SULIT

POLITEKNIK MALAYSIA

BAHAGIAN PEPERIKSAAN DAN PENILAIAN
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENDIDIKAN MALAYSIA

JABATAN TEKNOLOGI KIMIA DAN MAKANAN

PEPERIKSAAN AKHIR

SESI JUN 2019

DMT3043 : FATS AND OILS TECHNOLOGY

TARIKH : 05 NOVEMBER 2019
MASA : 2.30 PETANG – 4.30 PETANG (2 JAM)

Kertas ini mengandungi **SEBELAS (11)** halaman bercetak.

Struktur (5 soalan)

Dokumen sokongan yang disertakan :Tiada

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIARAHKAN

(CLO yang tertera hanya sebagai rujukan)

INSTRUCTION:

This section consists of **FIVE (5)** structured questions. Answer **ALL** questions.

ARAHAN:

*Bahagian ini mengandungi **LIMA (5)** soalan berstruktur. Jawab **SEMUA** soalan.*

QUESTION 1

SOALAN 1

CLO1 C1

a) State the difference between fats and oils.

Nyatakan perbezaan di antara lemak dan minyak.

[2 marks]

[*2 markah*]

CLO1 C2

b) In a diet, fats and oils in the food are needed by the body for normal growth and metabolism. State **THREE (3)** functions of fats and oils in food.

*Dalam diet pemakanan, lemak dan minyak dalam makanan diperlukan oleh badan untuk tumbesaran normal dan metabolisma. Berikan **TIGA (3)** fungsi lemak dan minyak dalam makanan.*

[3 marks]

[*3 markah*]

CLO1 C3

c) Based on Table 1(c), answer the questions below:

Jawab soalan di bawah, berpandukan Jadual 1(c).

Table 1(c): Chemical Properties of several types of Oil

Jadual 1(c): Sifat kimia beberapa jenis minyak

Types of oil	**Major fatty acid**
Palm oil	Palmitic acid
Olive oil	Oleic acid
Soybean oil	Linoleic acid

CLO1
C1

i. Oils are bought and sold according to a quality specification. Based on Table 1(c), choose the type of oil with the lowest iodine value.
Minyak dibeli dan dijual mengikut spesifikasi kualiti. Berpandukan jadual 1(c), pilih jenis minyak yang nilai iodin paling rendah.

[1 mark]
[*1 markah*]

CLO1
C2

ii . Explain your answer in question 1(c)(i).Give **TWO (2)** reasons.
*Terangkan jawapan anda dalam soalan 1(c)(i). Berikan **DUA (2)** sebab.*

[4 marks]
[*4 markah*]

CLO1
C3

iii. Crude palm oil is stored in a temporary tank and the oil condition need to be checked before undergoing the refining process. Give **FIVE (5)** physical parameters to determine the oil quality.
*Minyak sawit mentah disimpan di dalam tangki sementara dan keadaan minyak perlu diperiksa sebelum melalui proses penapisan. Berikan **LIMA (5)** parameter fizikal untuk menentukan kualiti minyak.*

[5 marks]
[*5 markah*]

CLO1
C4

d) Based on Table 1(d), answer the question below:
Jawab soalan dibawah, berpandukan Jadual 1(d):

Table 1(d) : Chemical formula of several types of fatty acid

Jadual 1(d): Formula kimia beberapa jenis asid lemak

Types of fatty acid	Chemical formula
Eicosenoic acid	$C_{20}H_{38}O_2$
Nervonic acid	$C_{24}H_{46}O_2$
Linoleic acid	$C_{18}H_{32}O_2$
Palmitic acid	$C_{16}H_{32}O_2$
Arachidic acid	$C_{20}H_{40}O_2$

Identify the classification for each type of fatty acid in the table above.

Kenalpasti pengkelasan bagi setiap asid lemak dalam jadual di atas.

[5 marks]

[*5 markah*]

QUESTION 2

SOALAN 2

CLO1
C1

a) Give the definition of the terms below:

Berikan definisi istilah-istilah berikut:

i. rendering

'*rendering*'

ii. crude oil

minyak mentah

[2 marks]

[*2 markah*]

b) Based on Figure 2(b), answer the questions below:
Jawab soalan berikut, berdasarkan Rajah 2(b):

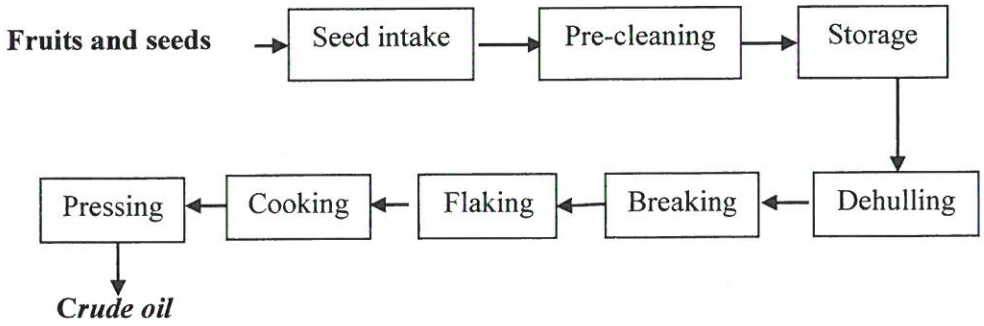

Figure 2(b): Flow chart of extraction process of vegetable oil
Rajah 2(b):Carta alir bagi proses pengekstrakan minyak sayuran

CLO1
C2

i. Explain the purpose of pre-cleaning and breaking.
Terangkan tujuan pra-pembersihan dan pemecahan.

[2 marks]
[*2 markah*]

CLO1
C2

ii. Explain why dehulling is very important in oil extraction process.
Terangkan mengapa pembuangan kulit sangat penting dalam proses pengekstrakan minyak.

[2 marks]
[*2 markah*]

CLO1
C3

iii. Discuss **TWO (2)** effects on oil if cooking is not performed.
*Bincangkan **DUA (2)** kesan terhadap minyak sekiranya pemasakan tidak dilakukan.*

[4 marks]
[*4 markah*]

c) Based on Figure 2(c), answer the questions below:
Jawab soalan berikut, berdasarkan Rajah 2(c):

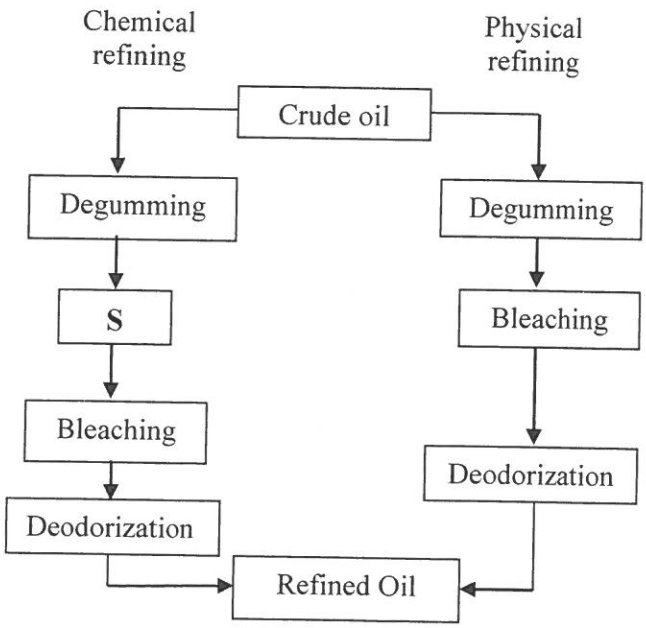

Figure 2(c): Flow chart of oil refining process
Rajah 2(c): Carta alir proses penapisan minyak

CLO1
C3

i. Differentiate between chemical refining and physical refining.
Bezakan di antara proses penapisan kimia dan penapisan fizikal.

[4 marks]
[*4 markah*]

CLO1
C2

ii. Explain **TWO (2)** effects on oil if phosphatides is not removed in degumming process.
*Terangkan **DUA (2)** kesan terhadap minyak jika fosfatida tidak disingkirkan di dalam proses penyahgaman.*

[4 marks]
[*4 markah*]

CLO1 C2

iii. Explain process S.
*Terangkan proses **S**.*

[2 marks]
[*2 markah*]

QUESTION 3
SOALAN 3

CLO1 C1

a) Distinguish between dewaxing and winterization.
Bezakan antara 'dewaxing' dan 'winterization'.

[2 marks]
[*2 markah*]

CLO1 C2

b) i. Plastisizing is to produce the finest possible crystal structure. Predict the types of crystal that will be formed in plasticizing and describe the characteristics of the crystal.
'Plasticizing' adalah untuk menghasilkan struktur hablur paling halus. Jangkakan jenis hablur yang akan terhasil dari 'plasticizing' dan huraikan ciri-ciri hablur tersebut.

[3 marks]
[*3 markah*]

CLO1 C3

ii. The reaction of triglycerides with glycerol to yield partial glycerides is normally done at high temperature to increase the solubility of glycerol in the oil phase. Name the types of inter-esterification involved in this reaction.
Tindak balas trigliserida dengan gliserol untuk mendapatkan separa gliserida biasanya dilakukan pada suhu tinggi bagi meningkatkan keterlarutan gliserol dalam fasa minyak. Namakan jenis 'inter-esterification' yang terlibat dalam tindak balas ini.

[2 marks]
[*2 markah*]

CLO1
C3

iii. Write the general chemical equation of alcoholysis.
Tuliskan persamaan kimia umum bagi alkoholisis.

[3 marks]
[*3 markah*]

CLO1
C3

c) i. Fractionation is a process to remove solid through controlled crystallization and separation techniques. Draw a flow chart showing solvent fractionation.
Pemecahan adalah proses untuk menyingkirkan pepejal dengan mengawal teknik pengkristalan dan pemisahan. Lukiskan carta alir bagi pemecahan pelarut.

[4 marks]
[*4 markah*]

CLO1
C2

ii. Explain the purpose of hydrolysis for fats and oils.
Terangkan fungsi hidrolisis bagi lemak dan minyak.

[2 marks]
[*2 markah*]

CLO1
C3

iii. Distinguish between dry fractionation and detergent fractionation.
Bezakan pemecahan kering dan pemecahan detergen.

[4 marks]
[*4 markah*]

QUESTION 4
SOALAN 4

CLO1
C1

a) Define the term mayonnaise.
Berikan definisi bagi istilah mayonis.

[2 marks]
[*2 markah*]

CLO1
C2

b) Oleochemical is one chemical derived from fats and oils. State **THREE (3)** oleochemical products from fats and oils.
*Oleokimia adalah bahan kimia terbitan daripada lemak dan minyak. Nyatakan **TIGA (3)** produk oleokimia daripada lemak dan minyak.*

[3 marks]
[*3 markah*]

CLO1
C3

c) i. Most cake recipes use spreading fat to make it fluffy and moist. Identify the
spreading fat that contains high trans fat.
Kebanyakan resepi kek menggunakan lemak penyebar untuk menjadikannya gebu dan lembap . Kenal pasti lemak penyebar yang mengandungi lemak trans yang tinggi.

[1 mark]
[*1 markah*]

CLO1
C4

ii. Suggest and explain the modification process needed to change cis fat to trans fat.
Cadangkan dan terangkan proses pengubahsuaian yang diperlukan untuk menukar daripada lemak cis kepada lemak trans.

[4 marks]
[*4 markah*]

CLO1
C3

iii. Give **THREE (3)** advantages and **TWO (2)** disadvantages of the suggested modification process.
*Berikan **TIGA (3)** kelebihan dan **DUA (2)** kekurangan bagi proses pengubahsuaian yang dicadangkan.*

[5 marks]
[*5 markah*]

CLO1
C4

d) Conventional margarine contains a much higher proportion of trans fats than butter. Discuss the suitable process that could be used to produce trans-fat free margarine.

Majerin konvensional mengandungi kadar lemak trans lebih tinggi berbanding mentega. Huraikan kaedah yang sesuai yang boleh digunakan untuk menghasilkan marjerin yang bebas lemak trans.

[5 marks]

[*5 markah*]

QUESTION 5

SOALAN 5

CLO1
C1

a) State the main fatty acid in palm fruit oil and palm kernel oil.

Nyatakan asid lemak utama dalam minyak buah sawit dan minyak isirong sawit.

[2 marks]

[*2 markah*]

CLO1
C2

b) Kernel recovery is the last process in palm oil processing. Describe the kernel recovery process.

Pemulihan kernel adalah proses terakhir dalam pemprosesan minyak sawit. Huraikan proses pemulihan kernel.

[8 marks]

[*8 markah*]

CLO1
C3

c) Treatment of waste water from palm oil mill effluent is divided into two categories. If the waste water contains high substance of toxic to biological decomposition, suggest the category of wastewater treatment and explain the suitable treatment system by sketching related figure.

Rawatan air sisa daripada efluen kilang minyak sawit terbahagi kepada dua kategori. Jika air sisa mengandungi bahan toksik kepada penguraian biologi yang tinggi, cadangkan kategori rawatan air sisa dan terangkan sistem rawatan yang bersesuaian dengan menggunakan lakaran gambar rajah yang berkenaan.

[10 marks]
[*10 markah*]

SOALAN TAMAT