higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

WASTE-WATER TREATMENT PRACTICE N3

30 July 2021

This marking guideline consists of 5 pages.

Copyright reserved

SECTION A

QUESTION 1

1.1 C
1.2 C
1.3 B
1.4 B
1.5 C

(5 × 1) **[5]**

QUESTION 2

2.1 G
2.2 F
2.3 A
2.4 I
2.5 H

(5 × 1) **[5]**

QUESTION 3

3.1 True
3.2 False
3.3 True
3.4 False
3.5 True

(5 × 2) **[10]**

TOTAL SECTION A: 20

SECTION B

QUESTION 4

4.1 4.1.1 The rate at which work is done
4.1.2 The volume of water which flows per unit time
4.1.3 When water changes from vapour to liquid

(3 × 2) (6)

4.2 Permanent hardness is caused by sulphates and chlorides and cannot be removed by boiling the water.✓✓
Temporary hardness is caused by carbonates and bicarbonates.✓✓ (4)

4.3 4.3.1 $CaCO_3$
4.3.2 NaOH

(2 × 2) (4)

4.4
- Adsorption of gases that have a small pore structure
- Gas masks
- Recovery of volatile solvent vapour
- Removal of impurities from gases in industrial processes
- Purification of product water in food and beverage industries
- Removal of odours from air in air conditioning systems
- Removal of impurities responsible for objectionable taste and odour in water treatment (Any 6 × 1) (6)

[20]

QUESTION 5

5.1 5.1.1 It is the process whereby solid particles settle out due to gravity.

OR

It is the process whereby solid matter in water, sewage or industrial waste is settled out from the liquid under the influence of gravity. (2)

5.1.2
- Size, shape and floc density
- Retention time
- Turbulence
- Surface area of the tank
- Upward flow rate
- Inlet and outlet design
- Depth of the tank
- Temperature and viscosity (Any 5 × 1) (5)

5.1.3 Since the settling process is very slow,✓ microorganisms start utilizing the food supply,✓ disturbing the settlement process,✓ causing offensive smells.

OR

All organic matters✓ liable to decay✓ such as putrescible.✓ (3)

5.1.4
- Ferric salts
- Aluminium salts
- Lime (Any 2 × 1) (2)

5.2 5.2.1 It will reduce digester retention time,✓ requiring more energy for sludge heating✓ and reducing methane gas production.✓

5.2.2 It will cause pumping problems and blockages as it will be too thick.✓ It will require long detention times in the PST,✓ which might lead to belching.✓

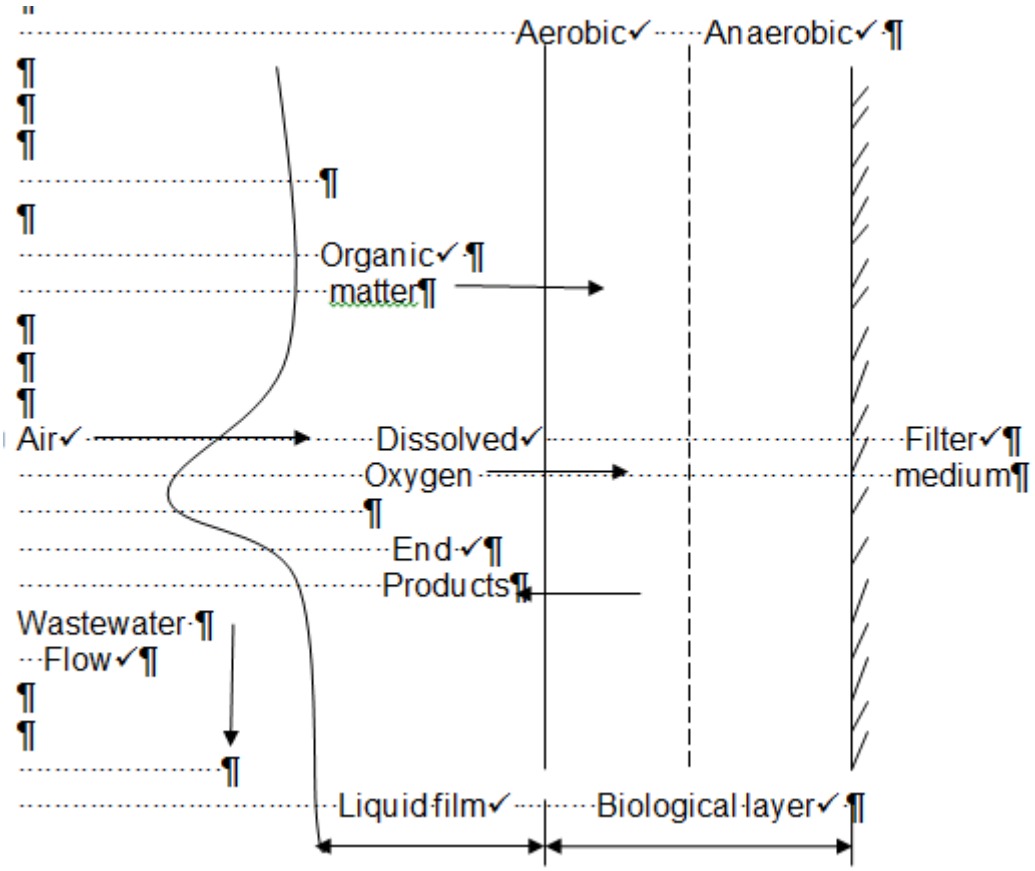
(3 × 2) (6)

5.3 Scum skimmer (2)

[20]

QUESTION 6

6.1



(10)

6.2
- Horizontal flow sedimentation tank
- Circular radial flow sedimentation tank
- Dortmund vertical flow tank (Any 2 × 1) (2)

6.3
- Amount of sludge discharged daily
- Recycled sludge
- Sludge to digesters
- Number of withdrawals per day
- Any unwanted or harmful objects in the tanks
- Central tests done to determine the quality of effluent (Any 4 × 1) (4)

6.4 6.4.1 5,5 to 9,0

6.4.2 Max 10 mg/l

(2 × 2) (4)

[20]

QUESTION 7

7.1 $C\checkmark + O_2\checkmark \longrightarrow CO_2\checkmark$ (3)

7.2 It is the dry mass of solids per unit of liquid volume in the aeration basin✓ which is determined by filtering or centrifuging the sludge from a certain volume of mixed liquid,✓ weighing and drying the sludge at 103 ˚C.✓ (3)

7.3
- Heat
- Light
- Alkalis and acids
- Metal ions
- Detergents
- Oxidising chemicals (6)

7.4 Class A: Wood or paper
Class B: Petrol or propane
Class C: Electrical fires
Class D: Flammable metal fires or magnesium or lithium (4 × 2) (8)
[20]

TOTAL SECTION B: 80
GRAND TOTAL: 100

Copyright reserved