higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

WATER TREATMENT PRACTICE N3

(8120033)

9 April 2021 (X-paper)
09:00–12:00

This question paper consists of 5 pages and 1 periodic table.

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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. Write neatly and legibly.

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QUESTION 1

1.1 Define the following:

1.1.1 Pre-sedimentation

1.1.2 Floc

1.1.3 Aerobic organisms

1.1.4 Jar tests

1.1.5 Sedimentation tank

(5 × 2) (10)

1.2 Write the chemical formula for each of the following chemical names:

1.2.1 Ammonium

1.2.2 Slaked lime

1.2.3 Calcium carbonate

1.2.4 Caustic soda

1.2.5 Sodium bicarbonate

1.2.6 Sulphuric acid

1.2.7 Soda ash

1.2.8 Sodium sulphate

1.2.9 Ferric chloride

1.2.10 Unslaked lime

(10 × 1) (10)

[20]

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QUESTION 2

2.1 Specify the problem associated with the following substances in drinking water by indicating whether they are physical, chemical or toxic:

2.1.1 Iron

2.1.2 Turbidity

2.1.3 Magnesium

2.1.4 Fluoride

2.1.5 Cadmium

(5 × 1) (5)

2.2 State FIVE operating checks that should be carried out regularly on pumps to prevent a major breakdown. (5)

2.3 State SEVEN causes why centrifugal pumps may fail to deliver water. (7)

2.4 State THREE advantages of using groundwater. (3)

[20]

QUESTION 3

3.1 Name FOUR general types of suspended matter found in water. (4)

3.2 Name FOUR examples of diseases caused by water pollution. (4)

3.3 Name THREE major aspects that must be kept in mind always during sample collection. (3)

3.4 Write the balanced chemical reactions of each of the following:

3.4.1 Ferrous bicarbonate can be precipitated by adding slaked lime. (6)

3.4.2 Chlorine gas reacts with water. (3)

[20]

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QUESTION 4

4.1 State THREE principles of flocculation. (3)

4.2 Name TWO different physical forms of chlorine used in the disinfection of water. (2)

4.3 State FIVE factors in jar tests that can help in controlling the coagulation and flocculation process. (5)

4.4 Determine the capacity of a reservoir with the following dimensions:

Diameter = 40 metres
Height = 6 metres (3)

4.5 How long would it take to fill up the reservoir in QUESTION 4.4 if a pump with capacity of 12 *l*/s is used? (3)

[16]

QUESTION 5

5.1 Explain what *desalination* is. (4)

5.2 Briefly explain the important procedure that should be kept in mind during maintenance and record-keeping of a rapid gravity sand filter. (5)

5.3 Explain the procedure used when starting up a chlorinator installation. (5)

5.4 Explain the saturation index and its properties. (4)

5.5 State SIX precautionary measures that could be taken to prevent corrosion. (6)

[24]

TOTAL: 100

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THE PERIODIC TABLE OF ELEMENTS
DIE PERIODIEKE TABEL VAN ELEMENTE

KEY / *SLEUTEL*

Atomic number / *Atoomgetal*

Electronegativity / *Elektronegatiwiteit*

Symbol / *Simbool*

Approximate relative atomic mass / *Benaderde relatiewe atoommassa*

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 1 H 1																	2 He 4
1,0 3 Li 7	1,5 4 Be 9											2,0 5 B 11	2,5 6 C 12	3,0 7 N 14	3,5 8 O 16	4,0 9 F 19	10 Ne 20
0,9 11 Na 23	1,2 12 Mg 24											1,5 13 Aℓ 27	1,8 14 Si 28	2,1 15 P 31	2,5 16 S 32	3,0 17 Cℓ 35,5	18 Ar 40
0,8 19 K 39	1,0 20 Ca 40	1,3 21 Sc 45	1,5 22 Ti 48	1,6 23 V 51	1,6 24 Cr 52	1,5 25 Mn 55	1,8 26 Fe 56	1,8 27 Co 59	1,8 28 Ni 59	1,9 29 Cu 63,5	1,6 30 Zn 65	1,6 31 Ga 70	1,8 32 Ge 73	2,0 33 As 75	2,4 34 Se 79	2,8 35 Br 80	36 Kr 84
0,8 37 Rb 86	1,0 38 Sr 88	1,2 39 Y 89	1,4 40 Zr 91	41 Nb 92	1,8 42 Mo 96	1,9 43 Tc	2,2 44 Ru 101	2,2 45 Rh 103	2,2 46 Pd 106	1,9 47 Ag 108	1,7 48 Cd 112	1,7 49 In 115	1,8 50 Sn 119	1,9 51 Sb 122	2,1 52 Te 128	2,5 53 I 127	54 Xe 131
0,7 55 Cs 133	0,9 56 Ba 137	57 La 139	1,6 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	1,8 81 Tℓ 204	1,8 82 Pb 207	1,9 83 Bi 209	2,0 84 Po	2,5 85 At	86 Rn
0,7 87 Fr	0,9 88 Ra 226	89 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

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