

INSTRUCTION:

This section consists of **FOUR (4)** structured questions. Answer **ALL** questions.

ARAHAN:

Bahagian ini mengandungi EMPAT (4) soalan berstruktur. Jawab SEMUA soalan.

QUESTION 1**SOALAN 1**CLO1
C1

- (a) i. Define distillation.
Takrif maksud penyulingan.

[2 marks]
[2 markah]

- ii. Name **THREE (3)** types of packing used in distillation process.
Namakan TIGA (3) jenis padatan yang digunakan dalam proses penyulingan.

[3 marks]
[3 markah]

CLO1
C2

- (b) Adsorption is a mass transfer process or a molecule gas or liquid that forms a bond to the surface.
Penjerapan adalah proses pemindahan beban atau molekul gas atau cecair yang membentuk ikatan ke permukaan.

- i. Describe construction design of adsorber column.
Huraikan rekabentuk binaan turus penjerap.

[2 marks]
[2 markah]

- ii. Explain the differences between physical and chemical adsorption.
Jelaskan perbezaan antara penjerapan fizikal dan kimia.

[4 marks]
[4 markah]

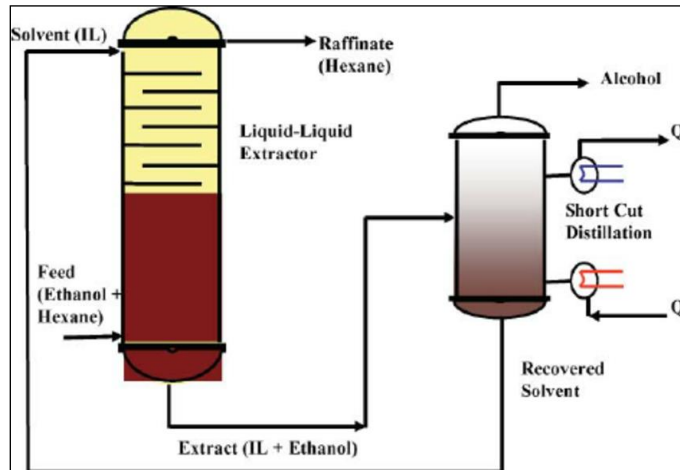


Figure 1: Liquid-liquid Extraction Process Flow
 Rajah 1: Aliran Proses Pengekstrakan Cecair-cecair

CLO2
C3

- (c) Figure 1 shows an example of liquid-liquid extraction process flow diagram.
 Rajah 1 menunjukkan contoh gambar rajah alir proses pengestrakan cecair-cecair.

- i. Describe **THREE (3)** examples of liquid-liquid extraction applications.
 Terangkan **TIGA (3)** contoh aplikasi pengekstrakan cecair-cecair.

[6 marks]
 [6 markah]

- ii. Explain the liquid-liquid extraction process shown in Figure 1.
 Terangkan proses pengekstrakan cecair-cecair seperti yang ditunjukkan dalam Rajah 1.

[8 marks]
 [8 markah]

QUESTION 2

SOALAN 2

CLO1
C1

- (a) The process inside the distillation column is very complicated.
 Proses yang berlaku di dalam turus penyulingan adalah sangat rumit.

- i. Define Cut Points in fractional distillation.
 Takrifkan Titik Potong dalam proses pemecahan penyulingan.

[2 marks]
 [2 markah]

- ii. Write down **THREE (3)** important devices for distillation process.

*Tuliskan **TIGA (3)** alatan penting untuk proses penyulingan.*

[3 marks]

[3 markah]

CLO1
C2

- (b) Hydrotreating is used to break sulphur. Describe the hydrocracking process.

Hidrorawatan digunakan untuk memecahkan sulfur. Bincangkan mengenai proses pemecahan hidro.

[6 marks]

[6 markah]

CLO2
C3

- (c) In the catalytic cracking process, heavy oil is subjected to heat resulting to cracking of heavy hydrocarbons when it is in contact with the catalyst. By using a diagram, describe the **THREE (3)** parts involved in the catalytic cracking hardware.

*Dalam proses pemecahan bermangkin, minyak berat dikenakan haba menyebabkan keretakan hidrokarbon berat apabila ianya bersentuhan dengan pemangkin. Dengan menggunakan gambarajah, terangkan **TIGA (3)** bahagian yang terlibat dalam komponen pemecahan bermangkin.*

[14 marks]

[14 markah]

QUESTION 3

SOALAN 3

CLO1
C1

- (a) The Gas Processing Plant (GPP), Kerteh was designed and built to treat a mixture of hydrocarbon gas.

Loji pemprosesan gas (GPP) di Terengganu direka bentuk dan dibina untuk merawat campuran gas hidrokarbon.

- i. List **TWO (2)** sources of gas used in Gas Processing Plant (GPP), Kerteh.
*Senaraikan **DUA (2)** sumber gas yang digunakan dalam Loji Pemprosesan Gas (GPP), Kerteh.*

[2 marks]
[2 markah]

- ii. Name **THREE (3)** process units in Gas Processing Plant (GPP).
*Namakan **TIGA (3)** unit proses di Loji Pemprosesan Gas (GPP).*

[3 marks]
[3 markah]

CLO1
C2

- (b) i. Explain the function of a Product Recovery Unit (PRU).
Jelaskan fungsi Product Recovery Unit (PRU).

[2 marks]
[2 markah]

- ii. Describe the process of butane production in Product Recovery Unit (PRU).
Terangkan proses penghasilan butana di dalam Product Recovery Unit (PRU).

[4 marks]
[4 markah]

CLO2
C3

- (c) Figure 3 shows a process flow diagram of Dew Point Control Unit (DPCU). The function of Dew Point Control Unit is to remove heavy hydrocarbon in natural gas. This process involves a decreasing in temperature.
Rajah 3 menunjukkan gambarajah aliran proses Unit Kawalan Titik Dew (DPCU). Fungsi Unit Kawalan Titik Dew adalah untuk mengeluarkan hidrokarbon yang berat dalam gas asli. Proses ini melibatkan penurunan suhu.

- i. Describe the factors which cause the temperature to drop.

Huraikan faktor yang menyebabkan kejatuhan suhu.

[6 marks]

[6 markah]

- ii. Describe the process in inlet separator.

Huraikan proses yang berlaku dalam 'Inlet Separator'.

[8 marks]

[8 markah]

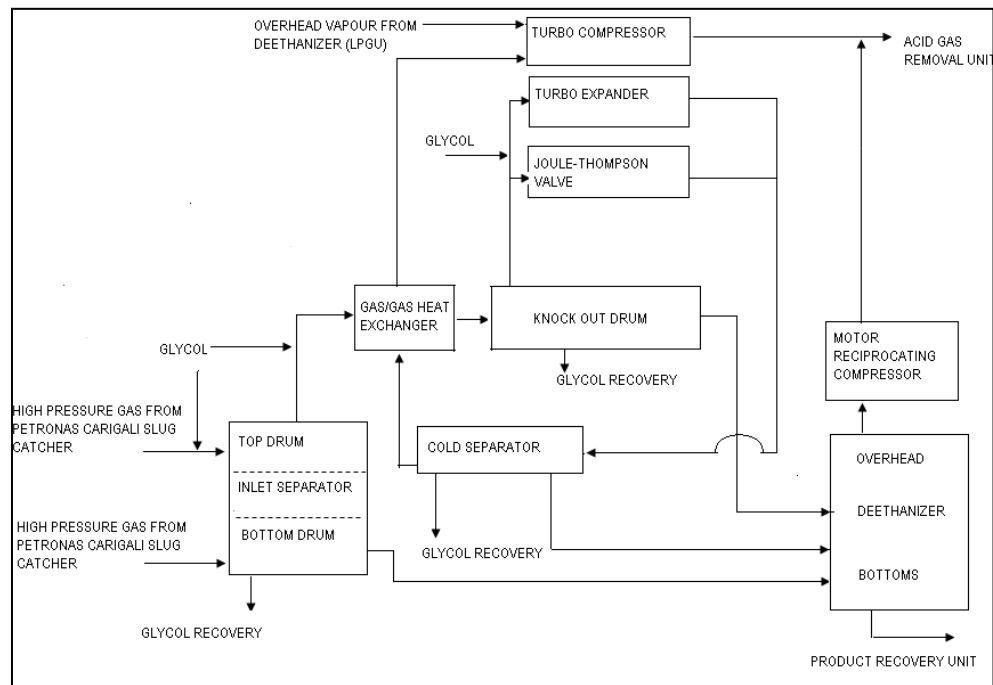


Figure 3: Dew Point Control Unit

Rajah 3: Unit Kawalan Titik Dew

QUESTION 4

SOALAN 4

CLO1
C1

- (a) Figure 4 shows the Block Flow Diagram of an Ammonia Plant. Name unit 1, 2, 3, 4 and 5.

Rajah 4 menunjukkan Rajah Aliran Blok Loji Ammonia. Namakan unit 1, 2, 3, 4 dan 5.

[5 marks]
[5 markah]

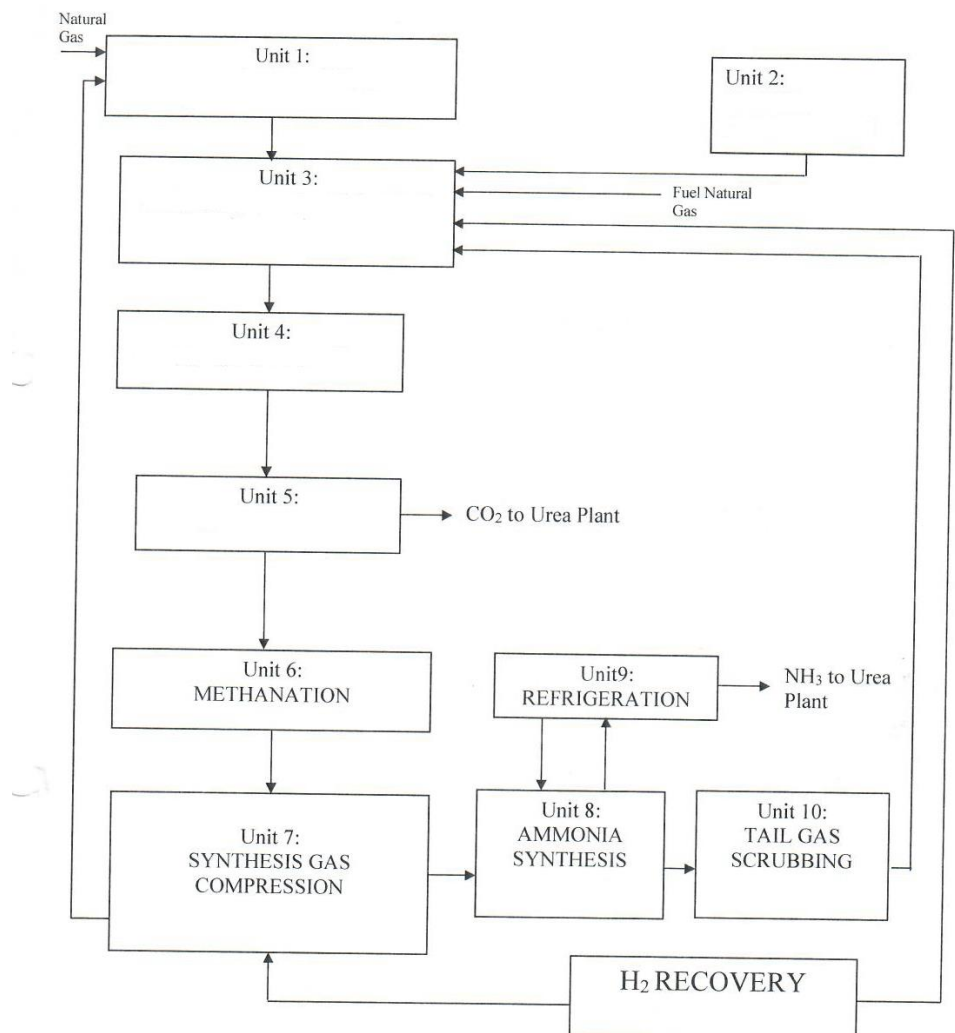


Figure 4: Block Flow Diagram of Ammonia Plant

Rajah 4: Aliran Blok Loji Ammonia

- | | | | |
|------------|-----|---|---------------------------|
| CLO1
C2 | (b) | Describe briefly the process of CO ₂ removal in an ammonia production plant.
<i>Terangkan secara ringkas mengenai proses penyingkiran CO₂ di loji ammonia.</i> | [6 marks]
[6 markah] |
| CLO2
C3 | (c) | Describe the process flow of ammonia synthesis in an ammonia production plant.
<i>Huraikan proses aliran sintesis ammonia di loji ammonia.</i> | [14 marks]
[14 markah] |

SOALAN TAMAT