

**EXAMINATION DATA SHEET FOR THE PHYSICAL SCIENCES
(CHEMISTRY)**

TABLE 1 PHYSICAL CONSTANTS

NAME	SYMBOL	VALUE
Magnitude of charge on electron	e	$1,6 \times 10^{-19} \text{ C}$
Mass of an electron	m_e	$9,1 \times 10^{-31} \text{ kg}$
Standard pressure	p^θ	$1,01 \times 10^5 \text{ Pa}$
Molar gas volume at STP	V_m	$22,4 \text{ dm}^3 \cdot \text{mol}^{-1}$
Standard temperature	T^θ	273 K
Avogadro's constant	N_A	$6,02 \times 10^{23} \text{ mol}^{-1}$
Faraday's constant	F	$96\,500 \text{ C} \cdot \text{mol}^{-1}$

TABLE 2 CHEMISTRY FORMULAE

$n = \frac{m}{M}$	$n = \frac{N}{N_A}$	$n = \frac{V}{V_m}$
$c = \frac{n}{V}$ OR $c = \frac{m}{MV}$	$K_w = [H_3O^+] \cdot [OH^-] = 1 \times 10^{-14}$ at 25 °C (298 K)	
$q = It$ $q = nF$	$E_{\text{cell}}^\theta = E_{\text{cathode}}^\theta - E_{\text{anode}}^\theta$ $E_{\text{cell}}^\theta = E_{\text{oxidising agent}}^\theta - E_{\text{reducing agent}}^\theta$	

TABLE 3 PERIODIC TABLE

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1 1 H																	2 4 He
2	3 7 Li	4 9 Be											5 10,8 B	6 12 C	7 14 N	8 16 O	9 19 F	10 20 Ne
3	11 23 Na	12 24,3 Mg											13 27 Al	14 28 Si	15 31 P	16 32 S	17 35,5 Cl	18 40 Ar
4	19 39 K	20 40 Ca	21 45 Sc	22 48 Ti	23 51 V	24 52 Cr	25 55 Mn	26 56 Fe	27 59 Co	28 59 Ni	29 63,5 Cu	30 65,4 Zn	31 70 Ga	32 72,6 Ge	33 75 As	34 79 Se	35 80 Br	36 84 Kr
5	37 85,5 Rb	38 88 Sr	39 89 Y	40 91 Zr	41 93 Nb	42 96 Mo	43 99 Tc	44 101 Ru	45 103 Rh	46 106 Pd	47 108 Ag	48 112 Cd	49 115 In	50 119 Sn	51 121 Sb	52 128 Te	53 127 I	54 131 Xe
6	55 133 Cs	56 137,3 Ba		72 178,5 Hf	73 181 Ta	74 184 W	75 186 Re	76 190 Os	77 192 Ir	78 195 Pt	79 197 Au	80 200,6 Hg	81 204,4 Tl	82 207 Pb	83 209 Bi	84 – Po	85 – At	86 – Rn
7	87 Fr	88 Ra																

57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lw

TABLE 4 STANDARD ELECTRODE POTENTIALS

Half-reaction		E°/volt
$\text{Li}^+ + \text{e}^- \rightleftharpoons \text{Li}$		-3,05
$\text{K}^+ + \text{e}^- \rightleftharpoons \text{K}$		-2,93
$\text{Cs}^+ + \text{e}^- \rightleftharpoons \text{Cs}$		-2,92
$\text{Ba}^{2+} + 2\text{e}^- \rightleftharpoons \text{Ba}$		-2,90
$\text{Sr}^{2+} + 2\text{e}^- \rightleftharpoons \text{Sr}$		-2,89
$\text{Ca}^{2+} + 2\text{e}^- \rightleftharpoons \text{Ca}$		-2,87
$\text{Na}^+ + \text{e}^- \rightleftharpoons \text{Na}$		-2,71
$\text{Mg}^{2+} + 2\text{e}^- \rightleftharpoons \text{Mg}$		-2,37
$\text{Al}^{3+} + 3\text{e}^- \rightleftharpoons \text{Al}$		-1,66
$\text{Mn}^{2+} + 2\text{e}^- \rightleftharpoons \text{Mn}$		-1,18
$2\text{H}_2\text{O} + 2\text{e}^- \rightleftharpoons \text{H}_2(\text{g}) + 2\text{OH}^-$		-0,83
$\text{Zn}^{2+} + 2\text{e}^- \rightleftharpoons \text{Zn}$		-0,76
$\text{Cr}^{3+} + 3\text{e}^- \rightleftharpoons \text{Cr}$		-0,74
$\text{Fe}^{2+} + 2\text{e}^- \rightleftharpoons \text{Fe}$		-0,44
$\text{Cd}^{2+} + 2\text{e}^- \rightleftharpoons \text{Cd}$		-0,40
$\text{Co}^{2+} + 2\text{e}^- \rightleftharpoons \text{Co}$		-0,28
$\text{Ni}^{2+} + 2\text{e}^- \rightleftharpoons \text{Ni}$		-0,25
$\text{Sn}^{2+} + 2\text{e}^- \rightleftharpoons \text{Sn}$		-0,14
$\text{Pb}^{2+} + 2\text{e}^- \rightleftharpoons \text{Pb}$		-0,13
$\text{Fe}^{3+} + 3\text{e}^- \rightleftharpoons \text{Fe}$		-0,04
$2\text{H}^+ + 2\text{e}^- \rightleftharpoons \text{H}_2(\text{g})$		0,00
$\text{S} + 2\text{H}^+ + 2\text{e}^- \rightleftharpoons \text{H}_2\text{S}(\text{g})$		+0,14
$\text{Sn}^{4+} + 2\text{e}^- \rightleftharpoons \text{Sn}^{2+}$		+0,15
$\text{SO}_4^{2-} + 4\text{H}^+ + 2\text{e}^- \rightleftharpoons \text{SO}_2(\text{g}) + 2\text{H}_2\text{O}$		+0,17
$\text{Cu}^{2+} + 2\text{e}^- \rightleftharpoons \text{Cu}$		+0,34
$2\text{H}_2\text{O} + \text{O}_2 + 4\text{e}^- \rightleftharpoons 4\text{OH}^-$		+0,40
$\text{SO}_2 + 4\text{H}^+ + 4\text{e}^- \rightleftharpoons \text{S} + 2\text{H}_2\text{O}$		+0,45
$\text{I}_2 + 2\text{e}^- \rightleftharpoons 2\text{I}^-$		+0,54
$\text{O}_2(\text{g}) + 2\text{H}^+ + 2\text{e}^- \rightleftharpoons \text{H}_2\text{O}_2$		+0,68
$\text{Fe}^{3+} + \text{e}^- \rightleftharpoons \text{Fe}^{2+}$		+0,77
$\text{Hg}^{2+} + 2\text{e}^- \rightleftharpoons \text{Hg}$		+0,79
$\text{NO}_3^- + 2\text{H}^+ + \text{e}^- \rightleftharpoons \text{NO}_2(\text{g}) + \text{H}_2\text{O}$		+0,80
$\text{Ag}^+ + \text{e}^- \rightleftharpoons \text{Ag}$		+0,80
$\text{NO}_3^- + 4\text{H}^+ + 3\text{e}^- \rightleftharpoons \text{NO}(\text{g}) + 2\text{H}_2\text{O}$		+0,96
$\text{Br}_2 + 2\text{e}^- \rightleftharpoons 2\text{Br}^-$		+1,09
$\text{Pt}^{2+} + 2\text{e}^- \rightleftharpoons \text{Pt}$		+1,20
$\text{MnO}_2 + 4\text{H}^+ + 2\text{e}^- \rightleftharpoons \text{Mn}^{2+} + 2\text{H}_2\text{O}$		+1,21
$\text{O}_2 + 4\text{H}^+ + 4\text{e}^- \rightleftharpoons 2\text{H}_2\text{O}$		+1,23
$\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{e}^- \rightleftharpoons 2\text{Cr}^{3+} + 7\text{H}_2\text{O}$		+1,33
$\text{Cl}_2(\text{g}) + 2\text{e}^- \rightleftharpoons 2\text{Cl}^-$		+1,36
$\text{Au}^{3+} + 3\text{e}^- \rightleftharpoons \text{Au}$		+1,42
$\text{MnO}_4^- + 8\text{H}^+ + 5\text{e}^- \rightleftharpoons \text{Mn}^{2+} + 4\text{H}_2\text{O}$		+1,51
$\text{H}_2\text{O}_2 + 2\text{H}^+ + 2\text{e}^- \rightleftharpoons 2\text{H}_2\text{O}$		+1,77
$\text{F}_2(\text{g}) + 2\text{e}^- \rightleftharpoons 2\text{F}^-$		+2,87

Increasing oxidising ability

Increasing reducing ability