

L3-CHEMMR



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

QUALIFY FOR THE FUTURE WORLD
KIA NOHO TAKATŪ KI TŌ ĀMUA AO!

Te Mātauranga Matū, Kaupae 3, 2020

2.00 i te ahiahi Rāmere 27 Whiringa-ā-rangi 2020

PUKAPUKA RAUEMI

Tirohia tēnei pukapuka hei whakatutuki i ngā tūmahi o ō Pukapuka Tūmahi, Tuhiinga hoki.

Tirohia mēnā e tika ana te raupapatanga o ngā whārangi 2–5 kei roto i tēnei pukapuka, ka mutu, kāore tētahi o aua whārangi i te takoto kau.

KA TAEA TĒNEI PUKAPUKA TE PUPURI HEI TE MUTUNGA O TE WHAKAMĀTAUTAU.

Ngā tikanga tātai mō 91390M: Te whakaatu māramatanga ki ngā tikanga matūrewarau me ngā āhuatanga o ngā korakora me ngā matū

$$n = cV$$

$$n = \frac{m}{M}$$

$$q = mc\Delta T \qquad \Delta_r H^\circ = \frac{-q}{n}$$

$$\Delta_r H^\circ = \sum \Delta_f H^\circ(\text{ngā hua}) - \sum \Delta_f H^\circ(\text{ngā pūmatū hohe})$$

Ngā tikanga tātai mō 91392M: Te whakaatu māramatanga ki ngā mātāpono taurite i ngā pūnaha waiwai

$$\text{pH} = -\log[\text{H}_3\text{O}^+] \qquad [\text{H}_3\text{O}^+] = 10^{-\text{pH}}$$

$$K_w = [\text{H}_3\text{O}^+][\text{OH}^-] = 1 \times 10^{-14} \text{ i te } 25^\circ\text{C}$$

$$\text{p}K_a = -\log K_a \qquad K_a = 10^{-\text{p}K_a}$$

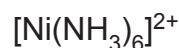
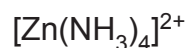
$$K_a = \frac{[\text{H}_3\text{O}^+][\text{A}^-]}{[\text{HA}]}$$

$$K_s = s^2 \qquad K_s = 4s^3$$

$$n = cV$$

$$n = \frac{m}{M}$$

Ngā katote tuatini mō 91392M: Te whakaatu māramatanga ki ngā mātāpono taurite i ngā pūnaha waiwai



Formulae for 91390: Demonstrate understanding of thermochemical principles and the properties of particles and substances

$$n = cV$$

$$n = \frac{m}{M}$$

$$q = mc\Delta T$$

$$\Delta_r H^\circ = \frac{-q}{n}$$

$$\Delta_r H^\circ = \sum \Delta_f H^\circ(\text{products}) - \sum \Delta_f H^\circ(\text{reactants})$$

Formulae for 91392: Demonstrate understanding of equilibrium principles in aqueous systems

$$\text{pH} = -\log[\text{H}_3\text{O}^+]$$

$$[\text{H}_3\text{O}^+] = 10^{-\text{pH}}$$

$$K_w = [\text{H}_3\text{O}^+][\text{OH}^-] = 1 \times 10^{-14} \text{ at } 25^\circ\text{C}$$

$$\text{p}K_a = -\log K_a$$

$$K_a = 10^{-\text{p}K_a}$$

$$K_a = \frac{[\text{H}_3\text{O}^+][\text{A}^-]}{[\text{HA}]}$$

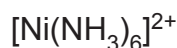
$$K_s = s^2$$

$$K_s = 4s^3$$

$$n = cV$$

$$n = \frac{m}{M}$$

Complex ions for 91392: Demonstrate understanding of equilibrium principles in aqueous systems



TE TAKA PŪMOTU

Papatipu ngota hāngai

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57	La	139	Ce	140	Pr	141	Nd	144	Pm	147	Sm	150	Eu	152	Gd	157	Tb	159	Dy	163	Ho	165	Er	167	Tm	169	Yb	173
89	Ac	227	Th	232	Pa	231	U	238	Np	237	Pu	239	Am	241	Cm	244	Bk	249	Cf	251	Es	252	Fm	257	Md	258	No	259

PERIODIC TABLE OF THE ELEMENTS

Atomic number																		1 H 1.0	18																
Relative atomic mass																																			
1																		2 He 4.0																	
2	4 Be 9.0																9 F 19.0	10 Ne 20.2																	
3	6.9 Li																16 O 16.0	17 Cl 35.5	18 Ar 40.0																
11	12 Mg 24.3																32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.9	36 Kr 83.8														
19	20 K 39.1	21 Ca 40.1	22 Ti 47.9	23 V 50.9	24 Cr 52.0	25 Mn 54.9	26 Fe 55.9	27 Co 58.9	28 Ni 58.7	29 Cu 63.6	30 Zn 65.4	31 Ga 69.7	32 Ge 72.6	33 As 74.9	34 Se 79.0	35 Br 79.9	36 Kr 83.8																		
37	38 Rb 85.5	39 Sr 87.6	40 Zr 91.2	41 Nb 92.9	42 Mo 95.9	43 Tc 98.9	44 Ru 101	45 Rh 103	46 Pd 106	47 Ag 108	48 Cd 112	49 In 115	50 Sn 119	51 Sb 122	52 Te 128	53 I 127	54 Xe 131																		
55	56 Cs 133	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	71 Lu 175	72 Hf 179	73 Ta 181	74 W 184	75 Re 186	76 Os 190	77 Ir 192	78 Pt 195	79 Au 197	80 Hg 201	81 Tl 204	82 Pb 207	83 Bi 209	84 Po 210	85 At 210	86 Rn 222				
87	88 Fr 223	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	103 Lr 262	104 Rf 261	105 Db 262	106 Sg 263	107 Bh 264	108 Hs 265	109 Mt 268	110 Ds 271	111 Rg 272	112 Cn 277	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts	118 Og				

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

English translation of the wording on the front cover

L3-CHEMMR

Level 3 Chemistry, 2020

2.00p.m. Friday 27 November 2020

RESOURCE BOOKLET

Refer to this booklet to answer the questions in your Question and Answer Booklets.

Check that this booklet has pages 2–5 in the correct order and that none of these pages is blank.

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