higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

# NATIONAL CERTIFICATE (VOCATIONAL)

## PROCESS CHEMISTRY
### NQF LEVEL 4

(6050444)

**16 November 2023 (X-paper)**
**09:00–12:00**

**This question paper consists of 6 pages.**

099Q1N2316

Copyright reserved

# DEPARTMENT OF HIGHER EDUCATION AND TRAINING
# REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)
PROCESS CHEMISTRY
NQF LEVEL 4
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 blue or black pen.
5. A pencil may be used to draw the diagram.
6. Write neatly and legibly.

---

Copyright reserved 

## QUESTION 1

Indicate whether the following statements are TRUE or FALSE by writing 'True' or 'False' next to the question number (1.1–1.5) in the ANSWER BOOK. Give ONE reason for each answer.

1.1 Insecticides are compounds that are used to eliminate insects.

1.2 Polypropylene is an example of thermosetting plastic.

1.3 Copper is used in the generation and transmission of electricity.

1.4 Ethane is not a component of LPG.

1.5 Diesel is only used in buses and heavy-duty trucks.

(5 × 1) **[5]**

## QUESTION 2

Give a word or term for each of the following descriptions by writing only the answer next to the question number (2.1–2.5) in the ANSWER BOOK.

2.1 A process of breaking down long molecular, heavier hydrocarbons in the presence of a catalyst.

2.2 The process of moving/extracting metal ore from the earth to the surface.

2.3 An antibiotic that was discovered accidentally from mold.

2.4 A precious metal used in the production of bracelets, rings and earrings.

2.5 This polymer is used in the production of bulletproof vests because it is extremely tough and strong.

(5 × 1) **[5]**

Copyright reserved 

## QUESTION 3: POLYMERS

3.1 Answer the following questions with regard to PVC:




[Source: *www.images.google.com*]

3.1.1 Give TWO reasons why PVC is used in water-supply pipe fittings. (2)

3.1.2 Name the THREE atoms that are the main components of PVC. (3)

3.1.3 State TWO advantages that PVC pipe fittings have over galvanised steel pipes. (2)

3.2 Rewrite and balance the following word equations using the correct formula:

3.2.1 Sodium chloride + water → chlorine gas + hydrogen gas + sodium hydroxide (5)

3.2.2 Chlorine gas + ethene → dichloroethane (3)

**[15]**

## QUESTION 4

4.1 Differentiate between the following and give ONE example of each type:

4.1.1 Thermoplastic resins

4.1.2 Thermo-hardening resins

(2 × 3) (6)

4.2 Give THREE examples of each of the following:

4.2.1 Synthetic rubber

4.2.2 Binders

(2 × 3) (6)
**[12]**

**QUESTION 5: METALS**

5.1 Name TWO producers of base metals in South Africa. (2)

5.2 Draw a neat and clearly labelled diagram of a base-metal refinery process. (11)
**[13]**

**QUESTION 6**

6.1 Write the symbols of each of the following PMGs and precious metals:

6.1.1 Ruthenium

6.1.2 Palladium

6.1.3 Gold

(3 × 1) (3)

6.2 Write a brief description of the dissolution or silver recovery process that occurs during the PGM and precious metal refinery process. (4)
**[7]**

**QUESTION 7: COAL AND CRUDE OIL**

7.1 Name THREE industrial applications of each of the following coal-based chemical products:

7.1.1 Propylene

7.1.2 Ethylene

7.1.3 Butadiene

(3 × 3) (9)

7.2 Write down what each of the following abbreviations stand for:

7.2.1 PONA

7.2.2 HTFT

(2 × 1) (2)

Copyright reserved 

7.3 In South Africa kerosene is commonly known as paraffin.

7.3.1 Name THREE strict specifications that are important for kerosene that is used as aviation fuel. (3)

7.3.2 State TWO other uses of paraffin than what was mentioned in QUESTION 7.3.1. (2)
**[16]**

**QUESTION 8**

8.1 Sasol is the largest producer of coal-to-liquid (CTL) in the world.

8.1.1 Write the FOUR main steps of the coal-to-liquid process in sequence. (4)

8.1.2 What is meant by syngas? (1)

8.1.3 Write a balanced reaction equation for the production of syngas. (5)

8.1.4 Explain the working of each of the processes used in a basic SBR production process. (5)
**[15]**

**QUESTION 9: BIOCHEMICALS AND AGROCHEMICALS**

9.1 Name the South African companies that are producing the following:

9.1.1 ARVs

9.1.2 Spirit vinegar

9.1.3 Penicillin

(3 × 1) (3)

9.2 Name THREE raw materials that are used in the production of beer. (3)

9.3 Briefly discuss the fermentation of beer. (6)
**[12]**

**TOTAL: 100**

Copyright reserved