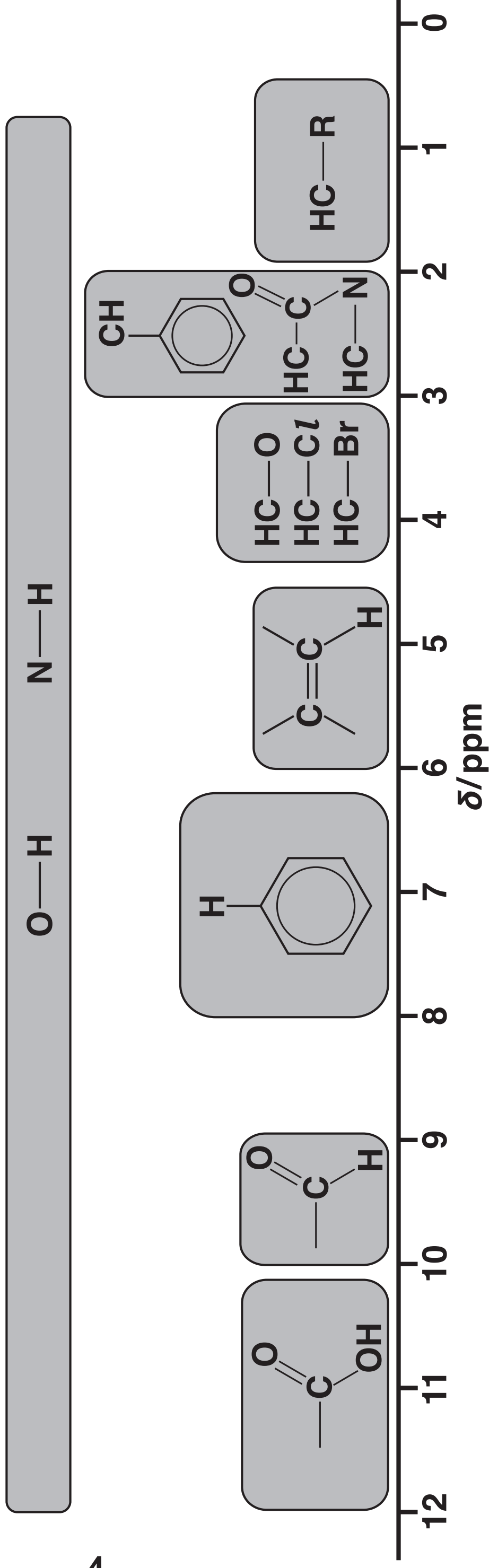
CHARACTERISTIC INFRARED ABSORPTIONS IN ORGANIC MOLECULES

BOND	LOCATION	WAVENUMBER / cm ⁻¹
C–C	Alkanes, alkyl chains	750–1100
C–X	Haloalkanes (X = Cl, Br, I)	500–800
C–F	Fluoroalkanes	1000–1350
C–O	Alcohols, esters, carboxylic acids	1000–1300
C=C	Alkenes	1620–1680
C=O	Aldehydes, ketones, carboxylic acids, esters, amides, acyl chlorides and acid anhydrides	1630–1820
aromatic C=C	Arenes	Several peaks in range 1450–1650 (variable)
C≡N	Nitriles	2220–2260
C–H	Alkyl groups, alkenes, arenes	2850–3100
O–H	Carboxylic acids	2500–3300 (broad)
N–H	Amines, amides	3300–3500
O–H	Alcohols, phenols	3200–3600

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)

Key																		
atomic number																		
Symbol																		
name																		
relative atomic mass																		
1	18																	
1	2																	
H	He																	
hydrogen	helium																	
1.0	4.0																	
3	4	17															18	
Li	Be																Ne	
lithium	beryllium																neon	
6.9	9.0																20.2	
11	12																18	
Na	Mg																Ar	
sodium	magnesium																argon	
23.0	24.3																39.9	
19	20	11										12						36
K	Ca	Cu										Zn						Kr
potassium	calcium	copper										zinc						krypton
39.1	40.1	63.5										65.4						83.8
37	38	47										48						54
Rb	Sr	Ag										Cd						Xe
rubidium	strontium	silver										cadmium						xenon
85.5	87.6	107.9										112.4						131.3
55	56	79										80						86
Cs	Ba	Au										Hg						Rn
caesium	barium	gold										mercury						radon
132.9	137.3	197.0										200.6						
87	88	111										112						
Fr	Ra	Rg										Cn						
francium	radium	roentgenium										copernicium						
		Ds																
		Mt																
		Hs																
		Bohrium																
		Seaborgium																
		Dubnium																
		Rutherfordium																
		Actinoids																

57	58	59	60	61	62	63	64	65	66	67	68	69	70	71
La lanthanum 138.9	Ce cerium 140.1	Pr praseodymium 140.9	Nd neodymium 144.2	Pm promethium 144.9	Sm samarium 150.4	Eu europium 152.0	Gd gadolinium 157.2	Tb terbium 158.9	Dy dysprosium 162.5	Ho holmium 164.9	Er erbium 167.3	Tm thulium 168.9	Yb ytterbium 173.0	Lu lutetium 175.0
89	90	91	92	93	94	95	96	97	98	99	100	101	102	103
Ac actinium	Th thorium 232.0	Pa protactinium	U uranium 238.1	Np neptunium	Pu plutonium	Am americium	Cm curium	Bk berkelium	Cf californium	Es einsteinium	Fm fermium	Md mendelevium	No nobelium	Lr lawrencium