higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

PROCESS CHEMISTRY
NQF LEVEL 4

(6050444)

7 November 2022 (X-paper)
09:00–12:00

This question paper consists of 6 pages.

119Q1N2207

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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. Start each section on a new page.
5. Use only a blue or black pen.
6. 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 Thermoplastic resins cannot be recycled.

1.2 Ultra-high molecular weight polyethylene (UHMWPE) is used to manufacture bullet-proof vests.

1.3 Amplats is a world leader in the production of platinum.

1.4 The chemical formula of hexane is C_6H_6.

1.5 Isomerism is a process of transforming one molecule into another molecule that has the same number of atoms.

(5 × 1) **[5]**

QUESTION 2

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

COLUMN A		COLUMN B	
2.1	Gold	A	Gl
2.2	Butane, toluene, and xylene	B	hormones
2.3	Butane and propane	C	XLPE
2.4	Production of contraceptives	D	Au
2.5	Cross-linked polyethylene	E	enzymes
		F	LPG
		G	BTX

(5 × 1) **[5]**

QUESTION 3

3.1 List TWO industrial applications of the following polymers:

3.1.1 Polyvinyl chloride (PVC)

3.1.2 Styrene butadiene rubber (SBR)

3.1.3 Nylon 66

(3 × 2) (6)

3.2 Which monomers are used to prepare the following polymers?

3.2.1 Polypropylene

3.2.2 Polytetrafluoroethylene

(2 × 2) (4)

3.3 Give a brief description of the Ziegler-Natta catalyst. (5)

[15]

QUESTION 4

Polyvinyl chloride (PVC) is produced in two steps which involve the production of the vinyl chloride monomer (VCM) and the polymerisation of VCM to form PVC.

4.1 Draw a labelled process-flow diagram to show the production of VCM. (11)

4.2 List TWO polymer manufacturers in South Africa. (2)

4.3 What is the main function of external lubricants in polymers? (2)

[15]

QUESTION 5

5.1 List TWO properties of the following metals:

5.1.1 Copper

5.1.2 Nickel

(2 × 2) (4)

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5.2 Give a brief description of the following processes:

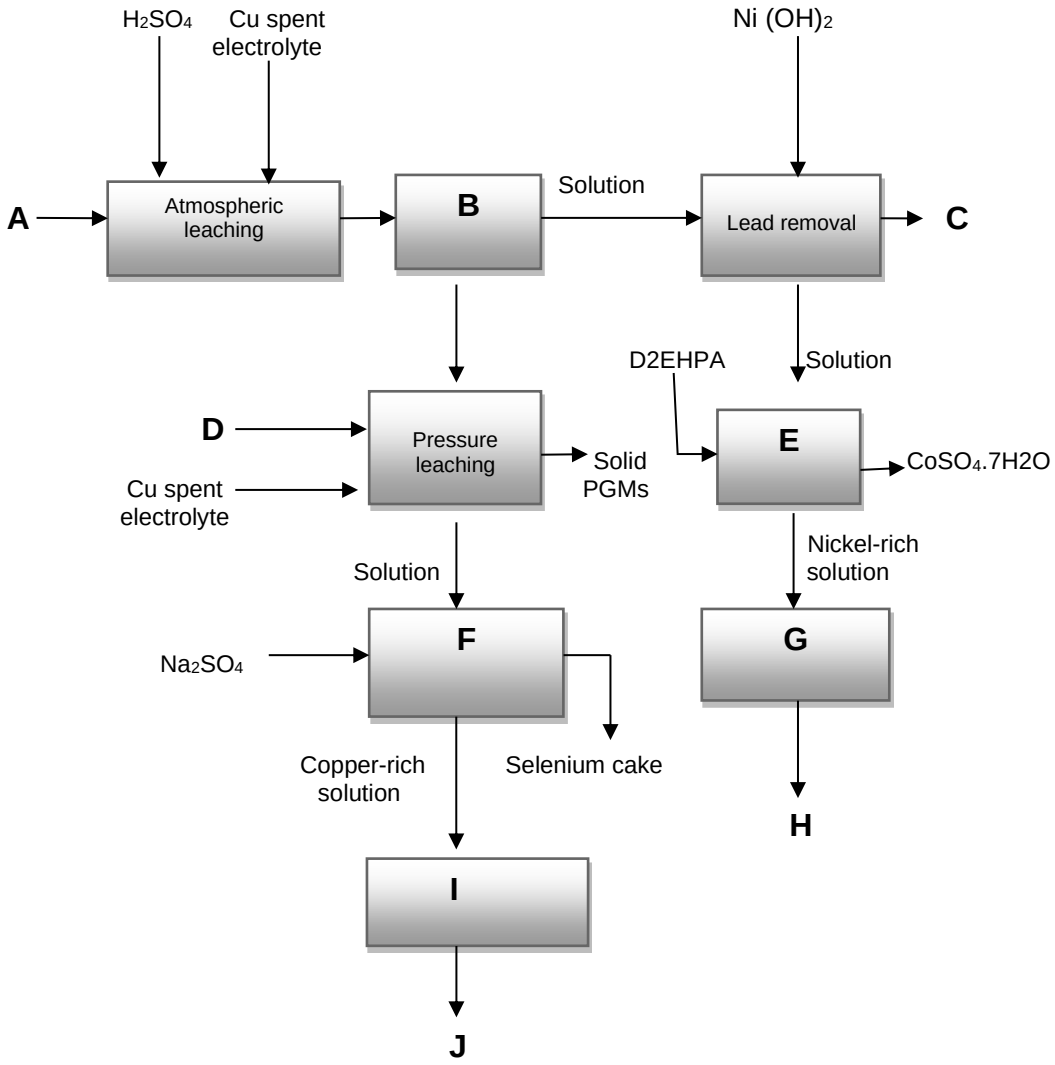
5.2.1 Flotation

5.2.2 Comminution

5.2.3 Smelting

(3 × 2) (6)

5.3 Complete the following diagram by giving the missing words. Only write the word next to the letter (A–J) in the ANSWER BOOK.



(10)

5.4 List THREE other types of ferrochrome alloys. (3)

[23]

QUESTION 6

6.1 Sasol is the main producer of coal-to-liquid fuel in the world.

6.1.1 Name the FOUR main steps of coal gasification. (4)

6.1.2 Complete and balance the following equation:

$C(s) + O_2(g) + H_2O(l) \rightarrow$ (4)

6.1.3 The Rectisol Unit is composed of THREE steps. List and explain these steps. (6)

(3 × 2)

6.1.4 Name THREE types of fertilisers produced from ammonia. (3)

6.2 Give a brief description of the following and provide ONE application of each:

6.2.1 Diesel

6.2.2 Marine heavy fuel oil (Marine gas oil)

6.2.3 Liquid petroleum gas (LPG)

(3 × 2) (6)

[23]

QUESTION 7

7.1 List TWO products that are produced by Kombat. (2)

7.2 Adcock Ingram manufactures a large range of generic medicines such as ARVs.

7.2.1 What does the abbreviation ARV stand for?

7.2.2 Which chronic disease is treated with ARVs?

(2 × 1) (2)

7.3 *Penicillium chrysogenum* is a fungus used in the production of penicillin.

7.3.1 Define the term *antibiotic*. (2)

7.3.2 Give a brief description of penicillin fermentation. Also indicate the fermentation conditions, and as to what happens to the final product. (8)

[14]

TOTAL: 100

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