
UNIVERSITI SAINS MALAYSIA

First Semester Examination
Academic Session 2003/04

September/October 2003

**IWK 305E – ADVANCED TECH. OF BIO-RESOURCE
UTILIZATION, PAPER & COATING**

Time: 2 hours

Please check that the examination paper consists of FOUR printed pages before you commence this examination.

Answer FOUR questions only. Students are allowed to answer all questions in English OR Bahasa Malaysia OR combination of both.

...2/-

1. (a) Draw the Jablonsky diagram and illustrate the various transitions that occur when a photoinitiator absorbs actinic radiation.

1. (a) *Lukiskan gambarajah Jablonsky dan tunjukkan berbagai peralihan yang berlaku apabila suatu fotopemula menyerap pancaran aktinik.*

(50 markah)

(b) The domain of wavelength generally employed in UV/visible light curing lies in the range between 200 nm and 700 nm. Calculate the corresponding energies in kJ/Einstein.

(b) *Panjang gelombang domain yang biasanya digunakan dalam pematangan cahaya UV/tampak terletak dalam julat di antara 200 nm dan 700 nm. Hitungkan tenaga yang terlibat dalam kJ/Einstein.*

(50 markah)

2. (a) Describe how an α -amino alkyl phenone photoinitiator undergoes Norrish Type I dissociation. Mention which of the photolytic products can initiate polymerization. Write down other parallel reactions among the photolytic products.

2. (a) *Huraikan bagaimana suatu fotopemula α - amino alkil fenon mengalami penguraian Norrish Jenis I. Sebutkan produk fotolitik yang manakah yang boleh memulakan pempolimeran. Tuliskan tindak balas selari yang lain di antara produk-produk fotolitik.*

(50 markah)

(b) Write short notes on TWO of the following:

- i) The stability of emulsion coating systems.
- ii) Multiplicity and orbital designations of ground and excited states.
- iii) Room Temperature Vulcanizable Silicone elastomers.

(b) *Tuliskan nota ringkas terhadap DUA daripada yang berikut:*

- i) Kestabilan sistem penglitup emulsi.*
- ii) Multiplisiti dan designasi orbital bagi keadaan bumi dan keadaan teruja.*
- iii) Elastomer silikone tervulkan suhu bilik.*

(50 markah)

3. (a) Describe the method of preparing any ONE of the following:

- i) Urethane acrylates.
- ii) Propoxylated trimethylol propane triacrylate.

3. (a) *Huraikan kaedah bagi penyediaan SATU daripada yang berikut:*

- i) Akrilat uretana.*
- ii) Trimetilol propana triakrilat terpropoksilat.*

(40 markah)

(b) Describe how radiation curable silicone release coatings can be produced and cured by UV/EB radiation.

(b) *Huraikan bagaimana penglitup pelepasan silikone termatang pancaran boleh dihasil dan dimatangkan dengan pancaran UV/EB .*

(60 markah)

4. (a) Describe with a diagram an Electron Beam processor indicating the essential features.

4. (a) *Huraikan dengan menggunakan gambarajah suatu pemproses Bim Elektron disertai dengan ciri-ciri penting.*

(50 markah)

(b) Illustrate with a diagram the construction of a medium pressure mercury lamp employed for the curing of surface coatings.

(b) *Tunjukkan dengan menggunakan gambarajah binaan suatu lampu merkuri bertekanan sederhana yang digunakan bagi pematangan penglitup permukaan.*

(50 markah)

5. (a) Discuss briefly the toxicity and irritancy of acrylic monomers employed in UV/EB curable coatings formulations.

5. (a) *Bincangkan dengan ringkas ketoksikan dan kegatalan monomer akrilik yang digunakan dalam formulasi penglitup termatang UV/EB.*

(50 markah)

(b) Describe an actinometric method of dosimetry of UV radiation.

(b) *Huraikan suatu kaedah aktinometrik bagi pendosan pancaran UV.*

(50 markah)