higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

WATER TREATMENT PRACTICE N3

(8120033)

25 November 2024 (X-paper)
09:00–12:00

Calculators may be used.

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

112Q1E2425

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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 black or blue pen.
5. The drawing should be neat, clear and labelled and a pencil may be used.
6. Write neatly and legibly.

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QUESTION 1

Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (1.1–1.10) in the ANSWER BOOK.

1.1 Viscosity is a measure of the resistance of fluids to flow.

1.2 A pump is a mechanical device for the transfer of liquid.

1.3 A globe valve that is used to regulate flow in a pipeline, consists of a movable disk-type element.

1.4 Flocculants are used to remove phenol from industrial effluent.

1.5 Stabilisation causes scaling and corrosion.

1.6 Reduction is a chemical reaction that involves the loss of one or more electrons by an atom or ion.

1.7 Turbidity is expressed in nephelometric turbidity units.

1.8 The first stage in the hydrologic cycle is condensation.

1.9 The chemical formula for sulphurous acid is H_2SO_4.

1.10 Yellow is used in the background of warning signs at places where there is a safety hazard.

(10 × 1) **[10]**

QUESTION 2

2.1 Complete and balance the following chemical reactions:

2.1.1 $Mg(HCO_3)_2 + Ca(OH)_2 \longrightarrow$ (3)

2.1.2 $CaSO_4 + Na_2CO_3 \longrightarrow$ (2)

2.1.3 $4Fe + 3O_2 \longrightarrow$ (3)

2.1.4 $A\ell_2(SO_4)_3 + 3Ca(HCO_3)_2$ (4)

2.2 Calculate the capacity of a reservoir with the following dimensions:

Diameter = 40 metres, Height = 6 metres (4)

2.3 Calculate how long it will take to fill up the reservoir mentioned in QUESTION 2.2 with a pump of a capacity of 12 ℓ/s. (4)

[20]

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QUESTION 3

3.1 Name THREE devices used to measure the flow rate of water in a water treatment plant. (3)

3.2 State FIVE causes of a centrifugal pump failing to deliver. (5)

3.3 Name FOUR types of suspended matter and state the reaction of each type of suspended matter found in water. (4 × 2) (8)

3.4 Name FOUR types of water. (4)

3.5 During summer conditions, a hypolimnion layer may form in a body of water.

Briefly explain what happens during this condition. (5)

[25]

QUESTION 4

4.1 State FIVE methods used for the removal of iron and manganese from water. (5)

4.2 Name THREE principles of flocculation. (3)

4.3 Draw a neat, labelled, and detailed diagram to illustrate a rapid gravity sand filter. (10)

4.4 Give a reaction that explains the breakpoint chlorination, when chlorine is added to water containing ammonia. (5)

[23]

QUESTION 5

5.1 State FIVE precautions that can be taken to prevent corrosion. (5)

5.2 Write the formula used to calculate the Ryznar stability index. (2)

5.3 State THREE disadvantages of the lime soda process during stabilization. (3)

5.4 Name FOUR classes of fire and define each one. (4)

5.5 The frequency of a sampling analysis and interpretation of results is important for water control.

Name EIGHT tests to be done for effective control of the quality of potable water. (Any 8 × 1) (8)

[22]

TOTAL: 100

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TABLE 3: THE PERIODIC TABLE OF ELEMENTS
TABEL 3: DIE PERIODIEKE TABEL VAN ELEMENTE

