higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

PROCESS TECHNOLOGY
NQF LEVEL 3

(6050353)

26 February 2018 (X-Paper)
09:00–12:00

This question paper consists of 5 pages.

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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. Write neatly and legibly.

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QUESTION 1

Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'true' or 'false' next to the question number (1.1–1.5) in the ANSWER BOOK.

1.1 Propellers are used for mixing and agitating liquids.

1.2 It is important to record all problematic incidents that take place during sampling.

1.3 Pitting of the metals is caused by the large growth of biological organisms that restricts the fluid flow.

1.4 Prechlorination and clarification are remedies of chemical damage of resins.

1.5 Turbidity is an indicator of water quality.

(5 × 1) **[5]**

QUESTION 2

Choose an item from COLUMN B that matches a description in COLUMN A. Write only the letter (A–H) next to the question number (2.1–2.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
2.1	An example of an in-line mixer	A	age of the material
2.2	The process where one solution is added to another solution until a chemical reaction between the components in the solution is completed	B	conical mixer
		C	cathode
		D	corrosion
2.3	A factor that affects the splash pack	E	static mixer
2.4	Dryers used for very viscous substances	F	anode
2.5	Electrode on which reduction occurs	G	drum dryer
		H	titration

(5 × 1) **[5]**

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QUESTION 3

3.1 State the hazards formed when the following are mixed:

3.1.1 Acid and water

3.1.2 Two liquids that precipitate

3.1.3 Acid and bases that become violent and spit

(3 × 2) (6)

3.2 List FOUR components of a high-speed mixer. (4)

3.3 Determine the volume of water in 70% acetic acid mixture if the total volume of solution is 120 m^3. (6)

[16]

QUESTION 4

4.1 Give THREE disadvantages of U-tube heat exchangers. (3)

4.2 Describe the working principles of a recuperator. (5)

4.3 Fouling is the build-up of various kinds of deposits on the internal surfaces of a cooling tower.

4.3.1 List THREE factors causing fouling in cooling towers. (3)

4.3.2 What are the indicators of fouling in a cooling tower? (2)

4.3.3 How can fouling in cooling towers be prevented? (2)

4.4 Name EIGHT components of flue stack. (8)

4.5 Coal fired burners can be used in different ways.

Explain how coal can be used in the following places:

4.5.1 Power stations

4.5.2 Boilers and steam trains

(2 × 2) (4)

4.6 Give FIVE reasons why natural gas is the best fuel supply. (5)

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4.7 Name TWO possible causes of each of the following problems in burners:

4.7.1 Smoke

4.7.2 Not enough heat

4.7.3 Too much heat

(3 × 2) (6)
[38]

QUESTION 5

5.1 List THREE types of refrigeration dryers. (3)

5.2 Give the type of dryer for the following characteristics:

5.2.1 Dryers that have clone separators

5.2.2 Dryers that have cabinets

(2 × 2) (4)

5.3 Name SEVEN components of a humidifier. (7)

5.4 Silica gel is an adsorbent used to remove moisture from gases.

Name FIVE of its applications. (5)

5.5 State THREE factors affecting the efficiency of a pump in an ion exchanger. (3)

5.6 Why do you think that the hydrogen and hydroxyl ions swab with the ions in the water that causes the water to be contaminated? (6)

5.7 Explain how adsorption and charge neutralisation can destabilise colloids in the coagulation process. (8)
[36]

TOTAL: 100

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