
UNIVERSITI SAINS MALAYSIA

First Semester Examination
2010/2011 Academic Session

November 2010

KAE345 – Special Topics In Analytical Chemistry
[Tajuk Khusus Dalam Kimia Analisis]

Duration: 3 hours
[Masa : 3 jam]

Please check that this examination paper consists of TEN pages of printed material before you begin the examination.

Instruction:-

Answer any **FIVE** (5) questions.

This paper consists of **SEVEN** (7) questions.

Answer each question on a new page.

You may answer either in Bahasa Malaysia or in English.

If a candidate answers more than five questions, only the answers to the first five questions in the answer sheet will be graded.

In the event of any discrepancies, the English version shall be used.

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1.
 - (a) The most important step in order to ensure the evidence is admissible to the court is the consistency in the chain of custody. Discuss the repercussions if the chain of custody is broken.
(8 marks)
 - (b) What is the value of a single piece of evidence having class characteristics?
(6 marks)
 - (c) Discuss on the superiority of the DNA fingerprint over the fingerprint.
(6 marks)

2.
 - (a) A biker struck a pedestrian at a dark intersection. The police collected the broken glass and broken headlamp at the road surface and submitted it to you for examination. Discuss how you would conclude that the biker is not guilty based on evidence collected.
(10 marks)
 - (b) Microscopic examination of paint chips recovered from the clothing of a pedestrian hit-and-run victim discloses the presence of numerous tiny glass spheres in the paint. Suggest the origin of these glass spheres in order to relate the suspect vehicle.
(10 marks)

3. (a) Discuss how striation markings along a gun's bore could be used to authenticate the bullet that was triggered from that particular gun.

(6 marks)

- (b) A forensic chemist was assigned to examine tape lifts taken from the hands of a suspected shooter. Justify the sampling and method of analysis of your choice.

(6 marks)

- (c) Convince the court that the bullet found at the crime scene and the owner of the gun has pulled the trigger to kill the victim.

(8 marks)

4. In the bedroom, a man in his fifties lies dead on the floor next to a bed with a broken glass bottle nearby, reddish-brown stains on the walls, a red stain on the carpet and the bathroom window smashed.

Explain how you as a forensic chemist would conduct the investigation at the crime scene and chemical analysis in the laboratory to conclude whether the incidence was an accident or involved foul play.

(20 marks)

5. Trace analysis of crime related samples for identification of the chemicals of interest mainly involved separation techniques especially chromatography. Deliberate on any suitable chromatographic method for the analysis of:

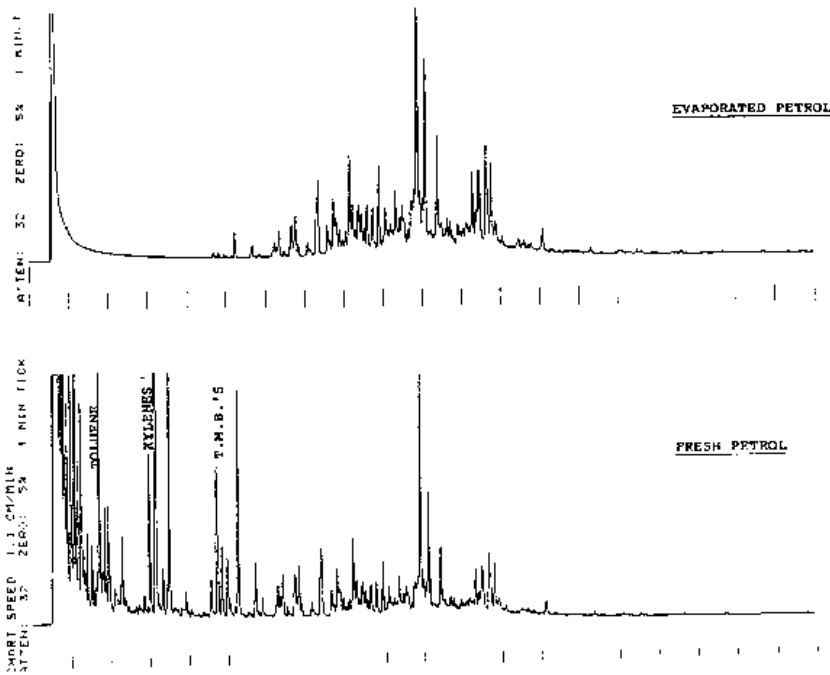
- i. drugs and its metabolites,
- ii. written document to be related to the ink,
- iii. fibre from carpet found at the trousers of the suspect, and
- iv. blood from driver involved in an accident.

(20 marks)

6. During the investigation at the crime scene, several samples were collected for analysis for potential clues at the scene of fire to establish the cause and origin of fire.

Elaborate how you would choose the location to collect the samples at the site and turn into analyzable form before analysis for useful outcomes.

If the chromatogram obtained from the sample collected is similar to the evaporated petrol as shown below, with reference to the chromatogram of fresh petrol, convince the court that the fire was deliberately set by arsonists.



(20 marks)

7. Section 39 of Dangerous Drugs Act 1951 is very crucial for the chemist to be accurate in analysis and correct in the presentation of the findings in the court. With reference to some clauses related to heroin below, elaborate this statement.

39A (1) Every person found guilty of an offence against this Act where the subject matter of the offence is –

- (d) a total of 2 grammes or more but less than 5 grammes in weight of heroin, morphine and monoacetylmorphine or total of 2 grammes or more but less than 5 grammes in weight of any two of the said dangerous drugs;
- (za) a total of 30 grammes or more in weight of any combination of the dangerous drugs listed in paragraphs (m) to (z) ;shall, instead of being liable to the punishment provided for that offence under the section under which the person has been so found guilty, be punished with imprisonment for a term which shall not be less than two years but shall not exceed five years, and he shall also be punished with whipping of not less than three strokes but not more than nine strokes.

39B (1) No person shall, on his own behalf or on behalf of any other person, whether or not such other person is in Malaysia —

- (a) traffic in a dangerous drug;
 - (b) offer to traffic in a dangerous drug; or
 - (c) do or offer to do an act preparatory to or for the purpose of trafficking in dangerous drug.
- (2) Any person who contravenes any of the provisions of subsection (1) shall be guilty of an offence against this Act and shall be punished on conviction with death.

(20 marks)

TERJEMAHAN

Arahan:-

Jawab **LIMA** soalan sahaja.

Kertas soalan ini mengandungi **TUJUH** (7) soalan sahaja.

Jawab setiap soalan pada muka surat yang baru.

Anda boleh menjawab sama ada dalam Bahasa Malaysia atau Bahasa Inggeris.

Jika calon menjawab lebih daripada lima soalan, hanya lima soalan pertama mengikut susunan dalam skrip jawapan akan diberi markah.

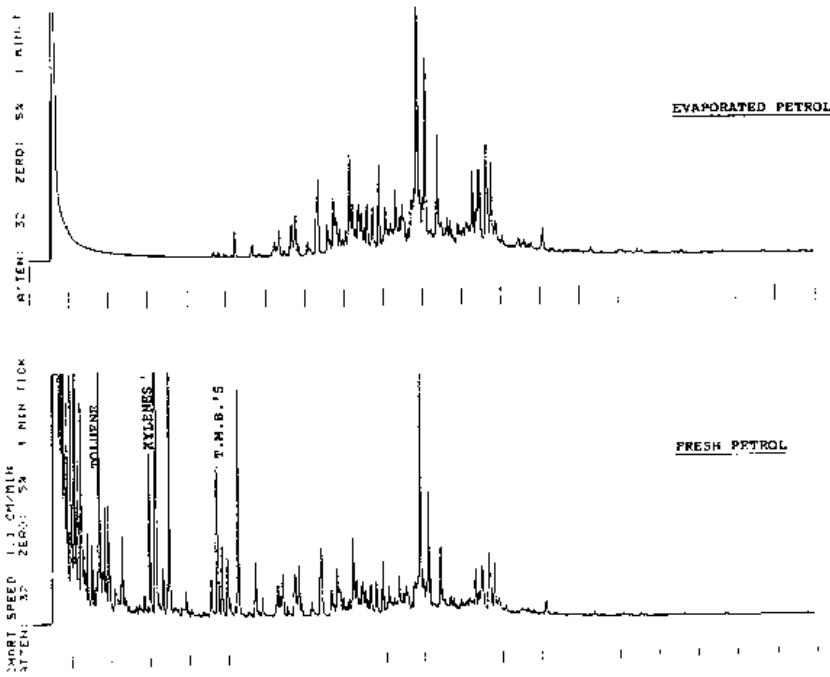
Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah diguna pakai.

-7-

1. (a) Langkah terpenting bagi memastikan bukti dapat diterima oleh mahkamah adalah pada rangkaian kawalan yang konsisten. Bincangkan akibatnya jika rangkaian kawalan terputus.
(8 markah)
 - (b) Apakah nilainya suatu bukti yang mempunyai ciri kumpulan?
(6 markah)
 - (c) Bincangkan mengenai kelebihan cap jari DNA dibandingkan dengan cap jari .
(6 markah)
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2. (a) Penunggang motosikal melanggar pejalan kaki di suatu persimpangan yang gelap. Polis telah mengumpulkan pecahan kaca dan pecahan lampu hadapan dari permukaan jalan dan diserahkan kepada anda untuk pemeriksaan. Bincangkan bagaimana anda dapat menyimpulkan bahawa penunggang motosikal tidak bersalah berdasarkan kepada bukti yang terkumpul.
(10 markah)
 - (b) Pemeriksaan mikroskop terhadap cebisan cat diperolehi daripada pakaian mangsa langgar lari menunjukkan kehadiran banyak sfera kaca halus di dalam cat. Cadangkan sumber sfera kaca ini untuk mengaitkan kenderaan orang yang disyaki.
(10 markah)

3. (a) Bincangkan bagaimana tanda-tanda goresan sepanjang lubang senapang dapat digunakan bagi memastikan suatu peluru yang telah ditembak daripada senapang tersebut.
(6 markah)
- (b) Seorang ahli kimia forensik telah ditugaskan untuk memeriksa angkatan pita diambil daripada tangan seorang penembak yang disyaki. Justifikasikan penyampelan dan kaedah analisis pilihan anda,
(6 markah)
- (c) Yakinkan mahkamah bahawa peluru yang dijumpai di tempat kejadian jenayah dan pemilik senapanglah yang membidik untuk membunuh mangsa.
(8 markah)
4. Di dalam sebuah bilik tidur, seorang lelaki terbaring mati diatas lantai berdekatan dengan botol kaca, titik-titik coklat kemerahan di dinding, titik-titik merah diatas permaidani dan tingkap bilik mandi yang pecah. Terangkan bagaimana anda sebagai ahli kimia forensik akan menjalankan siasatan pada tempat kejadian jenayah dan analisis kimia di dalam makmal bagi menyimpulkan sama ada kejadian adalah kemalangan atau melibatkan perlakuan jahat.
(20 markah)
5. Analisis surih sampel berkaitan jenayah bagi mengenalpasti bahan kimia yang berkaitan selalunya melibatkan teknik pemisahan terutamanya kromatografi. Huraikan sebarang kaedah kromatografi bagi analisis:
- i. dadah dan metabolitnya,
 - ii. dokumen bertulis bagi dikaitkan dengan dakwat,
 - iii. serat daripada permaidani diperolehi daripada seluar tertuduh, dan
 - iv. darah daripada pemandu yang terlibat dalam kemalangan.
- (20 markah)

6. Sewaktu menyiasat ditempat kejadian jenayah, beberapa sampel dikutip untuk analisis sebagai bakal petunjuk pada tempat kebakaran untuk memantapkan sebab dan punca kebakaran. Jelaskan bagaimana anda memilih lokasi untuk mengutip sampel daripada tempatnya dan jadikan kebentuk yang boleh dianalisis bagi mendapatkan hasil yang berfaedah. Jika kromatogram diperolehi daripada sampel yang dikutip adalah sama dengan petrol teruap seperti ditunjukkan dibawah, dengan merujuk kepada petrol baru, yakinkan mahkamah bahawa kebakaran telah disengajakan oleh pembakar.



(20 markah)

7. Seksyen 39 dalam Akta Dadah Merbahaya 1951 adalah amat penting bagi ahli kimia supaya jitu di dalam analisis dan betul di dalam persembahan keputusan di dalam mahkamah. Dengan merujuk kepada ceraiian berkaitan dengan heroin dibawah, huraikan kenyataan tersebut.

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(20 markah)