# UNIVERSITI SAINS MALAYSIA

Second Semester Examination
Academic Session 2009/2010

April/May 2010

**EBP 212/3 – Latex Processing**
***[Pemprosesan Lateks]***

Duration : 3 hours
*[Masa : 3 jam]*

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Please ensure that this examination paper contains EIGHT printed pages before you begin the examination.
*[Sila pastikan bahawa kertas peperiksaan ini mengandungi LAPAN muka surat yang bercetak sebelum anda memulakan peperiksaan ini.]*

This paper consists of SEVEN questions.
*[Kertas soalan ini mengandungi TUJUH soalan.]*

**Instruction:** Answer **FIVE** questions. If candidate answers more than five questions only the first five questions answered in the answer script would be examined.
*[**Arahan**: Jawab **LIMA** soalan. Jika calon menjawab lebih daripada lima soalan hanya lima soalan pertama mengikut susunan dalam skrip jawapan akan diberi markah.]*

The answers to all questions must start on a new page.
*[Mulakan jawapan anda untuk semua soalan pada muka surat yang baru.]*

You may answer a question either in Bahasa Malaysia or in English.
*[Anda dibenarkan menjawab soalan sama ada dalam Bahasa Malaysia atau Bahasa Inggeris.]*

In the event of any discrepancies, the English version must be used.
*[Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah diguna pakai.]*

1. [a] Discuss TWO techniques used to reduce the extractable protein in natural rubber latex gloves.

*Bincangkan DUA teknik yang digunakan untuk mengurangkan protein terekstrak dalam sarung tangan getah asli.*

(40 marks/*markah*)

[b] Discuss surface modification of latex gloves by coating with hydrogel materials. The discussion must be supported by suitable flow chart.

*Bincangkan modifikasi permukaan sarung tangan dengan penyalutan bahan hidrogel. Perbincangan mesti disokong dengan carta aliran yang sesuai.*

(60 marks/*markah*)

2. [a] Describe the following latex dipping method:

(i) Straight dipping

(ii) Heat-sensitized dipping

*Jelaskan kaedah pencelupan lateks berikut:*

*(i) Pencelupan terus.*

*(ii) Pencelupan terpeka suhu.*

(40 marks/*markah*)

[b] Describe a complete dipping process to make latex gloves with chlorination treatment by chlorinated water. The discussion must be supported by suitable flow chart.

*Jelaskan satu proses pencelupan yang lengkap untuk pembuatan sarung tangan lateks dengan rawatan pengklorinan menggunakan air terklorin. Perbincangan mesti disokong dengan carta aliran yang bersesuaian.*

(60 marks/*markah*)

...3/-

3. [a] Give TEN types of visible defects on latex gloves. Give remedies for all the TEN types of defects.

*Berikan SEPULUH jenis kecacatan yang boleh dilihat pada sarung tangan lateks. Berikan penyelesaian bagi kesemua SEPULUH jenis kecacatan itu.*

(60 marks/*markah*)

[b] Discuss on nitrosamine and latex allergy.

*Bincangkan nitrosamina dan alergi lateks.*

(40 marks/*markah*)

4. [a] Briefly discuss the preparation steps for sulphur pre-vulcanized natural rubber latex (please include the flow chart).

*Bincangkan secara ringkas langkah-langkah penghasilan pra-pemvulkanan sulfur bagi lateks getah asli (sila sertakan carta aliran).*

(40 marks/*markah*)

[b] Discuss the advantages and disadvantages of swelling index test as a method for assessing the degree of optimum vulcanization of natural rubber latex compound with comparison to chloroform number test.

*Bincangkan kebaikan dan keburukan ujian indeks pembengkakan sebagai kaedah untuk mengukur darjah pemvulkanan optima sebatian lateks getah asli berbanding kaedah ujian nombor klorofom.*

(30 marks/*markah*)

[c] Most latex products are made by destabilization of latex particles. The process of destabilization of latex can take one of the three forms:

(i) Gelation.

(ii) Flocculation.

(iii) Agglomeration.

Explain the differences between these three processes.

*Kebanyakan produk lateks dihasilkan melalui proses penyahstabilan partikel lateks. Proses penyahstabilan boleh melalui satu daripada bentuk:*

*(i) Penggelan.*

*(ii) Pengelompokan.*

*(iii) Penggumpalan.*

*Terangkan perbezaan antara ketiga-tiga proses ini*

(30 marks/*markah*)

5. [a] Well preserved field latex will have typical mechanical stability time (MST) with more than 1000 seconds. The latex received from XYZ LATEXX MANUFACTURED showed the MST less than 650 seconds.

*Lateks ladang yang diawetkan dengan baik akan memberikan masa kestabilan mekanikal (MST) lebih daripada 1000 saat. Lateks yang diterima daripada kilang XYZ LATEXX MANUFACTURED menunjukkan MST kurang daripada 650 saat.*

(i) Explain the important of the MST towards the quality of your received latex.

*Jelaskan kepentingan masa kestabilan mekanikal (MST) terhadap kualiti lateks yang diterima.*

(15 marks/*markah*)

(ii) Briefly discuss one chemical composition test and one colloidal stability test that need to be carried out to confirm the quality of your latex.

*Bincangkan dengan ringkas satu ujian komposisi kimia dan satu ujian kestabilan koloid yang perlu dilakukan untuk memastikan kualiti lateks anda.*

(40 marks/*markah*)

(iii) If the received latex from XYZ LATEXX MANUFACTURED was used in your latex compounding, what will be expected to your latex product quality?

*Jika lateks yang diterima dari XYZ LATEXX MANUFACTURED digunakan dalam penyebatian lateks anda, apakah yang dijangka akan berlaku terhadap kualiti produk lateks anda?*

(15 marks/*markah*)

[b] Briefly discuss theories that explain the mechanism of film formation for natural rubber latex.

*Bincangkan secara ringkas teori-teori yang menerangkan mekanisme pembentukan filem lateks getah asli.*

(30 marks/*markah*)

6. [a] The chemicals used in latex compounding can be divided into three general classifications. Give short description of the classification of each latex compounding ingredients.

*Bahan kimia yang digunakan dalam penyebatian lateks dapat dikelaskan kepada tiga kumpulan umum. Berikan secara ringkas pengkelasan setiap ramuan penyebatian lateks.*

(50 marks/*markah*)

[b] Based on formulation below, calculate the actual parts by mass and identify the function of each ingredient.

*Berdasarkan formulasi di bawah, kirakan berat sebenar dan kenalpasti fungsi setiap ramuan.*

| Ingredients / *Ramuan* | Function / *Fungsi* | Parts by mass / *Bahagian berdasarkan berat* | |
|---|---|---|---|
| | | Dry / *Kering* | Actual / *Sebenar* |
| 60% HA latex / *60% HA lateks* | | 100 | |
| 10% KOH | | 1.0 | |
| 50% sulphur / *50% sulfur* | | 1.5 | |
| 50% ZDEC | | 1.5 | |
| 50% ZnO | | 1.0 | |
| 50% Antioxidant / *50% antioksidan* | | 1.0 | |
| 25% Sago Starch / *25% tepung sagu* | | 20 | |

(35 marks/*markah*)

[c] Gives your comment on compounding ingredients used above if you want to produce more whitish latex product.

*Berikan komen anda tentang ramuan-ramuan penyebatian yang digunakan jika anda ingin menghasilkan produk lateks yang lebih putih.*

(15 marks/*markah*)

…8/-

7. [a] Discuss the manufacturing of talc-coated rubber latex thread. The discussion must be supported by a suitable flow chart.

*Bincangkan pembuatan bebenang lateks yang bersalut talkum. Perbincangan mesti disokong dengan satu carta aliran yang sesuai.*

(50 marks/*markah*)

[b] Give the definition of natural rubber latex.

*Berikan definisi lateks getah asli.*

(10 marks/*markah*)

[c] Field latex will undergo spontaneous coagulation after few hours of tapping and their concentrations are very low and not suitable to be used in productions of latex products. Briefly explain how to prevent this spontaneous coagulation and discuss the suitable concentration method to concentrate this field latex to 60% total solid content (TSC).

*Lateks ladang akan mengalami pengumpalan selepas beberapa jam ditoreh dan kepekatannya adalah tidak sesuai untuk digunakan dalam penghasilan produk lateks. Jelaskan dengan ringkas bagaimanakah cara untuk menghalang penggumpalan spontan lateks ladang ini dan bincangkan kaedah pemekatan yang sesuai bagi memekatkan lateks ladang ini kepada 60% jumlah kandungan pepejal.*

(40 marks/*markah*)

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