



# **Kursus Penulisan & Penerbitan Buku Penyelidikan**

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*Rosli Hussin*

**Pengerusi Panel Buku Penyelidikan & Book Chapters  
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Universiti Teknologi Malaysia, Johor**



# 4

## Monograph Examples & Analysis



# Outlines

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- Structure of Research Book
- Write and Structure Your Manuscript - Learn from Example
- Function/Need Editor?
- Produce Good Research Book?





# Contoh-1: Monograph

Laporan Penyelidikan

Bidang/  
Scope

Thermal Radiation Monograph

Title?

Penulis/  
Penyumbang?

Diterbitkan  
oleh...

The Institution of Chemical Engineers

- Snopsis/Perhal buku
  - Biodata

Pemilihan Tema Kulit  
Buku



Title

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PERP. SULTANAH ZAMARIAH UTM  
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# CALCULATION OF THE INTENSITY OF THERMAL RADIATION FROM LARGE FIRES

*First Report of the Major Hazards Assessment  
Panel — Thermal Radiation Working Group*

Penulis

THE INSTITUTION OF CHEMICAL ENGINEERS

Halaman Penerbit

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## PREFACE

The Major Hazards Assessment Panel was established in 1982 to provide a means for scientists and engineers, as professional people rather than as representatives of companies or other organisations, to comment on matters of current interest in the field of major chemical hazards. The full Panel, about sixty people, never meets. Instead a small Advisory Group selects subjects for study from among those suggested by members of the Panel, and Working Parties are set up to prepare reports on these subjects. The draft reports are sent to the full membership for comment.

The Institution of Chemical Engineers helped to set up the Panel and provides secretarial services but the Panel is not responsible to the Institution and it is not a committee of the Institution. The authority of the Panel's reports is due solely to the professional reputation of its members, particularly the members of the Working Parties.

This Working Group, on thermal radiation, was established by the Major Hazards Assessment Panel.

### Membership of the Working Group

Members served on the Working Group in a private, non-representational capacity. Their principal professional interests are:

- R. P. Pape (Risk assessment for regulation and control);
- N. F. Scilly (Assessment of flammable and explosive substances);
- F. K. Crawley (Risk assessment for the process industries);
- I. Hymes (Risk assessment for the process industries);
- J. Moorhouse (Combustion processes and behaviour of fires);
- J. A. Eyre (Combustion of large spillages of flammables);
- B. W. Platts (Medical aspects of accidents);
- E. S. Johnson (Planning control of land use).

Penulis/  
Penyumbang

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Symbol &  
unit

Indeks?



## SYMBOLS AND UNITS

$A$	Constant, relates fireball diameter to mass; (dimensionless)
$D$	Pool diameter, or Fireball diameter; (m)
$d$	Distance from point source to receiver; (m)
$e$	Emissivity; (dimensionless, fraction)
$E$	Surface emissive power of flame; ( $\text{kW/m}^2$ )
$f$	Fraction of total heat of combustion which is radiated; (dimensionless)
$F$	Geometrical configuration factor; (dimensionless)
$g$	Gravitational constant; ( $\text{m/s}^2$ )
$I$	Incident flux of a surface; ( $\text{kW/m}^2$ )
$I_0$	Flux at source; ( $\text{kW/m}^2$ )
$H_c$	Heat of combustion per unit time; (kW)
$K$	Spectral absorption coefficient; ( $\text{m}^{-1}$ )
$l$	Flame length; (m)
$L$	Atmospheric path length; (m)
$m$	Mass of fuel in fireball; (kg)
$\dot{m}$	Mass burning rate of fuel; (kg/s)
$P$	Pressure in liquefied gas container; (MPa)
$R$	Pool length; (m)
$T$	Flame temperature; ( $^{\circ}\text{K}$ )
$t$	Duration of fireball; (s)

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# Format Monograf

Fungsi Editor

Add Literature  
Review

Format

Improve style  
of Writing

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Bahagian Awalan?

INTRODUCTION

Methodology

Results &  
Discussion

Conclusion

Bahagian Akhiran



# 1. INTRODUCTION

## Prakata

This is the first report of the Working Group on Thermal Radiation of the Major Hazards Assessment Panel. .

The terms of reference are:

“to consider what levels of thermal radiation (from continuous fires, flash-fires and BLEVE’s) would be significant in an emergency at places to which the public have access, taking the probability of the emergency into account, and how the radiation levels should be calculated.”

The Working Group will report in three stages as follows:

- i. A description of various types of fire and methods for the calculation of the intensity and duration of thermal radiation in relation to the distance from the fire.
- ii. The relationship between the amounts of thermal radiation received by people and the consequent injury levels including the risk of death.
- iii. Factors influencing the choice of thermal radiation dose thresholds for the purposes of: emergency planning, control of public access and siting of installations.

intro

objective

## 2. TYPES OF FIRE

### scope

#### 2.1 SCOPE

This paper is mainly a study of fires which have the capacity to cause injury by the radiation of intense heat beyond the immediate flame boundary. Methods are described which may be used to calculate the intensity of thermal radiation at a given position in relation to a particular type and size of fire. For the purpose of this paper, no judgement is made about the probability of any particular fire situation. The paper begins with general comments on calculation methods, then it describes their application to different types of fire.

Fires may involve solids (eg wood piles, buildings etc); liquids (eg oil, petrol, alcohol etc) or gases (eg natural gas, process gases etc). In general the volatility of the fuel is one of the key parameters which determine the severity and speed of development of the fire (see Section 2.3).

Fires involving solids can, under some circumstances, present a significant hazard from thermal radiation outside the confines of the fires. However, such fires are usually relatively slow to build up, thus giving warning time; and the output of radiant heat is moderate, so that the range of the thermal radiation hazard is limited. Consequently, solid fires are not considered to constitute "Major Hazards" in the present context and are not included in this report. (Note: certain solids which are used as propellants for military applications are exceptionally fast-burning and these constitute special cases which are not covered here. Also, events such as the Bradford City Football Club fire show that warning-times may be short if a solids fire can spread over a wide area.)

The most severe types of fires are those involving highly flammable and highly volatile substances such as LNG, LPG or gases under pressure. Other flammable liquids may, however, give similar hazards if their volatility is increased by them being at elevated temperatures.

Any explosion effects associated with fires are not dealt with in this report. A companion paper on such effects has recently been published<sup>1</sup>.

#### 2.2 CLASSIFICATION OF FIRES

Release of liquids or gases from containment can give rise to a number of types of fires. These may be classified as pool fires, jet fires, flash fires, fireballs and firestorms.

##### i. POOL FIRE

A pool fire occurs when an accumulation of liquid in a pool on the ground or on water is ignited. A steadily burning fire is rapidly achieved since the fuel vapour required to sustain the flames is provided by evaporation of the liquid by the heat from the flames. For liquefied gases significant heat transfer from the surface on which the pool is

formed also contributes to the vaporisation of the fuel. The rate of consumption of fuel is dependent upon properties of fuel such as latent heat, and is equivalent to a pool depth regression in the range 6 to 13 mm/minute. The flames from pool fires behave entirely under the influence of their own buoyancy and are easily displaced by the wind.

##### ii. JET FIRE

A jet fire occurs when a flammable liquid or gas is released from a puncture or pipe into free air. The pressure of the release serves to generate a long flame which is stable under most conditions. Jet flames are largely unaffected by the wind. The duration of the fire is independent of the fire characteristics but is dependent on the release-rate and volume of the source. For a liquid or a two-phase jet a part of the liquid may "rain-out" of the jet giving rise to a pool fire.

##### iii. FLASH FIRE

A flash fire occurs when a cloud of flammable gas in a mixture with air is ignited. The shape of the fire is dependent upon the shape of the flammable cloud and the position of the ignition source. The fire is usually of short duration as the flame travels rapidly through the cloud. The velocity of the flame, which is usually a few metres per second, is dependent upon the gas concentration in the cloud and on the wind speed. Flash fires often serve as a way by which a remote source of ignition can lead to a jet or pool fire at the point of release. In certain circumstances it is possible for a flame to accelerate to a very high velocity, thus producing explosion effects<sup>1</sup>. This aspect is outside the scope of this document.

##### iv. FIREBALL

A fireball occurs when a quantity of flammable liquid or gas is suddenly released and is immediately ignited. The fuel is rapidly burnt as a spherical fireball which rises due to the initial momentum of the release and the high buoyancy of the hot flames. The initial fuel mass determines the fireball size and duration, and large fireballs are little affected by the wind.

Fireballs are known to arise following a BLEVE (boiling liquid expanding vapour explosion) in which fire induces heating and the subsequent failure of a pressurised storage vessel.

##### v. FIRESTORMS

In certain conditions, fire covering a very large area can produce a firestorm effect by inducing convection-driven winds which brighten the fire and propagate it by carrying sparks. There may also be significant damage and propagation by thermal radiation in such conditions. The scale of the phenomenon seems to exceed that of most installations, so it is not discussed further here.

#### 2.3 THE SIGNIFICANCE OF VOLATILITY

The magnitude of the thermal radiation arising from a fire depends on the rate and mass of gas or vapour released or produced by vaporisation of a liquid spill. For a liquid, volatility is a key factor in determining the type of fire, its

### significance

## Chap 2



### 3. ~~METHODS FOR THE~~ CALCULATION OF THERMAL RADIATION

Three different types of method are available for calculating the thermal radiation levels at selected positions outside the flame envelope. Each method is a different level of complexity and each is suited to different types of applications. The major differences in method are reflected in the description of the source of radiation.

#### 3.1 Point Source Method

The simplest way of estimating the thermal radiation levels from a fire is termed the point source model. In this technique a selected fraction  $f$  of the total heat of combustion is assumed to radiate in all directions from a single point. Incident flux  $I$ , at any distance  $d$ , is therefore given by

$$I = \frac{fH_c}{4\pi d^2}$$

where  $H_c$  is the heat of combustion per unit time. Values of  $f$  can be selected for different types of fires (see below).

The simplicity of the point source method is such that specific allowance is not normally made for the effects of atmospheric attenuation of thermal radiation by the atmosphere between the flame and receiver (see below). This is because it is normally inherently allowed for in the values selected for  $f$ . The advantages of this technique are its ease of use and its wide range of applicability.

A disadvantage is that for positions close to a flame (eg within 2 pool diameters in the case of pool fires) the incident radiation levels are underestimated. This may be particularly important for designing protective systems, planning fire-fighting response etc. Also precise values of  $f$  are not known for all types of fire, fuel types and size of fire and hence the accuracy is not high unless carefully tuned using experimental data. This has been done for some specific cases.

More refined point source methods have been developed for some special situations. See, for example, API 521<sup>2</sup>.

#### 3.2 SOLID FLAME MODEL

Some of the shortcomings of the point source model can be overcome using a solid flame model which assumes that the flame can be represented by simple solid geometrical shapes such as a cylinder, sphere or cone etc and that the radiation is emitted from its surface. Consequently, it allows a better assessment of the thermal

### 4. ~~APPLICATION OF METHODS~~ TO DIFFERENT TYPES OF FIRES

#### Analysis Types of Fire

#### 4.1 POOL FIRES

A pool fire results when a pool of liquid fuel is ignited. The pool may be contained, for example, in a tank or bund, or spreading, as for example from a spill on to a flat surface such as concrete or water. In the latter case, the fire will be short-lived unless it is continuously fed with fuel, since the 'pool' will be very shallow. Another possibility is a spill of liquid into a trench or channel which may limit the spread.

Application of the solid flame model to calculate thermal radiation from a pool fire requires that the flame shape be approximated to a simple geometry to facilitate the calculation of a view factor. In the discussion below it is assumed that the pool position is known; it is beyond the scope of this report to discuss methods of calculating the spread of unconstrained pools.

The methods described in this section can be used for pools of liquefied gases such as LNG or LPG, as well as higher-boiling flammable liquids. With spills of liquefied gases the formation of a large quantity of vapour may occur before ignition, giving the possibility of a flash fire or even a vapour-cloud explosion. This section deals only with the combustion of the residual pool of liquid.

#### i. FLAME SHAPE CORRELATION

The shape most commonly chosen to represent a fire on a circular or low aspect ratio rectangular pool is a tilted cylinder. However, there are several possible variations on the cylindrical theme including an oblique cylinder of circular cross-section, a tilted cylinder of circular cross-section and an oblique cylinder of elliptical cross-section.

#### Perlu Transformasi → Monograf Peranan Penulis & Editor

To calculate the length of the flame  $l$  above the pool surface, correlations have been developed based on the size of the pool  $D$  (the pool diameter in the case of a circular pool or an equivalent diameter for noncircular pool) and the physical properties of the fuel. One of the most widely used correlations is that developed by Thomas<sup>3</sup>:

$$\frac{l}{D} = 42 \left( \frac{\dot{m}}{\rho_a \sqrt{g D}} \right)^{0.6}$$

where  $\dot{m}$  is the mass burning rate of the fuel  
 $\rho_a$  is the ambient air density  
 $g$  is the gravitational constant

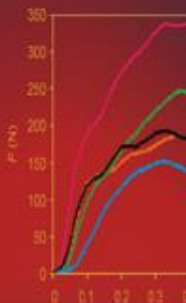


# Contoh-2

UTM Monographs in Science and Technology

## PEMBANGUNAN ROKET MOTOR BERSAIZ KECIL

Mohammad Nazri Mohd. Jaafar  
Wan Khairuddin Wan Ali  
Rizalman Mamat



**Pembangunan Raket Motor**  
Pengarang: Mohammad Nazri  
Khairuddin Wan Ali, Rizalman

- 2009
- ISBN 978-983-52-0496-8
- 80 muka surat
- RM 30.00
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## PEMBANGUNAN ROKET MOTOR BERSAIZ KECIL

Penyelidikan ke atas motor roket berbahan dorong pepejal meliputi kerja-kerja reka bentuk, fabrikasi, dan pengujian motor roket. Motor roket berskala kecil ini direka bentuk beresuaian dengan jenis propelan yang dibangunkan, iaitu propelan roket pepejal berasaskan kalium nitrat. Antara sistem sokongan yang digunakan untuk membantu proses menganalisis prestasi motor roket termasuklah sistem pemasa automatik, pencucuh elektrik kawalan jauh, rig ujian daya tujuh, dan sistem perolehan data (DAS). Motor roket direka bentuk daripada keluli lembut sepenuhnya untuk pengujian daya tujuh statik. Hasil ujian tersebut, beberapa parameter penting yang mencirikan prestasi propelan diperolehi. Daya tujuh yang dihasilkan oleh motor roket diperolehi secara langsung daripada ujian ini. Hasil ujian daya tujuh statik menunjukkan bahawa daya tujuh maksimum didapati sangat bergantung pada nisbah kandungan bahan pengoksida-bahan api bagi propelan. Propelan yang dihasilkan dengan nisbah campuran bahan pengoksida-bahan api (65/35) didapati menghasilkan daya tujuh maksimum melebihi 300 N dengan catatan jumlah denyut 150.04 Ns dan denyut tentu 154.8 s. Data prestasi yang diperolehi daripada ujian juga mendapati bahawa motor roket ini mempunyai ciri-ciri prestasi yang baik dan berpotensi untuk dibangunkan sebagai motor roket bagi sebuah kenderaan pelancar.



**Mohammad Nazri Mohd. Jaafar** ialah Profesor dan Ketua Jabatan di Jabatan Kejuruteraan Aeronautik, Fakulti Kejuruteraan Mekanikal, Universiti Teknologi Malaysia. Beliau memperoleh B.Sc (*cum laude*) in Aeronautical Engineering (1986) dan M.Sc in Aerospace Engineering (1989) dari Wichita State University, Wichita, Amerika Syarikat, diikuti Ph.D (1997) dalam bidang pembakaran dari University of Leeds, United Kingdom. Aktif dalam kerja-kerja penyelidikan dan perundingan, khususnya dalam bidang *Teknologi Pembakaran dan Kawalan Pencemaran Udara* serta *Pendorongan Roket*, selain kerja-kerja penterjemahan dan penulisan karya Asli. Beliau telah menghasilkan enam judul buku karya Asli dan sembilan judul karya Terjemahan yang kesemuanya adalah terbitan Penerbit UTM Press, serta lebih 100 kertas kerja teknikal yang diterbitkan dalam jurnal-jurnal dan prosiding kebangsaan dan antarabangsa.

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# KANDUNGAN

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Acknowledgment

Monograph of Thesis



# Contoh-3

Ringkaskan Tajuk

## NOVEL SOLID-PHASE MICROEXTRACTION FIBER Coating for the Forensic Detection of Accelerants in Arson Samples

Umi Kalthom Ahmad

### Novel Solid-phase Microextraction Fiber Coating for the Forensic Detection of Accelerants in Arson Samples

Authors: Umi Kalthom Ahmad

- 2008
- ISBN 978-983-52-0486-9
- 99 pages
- RM 30.00
- Subject [Science](#)

Pemilihan Tema Kulit  
Buku ?

### NOVEL SOLID-PHASE MICROEXTRACTION FIBER Coating for the Forensic Detection of Accelerants in Arson Samples

A crucial challenge in the scientific investigation of arson is the ability to uniquely detect accelerants. An improvement in accelerant extraction came with the development of headspace solid-phase microextraction (H-SPME) technique. The extraction is based on the enrichment of components on an adsorbent coated fused silica fiber. A number of adsorbents are commercially available, however some analytical methodologies might demand special coatings that have a particular selectivity towards specific analytes. Generally accepted drawbacks of conventional adsorbents are a relatively low thermal stability (200-270 °C) which leads to incomplete sample desorption and sample carry-over problem, short lifetime (40-100 times), poor solvent stability and expensive. As a preliminary study, a lab-made SPME adsorbent prepared by sol-gel method, containing [*n*-octyltriethoxysilane C<sub>8</sub>-TEOS): methyltrimethoxysilane (MTMOS), (1:1)], was evaluated against commercially available fiber for the determination of accelerants in arson samples, with the aim of improving the quality of ignitable liquid residue analysis. The lab-made fiber exhibited good thermal stability (up to 300 °C), good selectivity for hydrocarbon compounds, cost effective, and easily prepared. Compared with commercial polydimethylsiloxane/divinylbenzene (PDMS/DVB) fiber, the lab-made C<sub>8</sub>-coated fiber yielded shorter equilibration time, higher extraction capability and longer lifetime (over 200 times) hence, it can be a good alternative SPME fiber for arson accelerant detection analysis.



Umi Kalthom Ahmad received her B.Sc (Hons) in Chemistry with Environmental Chemistry from University College Swansea, United Kingdom in 1982; M.Sc Forensic Science from Strathclyde University, Scotland in 1986; and Ph.D. in Chemistry from UTM in 1994. She first started working as a Chemist in Jabatan Kimia Malaysia, Petaling Jaya before joining UTM in 1983. Her area of specialization includes Forensic Science, Chromatography, and Environmental Chemistry. She has written several chemistry text books and was a member of the Editorial Board of Jurnal Teknologi C. She is an author of the book entitled *Pengenalan Sains Forensik* published by Penerbit UTM Press. She is a member of Institut Kimia Malaysia (IKM) and International Water Association (IWA). She is currently the program coordinator for the M.Sc Forensic Science course in UTM which started in July 2008, the first of its kind to be offered in Malaysia as well as in the Asian region.

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