INSTRUCTION

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

ARAHAN:

*Bahagian ini mengandungi **EMPAT (4)** soalan struktur. Jawab semua soalan.*

QUESTION 1
SOALAN 1

CLO1 C1

(a) i) Name the catalyst used in Chiyoda Acetica Process.

Namakan pemangkin yang diguna dalam Proses 'Chiyoda Acetica".

[1 mark]
[*1 markah*]

ii) State **TWO (2)** advantages of using the catalyst mentioned above.

*Nyatakan **DUA (2)** kelebihan dengan menggunakan pemangkin yang disebutkan di atas.*

[4 marks]
[*4 markah*]

CLO1 C2

(b) Describe **TWO (2)** units that are consisted in Chiyoda Acetica Process.

*Huraikan **DUA (2)** unit yang terkandung dalam Proses 'Chiyoda Acetica'.*

[5 marks]
[*5 markah*]

CLO1 C3

(c) Benzene is alkylated with ethylene to yield a mixture of alkylated benzenes. Explain the steps of producing ethylbenzene in alkylation and transalkylation reactors.

Benzena di alkilasi bersama etilena untuk menghasilkan campuran alkilasi benzena. Terangkan langkah-langkah penghasilan etilbenzena di dalam reaktor 'alkylation' dan 'transalkylation'.

[10 marks]
[*10 markah*]

CLO1
C4

(d) Differentiate between EBOne and CDTech EB Technologies in producing ethylbenzene.

Bezakan antara Teknologi EBOne dan CDTech EB dalam menghasilkan etilbenzena.

[5 marks]
[*5 markah*]

QUESTION 2
SOALAN 2

CLO2
C1

(a) i) Desulfurizer is used to protect reformer from the damage due to sulfur poisoning. State the suitable operating temperature in desulfurizer.

'Desulfurizer' digunakan untuk melindungi 'reformer' dari kerosakan disebabkan keracunan sulfur. Nyatakan suhu operasi yang sesuai bagi 'desulfurizer'.

[1 mark]
[*1 markah*]

ii) Write down the reaction happens in desulfurizer.

Tuliskan tindakbalas yang berlaku dalam 'desulfurizer'.

[4 marks]
[*4 markah*]

CLO2
C2

(b) Describe briefly the methanol synthesis process.

Bincangkan secara ringkas tentang proses sintesis methanol.

[5 marks]
[*5 markah*]

CLO2 C3

(c) In UOP/Hydro MTO Process, the fractionation and purification sections are used to separate the key products from the by-product components.

Dalam Proses UOP/Hydro MTO, bahagian pemeringkatan dan penulenan digunakan untuk memisahkan hasil utama dan komponen sampingan.

i) Draw and label the fractionation and purification sections.

Lukis dan label bahagian pemeringkatan dan penulenan tersebut.

[8 marks]
[8 *markah*]

ii) Explain the function of each equipment based on your answer in c (i).

Terangkan fungsi setiap peralatan berdasarkan jawapan anda pada c (i).

[7 marks]
[7 *markah*]

QUESTION 3

SOALAN 3

CLO1 C1

(a) Write down the chemical reaction of classic styrene.

Tuliskan tindakbalas kimia 'classic styrene'.

[5 marks]
[*5 markah*]

CLO1 C2

(b) Describe the advantages of SMART styrene compared to classic styrene.

Terangkan kelebihan SMART styrene berbanding dengan klasik styrene.

[5 marks]
[*5 markah*]

CLO1
C3

(c) Explain the function of the following equipment in Pxmax reaction section :
Terangkan fungsi bagi peralatan-peralatan 'Pxmax reaction section' berikut :

i) Furnace / *Dandang*

ii) Condenser / *Kondenser*

iii) Separator / *Pemisah*

iv) Reactor / *Reaktor*

v) Compressor / *Pemampat*

[10 marks]
[*10 markah*]

CLO1
C4

(d) Differentiate mixed xylenes based on their chemical structures.
Bezakan campuran'xylenes' dengan berdasarkan struktur kimia.

[5 marks]
[*5 markah*]

QUESTION 4

SOALAN 4

CLO2
C1

(a) The polymer properties vary based on the type and amount of comonomer.

Sifat-sifat polimer dipelbagaikan berdasarkan jenis dan jumlah komonomer.

i) State an example of comonomer
Nyatakan satu contoh komonomer

ii) Name a polymer with high comonomer content
Namakan polimer dengan kandungan komonomer yang tinggi

iii) Name a polymer with low comonomer content
Namakan polimer dengan kandungan komonomer yang rendah

[5 marks]
[*5 markah*]

CLO2
C2

(b) i) Define monomer, homopolymer and random copolymer.

Takrifkan monomer, homopolimer dan 'random copolymer'.

[5 marks]
[*5 markah*]

ii) The UNIPOL^{TM} reaction system is very stable and easy to operate and to control with five independent process variables only. Identify the **FIVE (5)** process control variables as mentioned above.

*Sistem tindak balas UNIPOL^{TM} adalah sangat stabil dan mudah untuk dioperasi dengan hanya lima 'independent process variables'. Nyatakan **LIMA (5)** pemboleh ubah yang dinyatakan di atas.*

[5 marks]
[*5 markah*]

CLO2
C3

(c) After polymerization process is completed, polymer is sent to the next steps which are resin degassing, vent recovery and pelleting. Describe those steps in your own words.

Selepas proses pempolimeran telah selesai, polimer dihantar ke langkah seterusnya iaitu 'resin degassing', 'vent recovery' dan 'pelleting'. Huraikan langkah-langkah tersebut dengan menggunakan ayat anda sendiri.

[10 marks]
[*10 marks*]

SOALAN TAMAT