higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

PROCESS CHEMISTRY
NQF LEVEL 4

(6050444)

1 March 2018 (Y-Paper)
13:00–16:00

This question paper consists of 7 pages and 1 periodic table.

NCV

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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 Nylon is a polymer produced using carboxylic acid and ethyl glycol monomers in the presence of a catalyst.

1.2 Thermo-hardening polymers soften when heated and harden when cooled.

1.3 Anglo American Platinum and Impala Platinum use similar processes to recover ruthenium and osmium.

1.4 The by-products formed in the coking process contain 20% light oil.

1.5 Kernel steeping in beer brewing activates metabolic processes in soaked grains.

(5 × 1) **[5]**

QUESTION 2

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

COLUMN A		COLUMN B	
2.1	A chemical change in a solution facilitated by electrical energy	A	yeast
2.2	A mechanised system for transportation of materials from one place to another	B	molecular weight
2.3	Facilitators of a fermentation process	C	linear molecular chain
2.4	Depolymerisation of polymers	D	cracking
2.5	A sum of the atomic weights of molecules in a compound	E	electrolysis
		F	conveyor
		G	hops
		H	alkylation
		I	screen

(5 × 1) **[5]**

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QUESTION 3

3.1 Polyethylene terephthalene (PET) is commonly known as polyester in the clothing industry.

List FOUR applications of PET. (4)

3.2 Rubber can be produced naturally or synthetically.

Give ONE application for each of the following synthetic rubbers:

3.2.1 Silicone rubber

3.2.2 Butadiene rubber

(2 × 1) (2)

3.3 FIGURE 1 illustrates an extrusion process used for processing plastic.

Label the diagram by writing only the answer next to the letter (A–J) in the ANSWER BOOK.

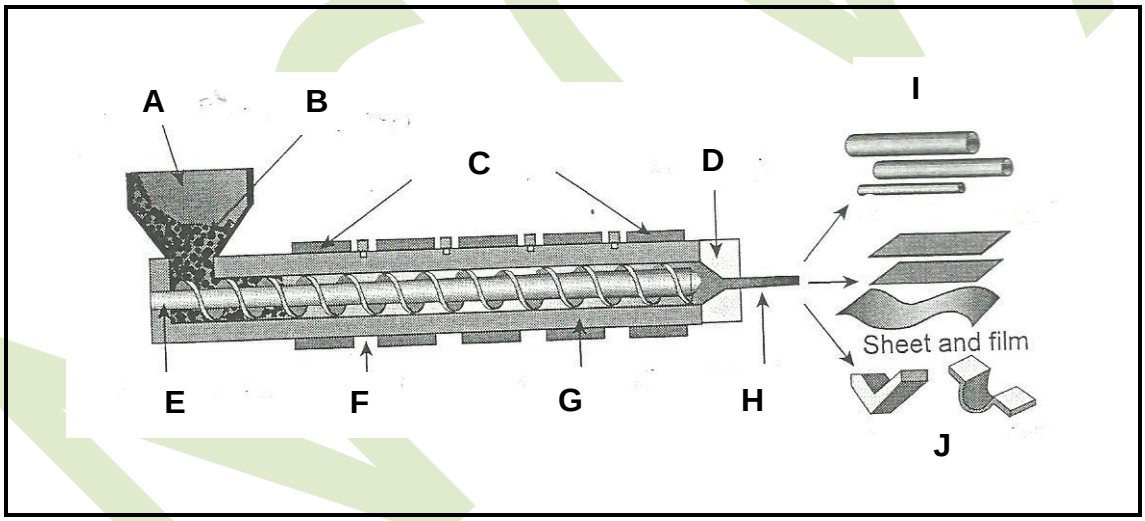

FIGURE 1 (10)

3.4 Briefly describe solution polymerisation for SBR production. (6)

3.5 Differentiate rubbers from elastomers. (4)

3.6 Give ONE example of an elastomer? (1)

[27]

QUESTION 4

4.1 Draw a labelled process flow diagram for the production of silicon. (13)

4.2 List FIVE metals categorised as PGMs. (5)

4.3 Different methods are used in various refining processes at Anglo American Platinum.

Name the process used to recover each of the following precious metals:

4.3.1 Gold

4.3.2 Silver

(2 × 1) (2)

4.4 Name THREE manufacturers of ferromanganese. (3)
[23]

QUESTION 5

5.1 State FOUR applications for each of the following chemicals:

5.1.1 Butane

5.1.2 Phenol

(2 × 4) (8)

5.2 Give FOUR examples of chemicals from a cooking process. (4)

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5.3 FIGURE 2 illustrates a crude oil refinery process.

Label the diagram by writing only the answer next to the letter (A–K) in the ANSWER BOOK.

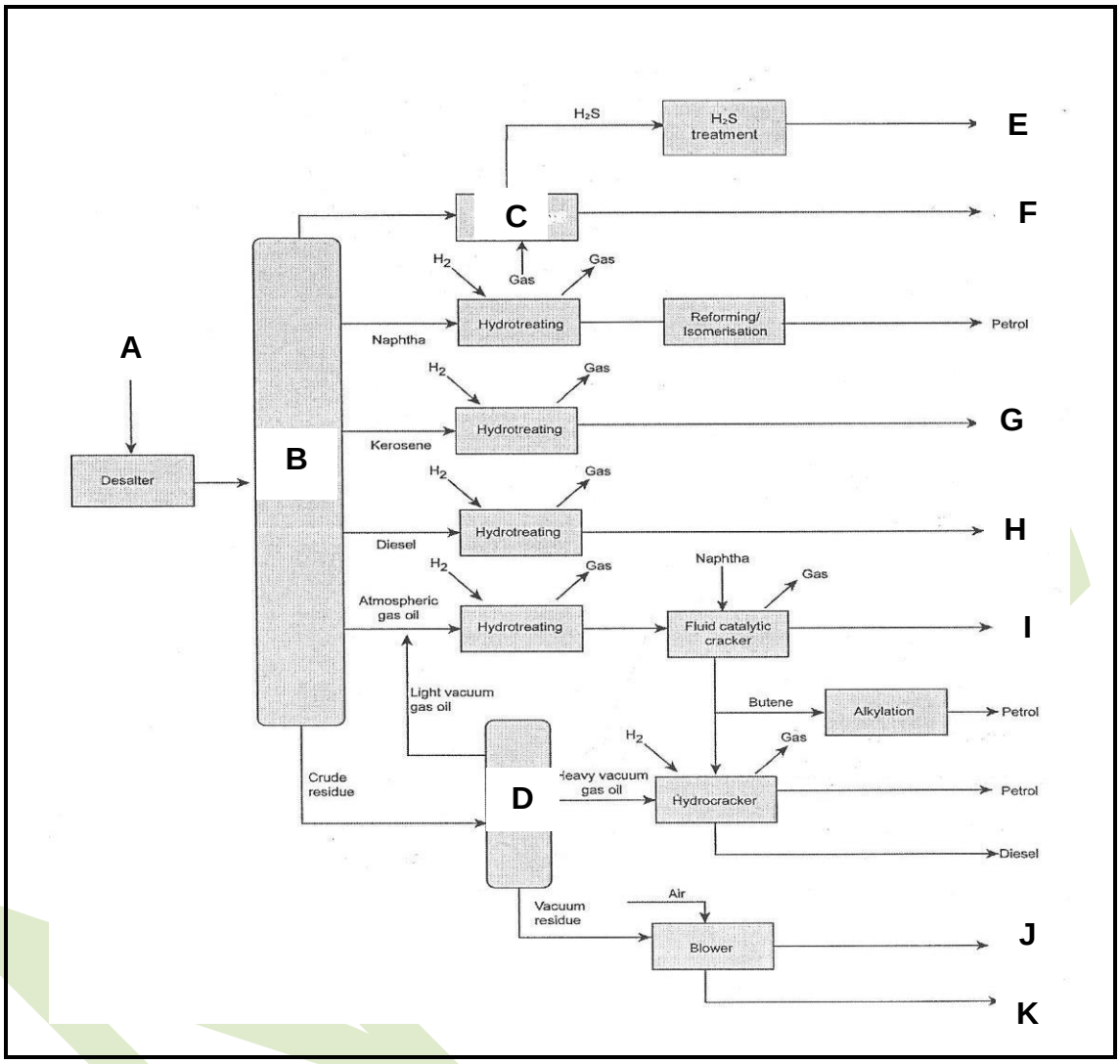

FIGURE 2 (11)

5.4 Differentiate between *sour* and *sweet* crude oil. (2)

5.5 Explain the necessity to use a desalter in crude oil refining. (2)

[27]

QUESTION 6

6.1 Biochemicals are important in our daily life.

Give ONE industrial application for each of the following biochemicals:

6.1.1 Amino acids

6.1.2 Molasses

6.1.3 Hormones

6.1.4 Enzymes

6.1.5 Spirit vinegar

(5 × 1) (5)

6.2 Describe the whirlpool process used in beer brewing. (4)

6.3 Name TWO generic process classifications used for pre- and post- *Penicillium chrysogenum* fermentation. (2)

6.4 Describe nutrient medium pasteurisation in penicillin production. (2)

[13]

TOTAL: 100

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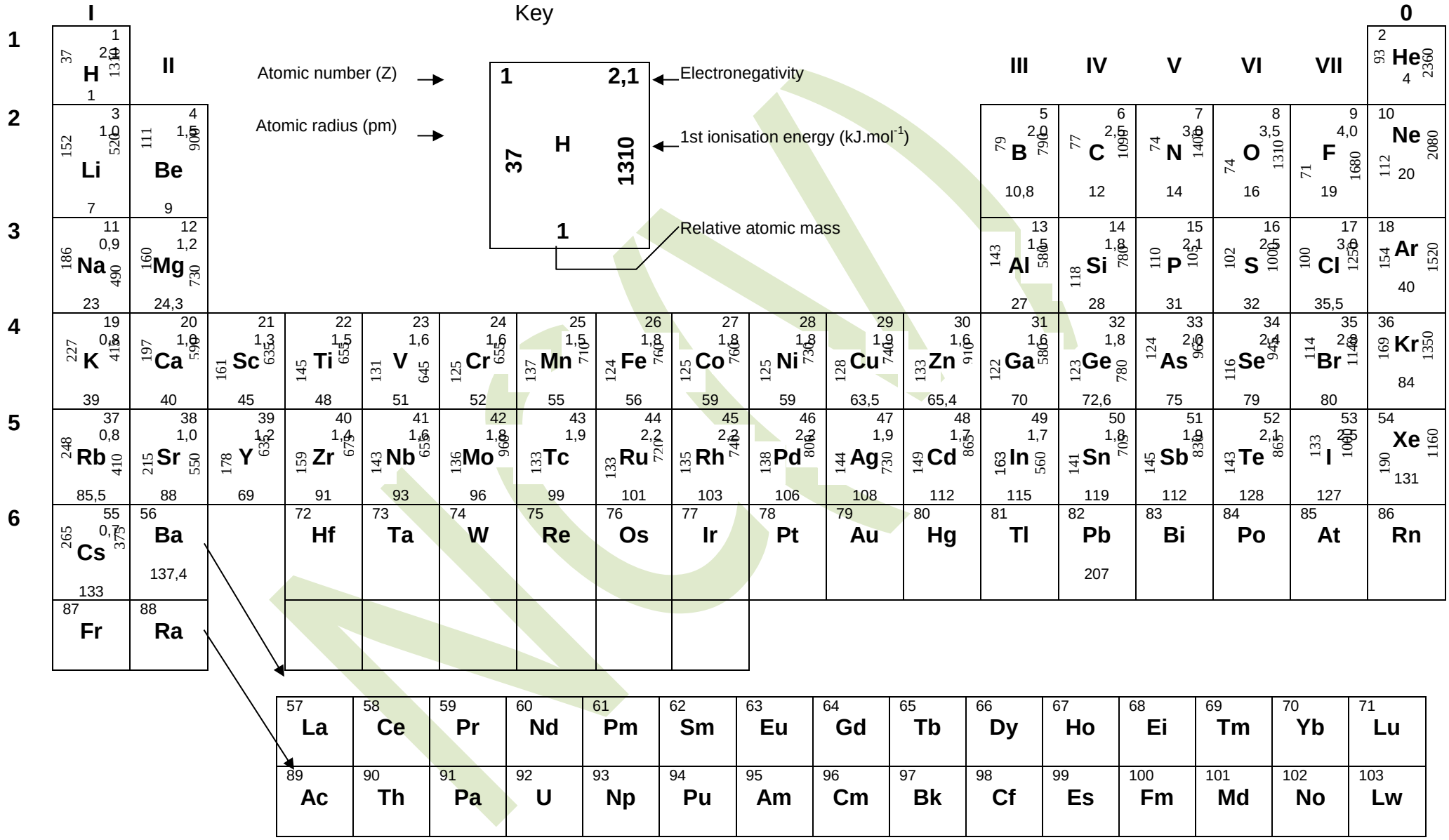
PERIODIC TABLE



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