

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) Define the meaning of the following terms:

Takrifkan maksud seperti berikut:

i. Distillation [2 ½ marks]

Penyulingan [2 ½ markah]

ii. Extraction [2 ½ marks]

Penyarian [2 ½ markah]

CLO1
C2

(b) The components in a distillation column include trays, bubble caps, inlet stream and outlet stream. Illustrate and label the interior construction design of a distillation column.

Komponen-komponen di dalam turus penyulingan terdiri daripada dulang, bubble caps, aliran masukan dan aliran keluaran. Lukis dan labelkan rekabentuk binaan dalaman sebuah turus penyulingan.

[6 marks]

[6 markah]

CLO2
C3

(c) Adsorption is a mass transfer process or a molecule gas or liquid that forms a bond to the surface. Based on Figure 1, explain an adsorption process of 'Gas A' from the mixture.

Penjerapan adalah proses pemindahan jisim atau perubahan suatu bahan dari fasa gas kepada fasa cecair. Berpandukan Rajah 1, terangkan proses penyerapan 'Gas A' daripada campuran tersebut.

[14 marks]

[14 markah]

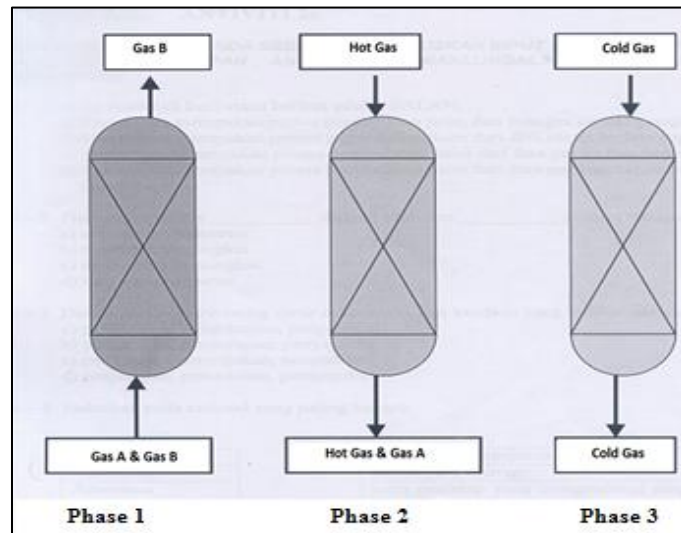


Figure 1: Adsorption Process of Gas A and Gas B

Rajah 1: Proses Penjerapan Gas A dan Gas B

QUESTION 2

SOALAN 2

CLO1
C1

- (a) Crude oil is unprocessed oil and contains hydrocarbons. It has four different types and varies in color and viscosity.

Minyak mentah adalah minyak yang belum diproses dan mengandungi hidrokarbon. Ia terdiri daripada empat jenis dan berbeza dari segi warna dan kelikatan.

- i. State **FOUR (4)** types of crude oil. [4 marks]

*Nyatakan **EMPAT (4)** jenis minyak mentah.* [4 markah]

- ii. Name the process of removing salt and contaminants in crude oil.

Namakan proses penyingkiran garam dan bendasing lain di dalam minyak mentah.

[1 mark]
[1 markah]

(b) Based on Figure 2,

Berpandukan Rajah 2,

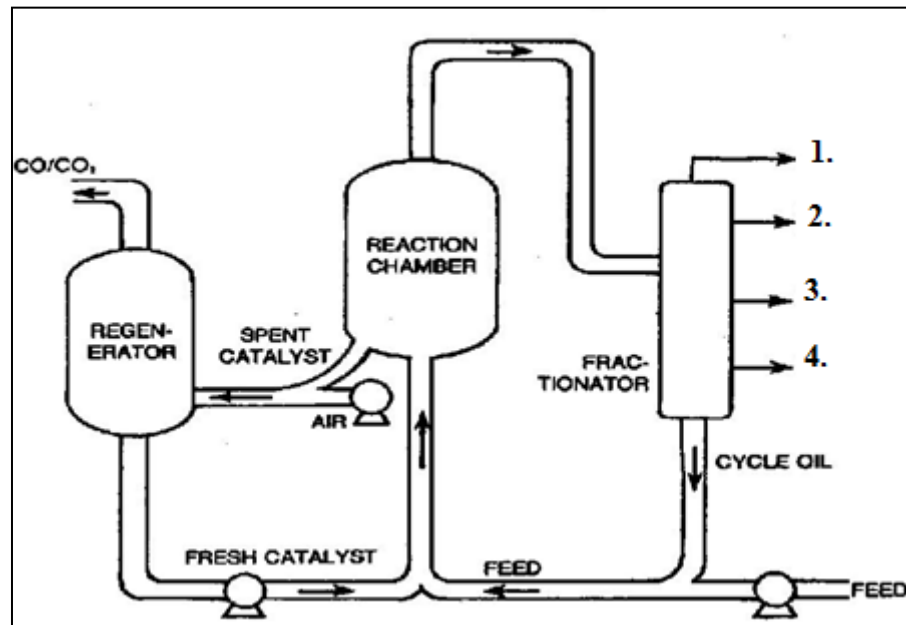


Figure 2: Catalytic Cracking Process in Oil Refinery Plant

Rajah 2: Proses Pemecahan Bermangkin di Loji Penapisan Minyak

CLO1
C2

i. Write **TWO (2)** chemical reactions in the regenerator. [4 marks]

Tuliskan DUA (2) tindakbalas yang berlaku di dalam regenerator. [4 markah]

ii. Label **1, 2, 3** and **4** that are being produced from catalytic cracking process.

Labelkan 1, 2, 3 dan 4 yang terhasil daripada proses pemecahan bermangkin.

[2 marks]

[2 markah]

CLO2
C3

(c) In Catalytic Reforming Unit, the naphtha feed is pressurized, heated and charged to the first reactor. It trickles through the catalyst and out of the bottom of the reactor. This process is repeated twice in the next two reactors.

Dalam Unit 'Catalytic Reforming', masukan nafta dikenakan tekanan, dipanaskan dan dihantar ke reaktor pertama. Ia melalui pemangkin dan keluar daripada bawah reaktor. Proses ini berulang sebanyak dua kali di reaktor yang seterusnya.

i. Describe the function of Catalytic Reforming Unit.

[4 marks]

Huraikan fungsi Unit 'Catalytic Reforming'.

[4 markah]

- ii. Discuss the reasons of using regeneration process on the catalysts with coke deposits on its surface, which usually found after an interval of catalytic reforming operation.
Bincangkan sebab penggunaan proses penjanaan semula terhadap pemangkin yang mempunyai lapisan kok melekat pada permukaannya, selalunya dijumpai selang beberapa lama setelah operasi 'catalytic reforming' berlaku.

[10 marks]

[10 markah]

QUESTION 3**SOALAN 3**CLO1
C1

- (a) State **FIVE (5)** factors to be considered in designing a gas processing plant.

*Nyatakan **LIMA (5)** faktor yang perlu diambilkira dalam merekabentuk loji pemprosesan gas.*

[5 marks]

[5 markah]

CLO1
C2

- (b) Based on Figure 3,

Berpandukan Rajah 3,

- i. State the function of Dew Point Control Unit (DPCU).

[2 marks]

Nyatakan fungsi Unit 'Dew Point Control' (DPCU).

[2 markah]

- ii. Label Unit 1, Unit 2, Unit 3 and Unit 4.

[4 marks]

Labelkan Unit 1, Unit2, Unit 3 and Unit 4.

[4 markah]

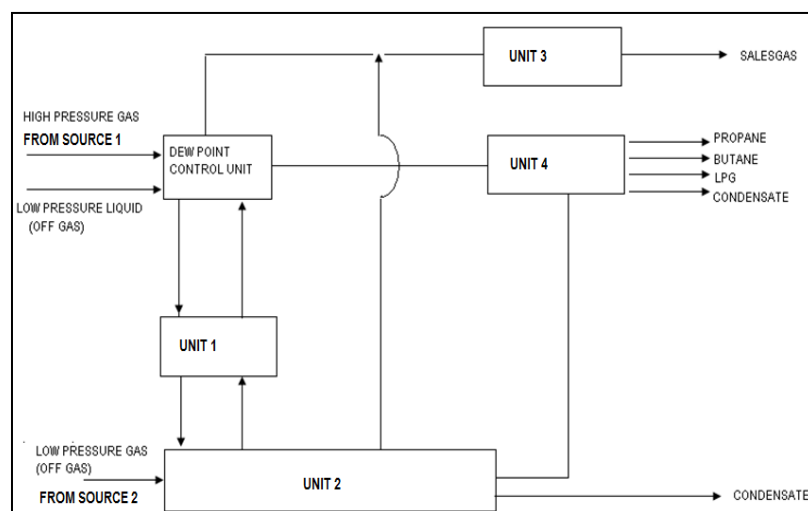


Figure 3: Gas Processing Plant

Rajah 3: Loji Pemprosesan Gas

CLO2
C3

- (c) Explain the process occurred after propane is withdrawn from the bottom of the depropanizer reflux drum in the Product Recovery Unit (PRU).

Terangkan proses yang berlaku selepas propana dihasilkan daripada bahagian bawah tangki 'depropanizer reflux' di Unit 'Product Recovery' (PRU).

[14 marks]

[14 markah]

QUESTION 4
SOALAN 4

CLO1
C1

- (a) Ammonia has been brought together at high temperature and pressure in the presence of catalyst.

Ammonia terhasil daripada gabungan suhu dan tekanan yang tinggi dengan kehadiran pemangkin.

- i. Name **ONE (1)** application of ammonia.

[1 mark]

*Namakan **SATU (1)** aplikasi ammonia.*

[1 markah]

- ii. List **FOUR (4)** characteristics of ammonia either physical or chemical charactersitics.

*Senaraikan **EMPAT (4)** ciri-ciri ammonia samada ciri-ciri fizikal atau kimia.*

[4 marks]

[4 markah]

CLO1
C2

- (b) Describe the function of the following equipment. If there is any chemical reaction involved, please write the chemical reactions:

Terangkan fungsi alatan berikut. Jika melibatkan tindakbalas kimia, tuliskan tindakbalas kimia tersebut:

- i. Absorber in CO₂ Removal Unit.

[3 marks]

[3 markah]

- ii. NH₃ Converter in Ammonia Synthesis Unit.

[3 marks]

[3 markah]

CLO2
C3

- (c) Illustrate a block flow diagram complete with label of ammonia plant. [14 marks]
Ilustrasikan gambarajah aliran blok lengkap dengan label loji ammonia. [14 markah]

SOALAN TAMAT