higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

WATER AND WASTEWATER TREATMENT PRACTICE
N1

28 November 2022 (X-paper)

This marking guideline consists of 5 pages.

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QUESTION 1

1.1 Because it mixes very well✓ with so many different substances.✓ (2)

1.2
- Water is the most abundant compound on Earth's surface, covering about 70% of the planet.
- In nature, water exists in liquid, solid and gaseous stages.
- It is a dynamic equilibrium between the liquid and gas states at standard temperature and pressure.
- At room temperature, it is a tasteless and odourless liquid, nearly colourless with a hint of blue.
- Many substances dissolve in water and it is commonly referred to as a universal solvent.
- Because of this, water in nature and in use is rarely pure, and some of its properties may vary slightly from those of pure substances.
- However, there are also many compounds that are essentially, if not completely, insoluble in water.
- Water is the only common substance found naturally in all three common states of matter, and it is essential for all life on Earth.
- Water usually makes up 55% to 78% of the human body. (9)

1.3
- Solid
- Liquid
- Gas (3)

1.4
- Precipitation
- Storage
- Runoff
- Evaporation and transpiration
- Condensation
- Acid rain (Any 5 × 1) (5)

1.5
- Water carries nutrients such as vitamins and carbohydrates to our cells.
- It also carries waste out of our bodies.
- It regulates body temperature.
- Water prevents dehydration.
- It aids in our metabolism. (5)

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QUESTION 2

2.1 Water generally used✓ inside and outside the home✓ (2)

2.2
- Close the tap while brushing your teeth.
- Use water-wise plants.
- Do not pollute our water sources. (3)

2.3
- Lower freshwater extraction from rivers and aquifers
- Less impact from septic tank and treatment plant infrastructure
- Topsoil nitrification
- Reduced energy use and chemical pollution from treatment
- Groundwater recharge
- Increased plant growth
- Reclamation of nutrients
- Greater quality of surface and groundwater when preserved by the natural purification in the top layers of soil than generated water treatment processes (8)

2.4
- Clarity
- Colour
- Odour
- Taste (4)

[17]

QUESTION 3

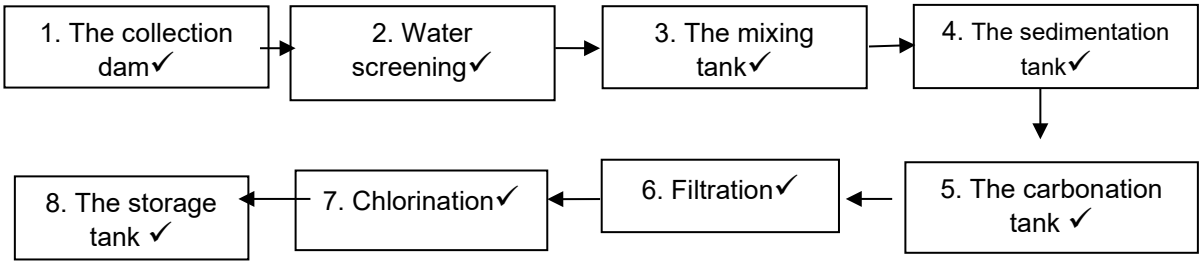
3.1
- Inexpensive
- Quick to construct
- No water needed for operation
- Easily understood (4)

3.2 It is the procedure that takes place in order to make sewage less harmful to people and the environment. (2)

3.3 In this process the wastewater from the primary treatment tanks flows into large tanks✓ where there are healthy bacteria that help break down the sewage, and air (containing oxygen) is bubbled into the water.✓
The water is then pumped into another tank where the dirt in the water settles on the bottom of the tank as sludge,✓ which looks like mud.✓ The clean water at the top of the tank can be pumped into the water system.✓ (5)

3.4
- Bugs are never a problem because the composting process produces carbon dioxide and an environment that repels bugs and vermin.✓
- It is entirely safe and sanitary – even more sanitary for the environment than our current sewer system.✓
- It does not require any of the special chemical additives that sewer water treatment plants require.✓
- They do not require any expensive septic system installation.✓
- It is purely a combination of nature and technology, making humus toilets clean, simple, safe and sustainable.✓
- Any pathogens are restrained and destroyed.✓
- The system does not produce odours because of the toilet's air flow.✓ (7)

3.5



(8)
[26]

QUESTION 4

4.1
- All daily records of compliance monitoring and treatment performance must be kept for a period of five years.
- All daily records of operational monitoring must be kept for at least three years.
- All violation of waste standards and all approved operating requirements must be recorded. (3)

4.2
- The objective of record keeping is to aid in maintaining a safe, cost-effective and ecologically sound✓ water and wastewater service in public.✓
- It provides accurate and up-to-date information about the operations taking place within the system✓ and about the quality of the water.✓ (4)

4.3 During the flocculation stage, the heavy, dense floc settles to the bottom of the water in large tanks.✓✓ Once the floc settles, the water is ready for the next stage of treatment.✓✓ (4)

4.4 Coagulation removes small particles that are made up of microbes, silt✓ and other suspended material in the water.✓ Chemicals are added to the water and mixed at a high speed in a large basin.✓
These chemicals cause small particles to clump together or coagulate.✓ In turn, these small clumps of particles join together to form larger groups called floc.✓ Some of the floc begins to settle during this stage.✓ (6)
[17]

QUESTION 5

5.1 5.1.1 Turbidity – 1 Nephelometric turbidity
5.1.2 Colour – 20 mg/l of platinum
5.1.3 Taste and colour – Shall not be objectionable
5.1.4 pH – 6,0–9,0 pH units

(2 × 4) (8)

5.2
- A hazardous atmosphere
- A material that could potentially engulf a person
- An internal configuration that could trap or asphyxiate a person through inwardly converging walls or a floor that slopes downward and tapers to a smaller cross section
- Any serious safety or health hazard (4 × 1) (4)

5.3
- Replace faulty and worn pipes.
- Check and regularly service all pipe flanges.
- Check pipeline seals and replace if faulty.
- Test pressure points. (4)

[16]

TOTAL: 100

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