higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

WATER TREATMENT PRACTICE N3

(8120033)

21 November 2022 (X-paper)
09:00–12:00

This question paper consists of 4 pages and 1 periodic table.

120Q1E2221

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
WATER TREATMENT PRACTICE N3
TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer all the questions.
2. Read all the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Use only a blue or black pen.
5. The sketch should be clear, neat and labelled. A pencil may be used.
6. Write neatly and legibly.

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QUESTION 1

Complete and balance the following chemical reactions:

1.1 $Mg(OH)_2 + CO_2 \longrightarrow$ (2)

1.2 $CaCl_2 + Na_2CO_3 \longrightarrow$ (2)

1.3 $Al_2(SO_4)_3 + 3Ca(HCO_3)_2 \longrightarrow$ (4)

1.4 $MgCO_3 + Ca(OH)_2 \longrightarrow$ (2)

[10]

QUESTION 2

2.1 Define the following terms:

2.1.1 Filtration

2.1.2 Breakpoint

2.1.3 Coagulant

2.1.4 Turbidity

(4 × 2) (8)

2.2 Calculate the molecular mass of the following compounds:

2.2.1 Ferric hydroxide

2.2.2 Carbon monoxide

2.2.3 Limestone

2.2.4 Magnesium sulphate

(4 × 3) (12)

[20]

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QUESTION 3

3.1 Explain the purpose of each of the following in the backwashing process of a rapid sand filter:

3.1.1 Air blower (3)

3.1.2 Wash water (4)

3.2 Compounds which dissolve in water usually separate into positively and negatively charged ions.

Use sodium chloride to explain the phenomenon of ionisation. (7)

3.3 Name FOUR methods of iron removal. (4)

3.4 Name THREE types of sedimentation tanks. (3)
[21]

QUESTION 4

4.1 Make a sketch to show how the process of the pressure sand filter works. (10)

4.2 State THREE methods of chlorination. (3)

4.3 State FOUR definite regions in a breakpoint chlorination curve. (4)

4.4 Give the formula that is used to calculate pHs (stability of water). (2)
[19]

QUESTION 5

5.1 State SIX precautions that can be taken to prevent rusting. (6)

5.2 State THREE disadvantages of the lime soda process. (3)

5.3 Name THREE types of fluoride used in water treatment to prevent dental damage. (3)

5.4 Name FOUR classes of fire, give ONE example of each class and name the type of extinguisher used for each class of fire. (8)

5.5 State 10 types of information that should be supplied when samples are submitted for testing. (10)
[30]

TOTAL: 100

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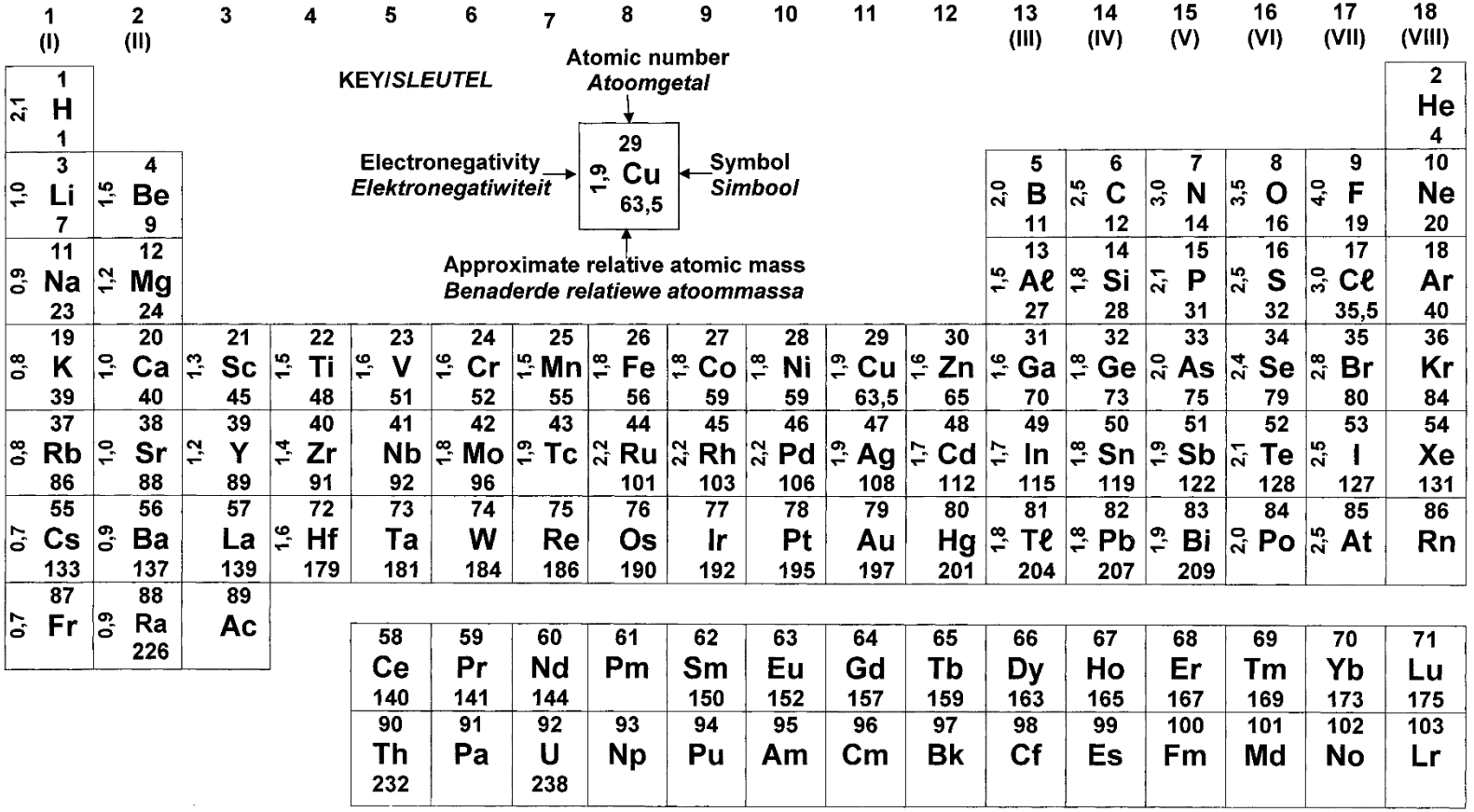
THE PERIODIC TABLE OF ELEMENTS
DIE PERIODIEKE TABEL VAN ELEMENTE



1 (I)	2 (II)	3	4	5	6	7	8	9	10	11	12	13 (III)	14 (IV)	15 (V)	16 (VI)	17 (VII)	18 (VIII)
2,1 H 1																	2 He 4
1,0 Li 7	1,5 Be 9											2,0 B 11	2,5 C 12	3,0 N 14	3,5 O 16	4,0 F 19	Ne 20
0,9 Na 23	1,2 Mg 24											1,5 Aℓ 27	1,8 Si 28	2,1 P 31	2,5 S 32	3,0 Cℓ 35,5	Ar 40
0,8 K 39	1,0 Ca 40	1,3 Sc 45	1,5 Ti 48	1,6 V 51	1,6 Cr 52	1,5 Mn 55	1,8 Fe 56	1,8 Co 59	1,8 Ni 59	1,9 Cu 63,5	1,6 Zn 65	1,6 Ga 70	1,8 Ge 73	2,0 As 75	2,4 Se 79	2,8 Br 80	Kr 84
0,8 Rb 86	1,0 Sr 88	1,2 Y 89	1,4 Zr 91	Nb 92	1,8 Mo 96	1,9 Tc	2,2 Ru 101	2,2 Rh 103	2,2 Pd 106	1,9 Ag 108	1,7 Cd 112	1,7 In 115	1,8 Sn 119	1,9 Sb 122	2,1 Te 128	2,5 I 127	Xe 131
0,7 Cs 133	0,9 Ba 137	La 139	1,6 Hf 179	Ta 181	W 184	Re 186	Os 190	Ir 192	Pt 195	Au 197	Hg 201	1,8 Tℓ 204	1,8 Pb 207	1,9 Bi 209	2,0 Po	2,5 At	Rn
0,7 Fr	0,9 Ra 226	Ac															

				58 Ce 140	59 Pr 141	60 Nd 144	61 Pm	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
				90 Th 232	91 Pa	92 U 238	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr