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L3-CHEMMR



Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Te Mātai Matū, Kaupae 3, 2024

TE PUKAPUKA RAUEMI

Tirohia te pukapuka nei hei whakatutuki i ngā tūmahi kei ō Pukapuka mō ngā Tūmahi me ngā Tuhinga.

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

E ĀHEI ANA TŌ PUPURI KI TĒNEI PUKAPUKA HEI TE MUTUNGA O TE WHAKAMĀTAUTAU.

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

$$n = cV$$

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

$$q = mc\Delta T$$

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

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

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

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

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

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

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

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

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

$$K_s = s^2$$

$$K_s = 4s^3$$

$$n = cV$$

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

Ngā katote tuatini mō 91392: 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

18

		Te taumaha iraoho																	
		Te tau iraoho																	
		1																	
		H																	
		1.0																	
	2															2			
		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
3	4	Li 6.9	Be 9.0															Ne 20.2	
11	12	Na 23.0	Mg 24.3															Ar 40.0	
19	20	K 39.1	Ca 40.1	Sc 45.0	Ti 47.9	V 50.9	Cr 52.0	Mn 54.9	Fe 55.9	Co 58.9	Ni 58.7	Cu 63.6	Zn 65.4	Ga 69.7	Ge 72.6	As 74.9	Se 79.0	Br 79.9	Kr 83.8
37	38	Rb 85.5	Sr 87.6	Y 88.9	Zr 91.2	Nb 92.9	Mo 95.9	Tc 98.9	Ru 101	Rh 103	Pd 106	Ag 108	Cd 112	In 115	Sn 119	Sb 122	Te 128	I 127	Xe 131
55	56	Cs 133	Ba 137	Lu 175	Hf 179	Ta 181	W 184	Re 186	Os 190	Ir 192	Pt 195	Au 197	Hg 201	Tl 204	Pb 207	Bi 209	Po 210	At 210	Rn 222
87	88	Fr 223	Ra 226	Lr 262	Rf 261	Db 262	Sg 263	Bh 264	Hs 265	Mt 268	Ds 271	Rg 272	Cn 277	Nh 277	Fl 277	Mc 277	Lv 277	Ts 277	Og 277

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
57	58	59	60	61	62	63	64	65	66	67	68	69	70				
Te Raupapa Lanthanide	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			
Te Raupapa Actinide	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			

PERIODIC TABLE OF THE ELEMENTS

Atomic number		Relative atomic mass																																	
1		2																																	
H 1.0		He 4.0																																	
18		17																																	
16		15																																	
15		14																																	
14		13																																	
13		12																																	
12		11																																	
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8		7																																	
7		6																																	
6		5																																	
5		4																																	
4		3																																	
3		2																																	
2		1																																	
3	Li 6.9	4	Be 9.0	5	B 10.8	6	C 12.0	7	N 14.0	8	O 16.0	9	F 19.0	10	Ne 20.2	11	Na 23.0	12	Mg 24.3	13	Al 27.0	14	Si 28.1	15	P 31.0	16	S 32.1	17	Cl 35.5	18	Ar 40.0				
19	K 39.1	20	Ca 40.1	21	Sc 45.0	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	Rb 85.5	38	Sr 87.6	39	Y 88.9	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	Cs 133	56	Ba 137	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				
87	Fr 223	88	Ra 226	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				
81	Tl 204	82	Pb 207	83	Bi 209	84	Po 210	85	At 210	86	Rn 222	113	Nh 277	114	Fl 277	115	Mc 277	116	Lv 277	117	Ts 277	118	Og 277												

Lanthanide Series	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
Actinide Series	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

English translation of the wording on the front cover



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Level 3 Chemistry 2024

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.