



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

WATER TREATMENT PRACTICE N3

4 APRIL 2018

This marking guideline consists of 5 pages.

QUESTION 1

- | | | | |
|-----|-------|---------------|------|
| 1.1 | 1.1.1 | Siphon | (2) |
| | 1.1.2 | Aeration | (2) |
| | 1.1.3 | Brackish | (2) |
| | 1.1.4 | Sedimentation | (2) |
| | 1.1.5 | Precipitate | (2) |
| | | | [10] |

QUESTION 2

- | | | | |
|-----|-------|---|------|
| 2.1 | 2.1.1 | $\text{NH}_2\text{Cl} \checkmark + \text{H}_2\text{O} \checkmark$ | (2) |
| | 2.1.2 | $\text{Mg}(\text{OH})_2 \checkmark + \text{CaSO}_4 \checkmark$ | (2) |
| | 2.1.3 | $2\text{CaCO}_3 \checkmark + 2\text{H}_2\text{O} \checkmark$ One mark for correct balancing | (3) |
| | 2.1.4 | $\text{CaCO}_3 \checkmark + \text{H}_2\text{O} \checkmark$ | (2) |
| | 2.1.5 | $\text{MgCO}_3 \checkmark + \text{H}_2\text{O} \checkmark$ | (2) |
| | 2.1.6 | $\text{CaCO}_3 \checkmark + \text{Na}_2\text{SO}_4 \checkmark$ | (2) |
| 2.2 | | <ul style="list-style-type: none"> To remove suspended material from water $\checkmark \checkmark$ OR to remove finely divided particles ,suspended flocs and most microorganisms$\checkmark \checkmark$ | (2) |
| 2.3 | | <ul style="list-style-type: none"> A prime mover An inlet (suction side) A delivery side $\checkmark$ | (3) |
| 2.4 | | To reduce the PH $\checkmark$, so CaCO_3 will not form deposits in the distribution system $\checkmark$ | (2) |
| | | | [20] |

QUESTION 3

- 3.1 It has been proven that concentrations of less than 1 mg/l fluoride✓ have a beneficial effect on bone structure and teeth.✓ Concentrations from 1–3 mg/l fluoride cause teeth to discolour.✓ Higher concentrations have a bad influence on the bone structure.✓ Cattle and sheep that drink water containing more than 10 mg/l of fluoride✓ develop knobby knees as a result of muscles that thicken to support the bones that have been eroded.✓ (6)
- 3.2 Apparent colour is a colour measured in the presence of turbidity in the water.✓
Actual colour is the colour measured once the turbidity has been removed.✓
The colour present in natural water is mostly due to vegetable matter.✓
Coloured water is normally unacceptable to consumers because of its appearance. It can cause stains to clothing and can be a disadvantage in textile factories and in terms of the storage of water.✓ (4)
- 3.3 Iron and manganese are not harmful to human health,✓ but such water has an unattractive appearance.✓ When iron is dissolved in water it is usually present in the unstable ferrous state.✓ When the iron comes into contact with oxygen or some other oxidising agent such as chlorine, it forms a red-brown precipitate.✓
The same thing happens with manganese, which forms a brown or black precipitate.✓ The precipitate stains fabrics and other materials when this type of water is used in laundries.✓ (6)
- 3.4
- Chlorine dose required must be predetermined. ✓
 - It must be uniformly dosed. ✓
 - It must be continuous. ✓
 - Good control must be exercised. ✓
 - Bacteriological tests must be done regularly. ✓
- (5)
- 3.5 Floc formation occurs when flocculants are added to water which has colloidal particles, causing certain physical and chemical reactions.✓ The basic physical reaction which occurs is the neutralisation of the negative charges on the colloids by the positive charges on the flocculants.✓ Floccules result but they are still too small to settle out quickly on their own.✓ These floc particles are a combination of the coagulant and the particles in the water ✓ Visible particles made up of the original nonsettleable particles and the chemicals added. ✓ (Any Four) (4)
- [25]**

QUESTION 4

- 4.1
- Evaporation/Transpiration
 - Condensation
 - Precipitation
 - Infiltration
 - Surface run-off
- (5)
- 4.2
- It cuts time away from work due to injuries and illness
 - It reduces disablement and disruption of production
 - Develops a team spirit among the workers trained in first –aid
 - Makes workers safety conscious
- (4)
- 4.3
- It is a quick way to evaluate chlorination effectiveness. ✓ A residual is evidence that enough chemical was added. ✓ In chlorination, practical experience indicates that if a certain chlorine residual is present after a certain period of time, then enough chlorine was added to accomplish disinfection. ✓
- (3)
- 4.4
- Divalent metallic cations associated with hardness combine✓ with other minerals dissolved in water and precipitate✓
- (2)
- 4.4
- The name and address of the organisation or person requesting the tests
 - The type of testing required (both biological or chemical)
 - Date and time of sampling
 - Date and time when sample was dispatched
 - Name of the sampler
 - Description of the sampling point
 - Date when last rain occurred and whether or not it was heavy
 - Whether the water had any odour or taste that was considered objectionable
 - Approximate number of persons receiving the supplied sample
 - Whether the source of the sample had been treated or not
- (10)
- [24]**

QUESTION 5

- 5.1 To control the corrosive or scale –forming tendencies of drinking water (2)
- 5.2
- Localized corrosion✓ – attacks the metal surfaces unevenly and can produce rapid failure of pipe✓
 - Uniform corrosion✓ - takes place at an equal rate over the entire surface. ✓ (4)
- 5.3
- Backwash the filter in the normal way✓
 - Drain the filter completely
 - Examine the sand on the filter (remove the fine sand completely)
 - Repeat the process every time the filter is washed until all the fine sand is removed
 - The same procedure should be followed whenever more sand is added to the filter Any five (5)
- 5.4
- Open the water supply to the injector.✓ If applicable, start the pump check to see that the needed pressure is obtained.✓
 - Open the valve on the cylinder✓ to the flowmeter on the desired setting.✓
 - Note the mass of the cylinder.✓
 - Check whether the pressure gauge and vacuum are registering correctly.✓ (6)
- 5.5
- Alkalinity
 - Total dissolved solids
 - Total and calcium hardness
 - pH measured with pH meter
 - Temperature measured with calibrated thermometer (Any 4 × 1) (4)
- [21]**
- TOTAL: 100**