

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) There are two main flow configurations of membrane processes which are cross-flow and dead-end filtrations. Both flow geometries offer some advantages and disadvantages.

Terdapat dua konfigurasi aliran utama proses membran: aliran 'crossflow' dan 'dead-end'. Kedua-dua geometri aliran menawarkan beberapa kelebihan dan kekurangan.

- i) Draw and label the crossflow filtration.

Lukis dan labelkan penapisan aliran silang.

[3 marks]

[3 markah]

- ii) State **TWO (2)** factors affecting the rate of filtration.

*Nyatakan **DUA (2)** factor yang mempengaruhi kadar penapisan.*

[2 marks]

[2 markah]

CLO1
C2

(b) Diagram 1 (b) is size reducing equipment. Feed is admitted between the two jaws. One of the jaw is fixed and vertical, while the other side is the swinging jaw. This jaw reciprocates in a horizontal plane and makes the angle of 20-30°. The jaw is driven by an eccentric, in which it applies great compressive force to the lumps caught between the jaws.

Rajah 1 (b) adalah peralatan pengurangan saiz. Bahan masukan di masukkan antara dua rahang. Salah satu rahang adalah rahang tetap menegak manakala di sebelah lain adalah rahang berayun. Rahang menggambarkan satah mengufuk dan membuat sudut 20-30°. Rahang didorong oleh 'eccentric' supaya ia mengenakan daya mampatan yang besar kepada ketulan terperangkap di antara rahang.

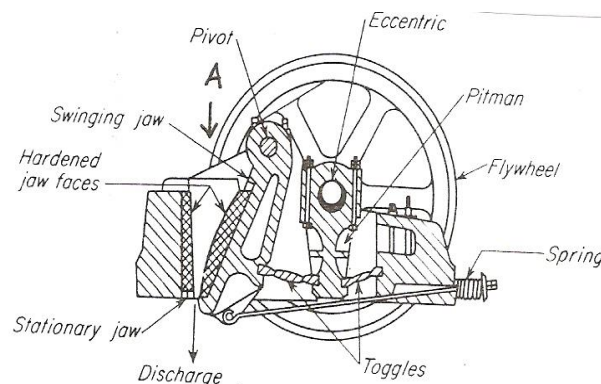


Diagram 1(b) / Rajah 1 (b)

i) Identify the equipment in the diagram 1(b).

Kenal pasti peralatan di dalam rajah 1 (b).

[2 marks]
[2 markah]

ii) Explain the specification of the equipment.

Terangkan spesifikasi peralatan tersebut.

[8 marks]
[8 markah]

CLO1
C3

- (c) A 100 tons/h of iron ore need to be crushed. 80% of the feed need to pass a 76.2mm screen and 80% of the product need to pass a 3.175mm screen. By assuming the work index W_i for iron ore is 12.84.

100tan/h bijih besi perlu dihancurkan. 80% suapan perlu melepasi skrin 76.2mm dan 80% daripada produk perlu melepasi skrin 3.175mm. Dengan andaian indeks kerja W_i untuk bijih besi sebagai 12.84.

$$P/m = 0.316 W_i \left[\left(1/D_p^{0.5} \right) - \left(1/D_F^{0.5} \right) \right]$$

- i) Choose the method that can be used for operation above
Pilih kaedah yang boleh digunakan untuk operasi di atas

[2 marks]

[2 markah]

- ii) Calculate the gross power (P) required by using the equation given.
Kirakan kuasa kasar (P) yang diperlukan dengan menggunakan persamaan di atas.

[8 marks]

[8 markah]

QUESTION 2

SOALAN 2

CLO2
C1

- (a) Drying a solid means reducing the content of residual liquid to an acceptable low value.

Pengeringan suatu pepejal bermaksud mengurangkan jumlah cecair kepada nilai penerimaan yang lebih rendah.

- i) State **THREE (3)** purposes of drying.

*Nyatakan **TIGA (3)** tujuan pengeringan.*

[3 marks]

[3 markah]

- ii) Draw and label the drying period in graph of drying rate versus time.

Lukis dan labelkan tempoh pengeringan dalam graf kadar pengeringan melawan masa.

[3 marks]

[3 markah]

CLO2
C2

- (b) Interpret the progression of crystallization process in diagram 2 (b) (1 to 7).

Tafsirkan proses pengkristalan in diagram 2(b) (1 hingga 7).

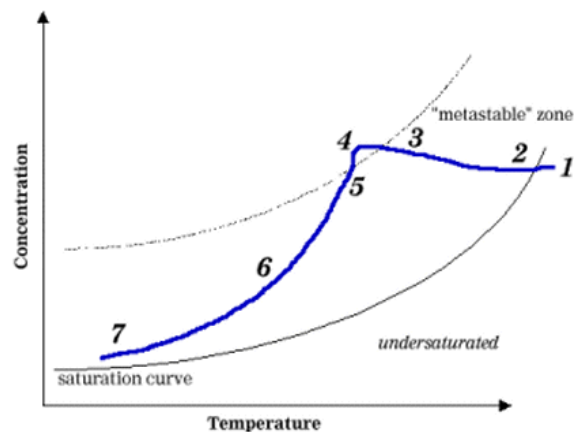


Diagram 2 (b) / Rajah 2 (b)

[7 marks]

[7 markah]

CLO2
C3

(c) The following questions are based on diagram given below

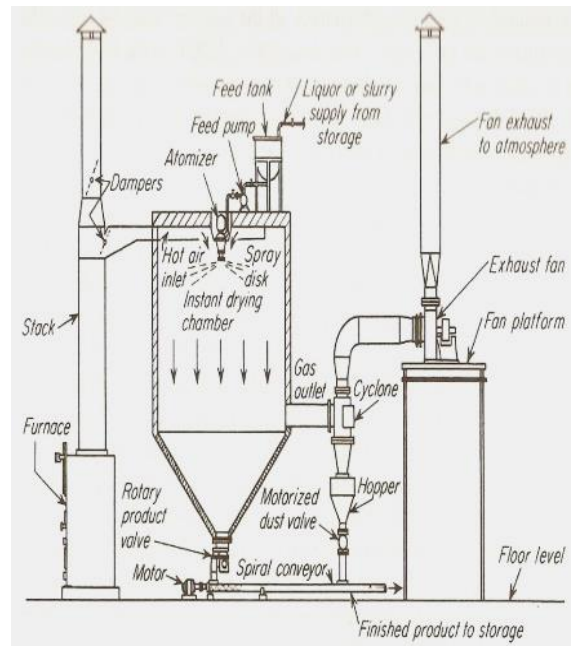


Diagram 2 (c) / Rajah 2 (c)

- i) Identify the drying equipment in the Diagram 2(c).

Kenalpasti alat pengeringan dalam Rajah 2(c).

[2 marks]

[2 markah]

- ii) Interpret the mechanism of the equipment in Diagram 2(c).

Terangkan mekanisma alat Rajah 2(c).

[10 marks]

[10 markah]

QUESTION 3

SOALAN 3

CLO1
C1(a) State **THREE (3)** differences between evaporation and drying.*Nyatakan **TIGA (3)** perbezaan antara penyejatan dan pengeringan*

[6 marks]

[6 markah]

CLO1
C2

(b) Multi-Effect Evaporation is an important procedure adopted to economize the consumption of energy. Explain briefly the process operation in Diagram 3(b)
Kesan-multi Penyejatan adalah prosedur penting diguna pakai untuk menjimatkan penggunaan tenaga. Terangkan secara ringkas operasi proses di Rajah 3(b).

[8 marks]

[8 markah]

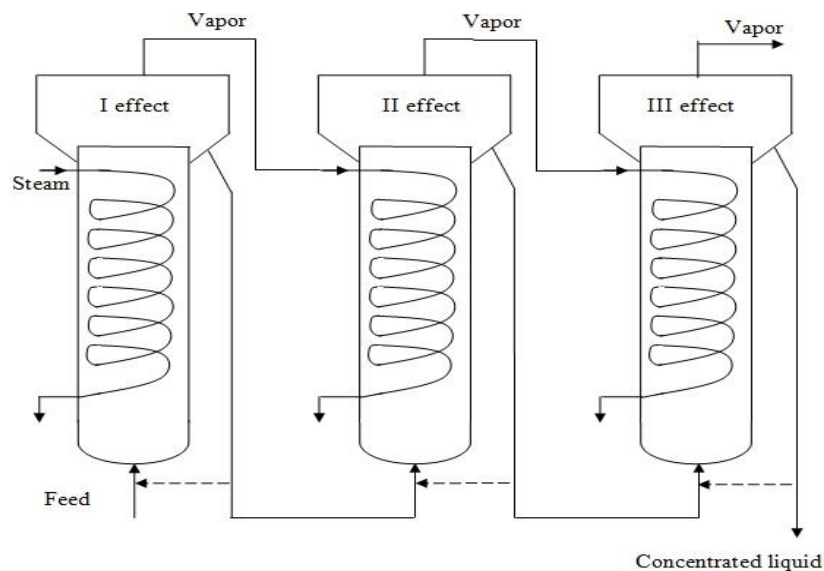


Diagram 3 (b) / Rajah 3 (b)

CLO1
C3

(c) Diagram 3(c) shows the liquid-liquid extraction equipment to separate products that have different chemical structures but within the same boiling range.

Rajah 3(c) menunjukkan peralatan pengekstrakan untuk mengasingkan produk yang mempunyai struktur kimia yang berlainan tetapi dengan takat didih yang sama.

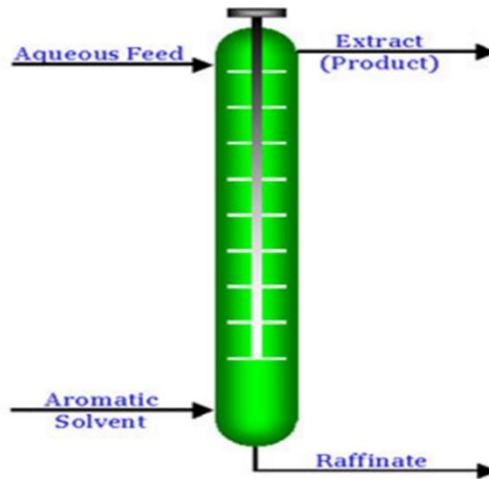


Diagram 3 (c) / Rajah 3 (c)

i) Interpret of the following:

Interpretasikan yang berikut:

- Emulsion
- Extract
- Raffinate
- Solvent
- Solute

[5 marks]

[5 markah]

ii) List **THREE (3)** factors that exert a positive influence on solvent extraction.

*Senaraikan **TIGA (3)** factor yang memberikan kesan positif kepada pengekstrakan pelarut.*

[6 marks]

[6 markah]

QUESTION 4

SOALAN 4

CLO1
C1

- (a) The shell of the column may be constructed from metals, ceramics, glass or plastics materials from metals with corrosion- resistant lining. The column should be mounted truly vertically to help uniform liquid distribution.

Dinding turus boleh dibina daripada logam, seramik, kaca, plastik atau bahan-bahan daripada logam dengan lapisan tahan hakisan. Ruangan ini perlu dipasang secara menegak untuk membantu pengedaran cecair seragam.

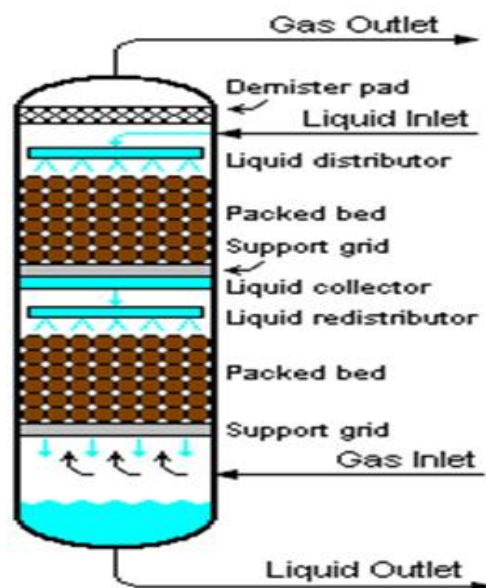


Diagram 5 (a) / Rajah 5 (a)

- i) List **THREE (3)** general design procedures for gas absorption tower.
*Senaraikan **TIGA (3)** prosedur reka bentuk am bagi menara penyerapan gas.*

[6 marks]
[6 markah]

CLO1
C2

(b) With the help of diagram, discuss **THREE (3)** differences between the absorption and adsorption.

Dengan bantuan gambarajah, bincangkan **TIGA (3)** perbezaan antara penyerapan dan penjerapan.

[10 marks]

[10 markah]

CLO1
C3

(c) Adsorption is usually described through isotherms, which is the amount of adsorbate on the adsorbent as a function of its pressure (gas) or concentration (liquid) at constant temperature.

Penjerapan biasanya digambarkan melalui garisan sesuhu, iaitu, jumlah terjerap pada penjerap sebagai fungsi tekanan (gas) atau kepekatan (cecair) pada suhu malar.

i) Draw the Type 1 Adsorption Isotherm of adsorbents.

Lukiskan isoterma penjerapan jenis 1 dalam pejerap.

[3 marks]

[3 markah]

ii) Interpret Type 1 Adsorption isotherm as drawn above.

Tafsirkan penjerapan isoterma jenis 1 dalam penjerap seperti yang dilukis diatas.

[6 marks]

[6 markah]

SOALAN TAMAT