



**higher education  
& training**

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Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

**T330(E)(A2)T**

**NATIONAL CERTIFICATE**

**CHEMICAL PLANT OPERATION N6**

(8050026)

**2 April 2019 (X-Paper)**

**09:00–12:00**

**This question paper consists of 4 pages.**

**DEPARTMENT OF HIGHER EDUCATION AND TRAINING**  
**REPUBLIC OF SOUTH AFRICA**  
NATIONAL CERTIFICATE  
CHEMICAL PLANT OPERATION N6  
TIME: 3 HOURS  
MARKS: 100


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**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. Sketches must be large, neat and fully labelled.
  5. 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 A fixed-bed absorber is designed to process vapours at high pressures.
- 1.2 LPG is only obtained as a by-product in refineries.
- 1.3 When an acid is dissolved in water, it is broken up into small particles called cations. 
- 1.4 Thermometers filled with mercury can be used within the range of -35 °C to 510 °C.
- 1.5 A gas purge system can be used when the contents of a tank is very hot and highly corrosive.

(5 × 1) **[5]**

**QUESTION 2**

- 2.1 Filtration is a process that is used to remove small particles of liquid or gas by forcing the liquid through a porous medium.
-  2.1.1 State TWO applications of contact filtration of liquids. (2)
- 2.1.2 Differentiate between *continuous steady state* and *unsteady-state contact filtration*. (4)
- 2.2 Write a brief description about the following:
- 2.2.1 Simple batch distillation (2)
- 2.2.2 Relative volatility (4)
- 2.3 Define the following terms:
- 2.3.1 Volatility  (3)
- 2.3.2 Ion exchange (3)
- 2.3.3 Q-condition of feed (2)

**[20]**

**QUESTION 3**

- 3.1 State FIVE characteristics of *tower packing*. (5)
- 3.2 Briefly explain *tray spacing*. (4)
- 3.3 Name TWO processes that can be used in the refining and manufacturing of petroleum products. (2)
- 3.4 Differentiate between *polymerisation* and *isomerisation*. (4)
- 3.5 Discuss FOUR methods that are employed for the purification of natural gas. (9)
- 3.6 Define the following terms:
- 3.6.1 Alkylation (2)
- 3.6.2 Octane number (4)
- [30]**

**QUESTION 4**

- 4.1 Name FIVE examples of gaseous products produced from coking of coal. (5)
- 4.2 State THREE uses of coal. (3)
- 4.3 Draw a labelled flow diagram of a coke-oven plant. The diagram can be done on one whole page in landscape. (12)
- [20]**

**QUESTION 5**

- 5.1 Name THREE parts of a measuring instrument. (3)
- 5.2 Draw a labelled diagram of a Bourdon tube. (8)
- 5.3 Describe the operation of an inductance bridge hydrometer. (6)
- 5.4 Write brief, clarifying notes on the following:
- 5.4.1 Rankine scale (4)
- 5.4.2 A hydrogen electrode as a quality measuring instrument (4)
- [25]**

**TOTAL: 100**