

# Vapor-Liquid Critical Properties of Elements and Compounds

Poster presented at the  
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# Introduction

The aim is to produce compilations of critically evaluated vapour-liquid values for critical temperature,  $T_c$ , critical pressure,  $p_c$  and critical volume  $V_c$  for elements and compounds.

- these are important parameters for reduction of data in universal corresponding-states descriptions of thermodynamic and transport properties of fluids
- they are used in the estimation of properties of fluids in chemical engineering industry

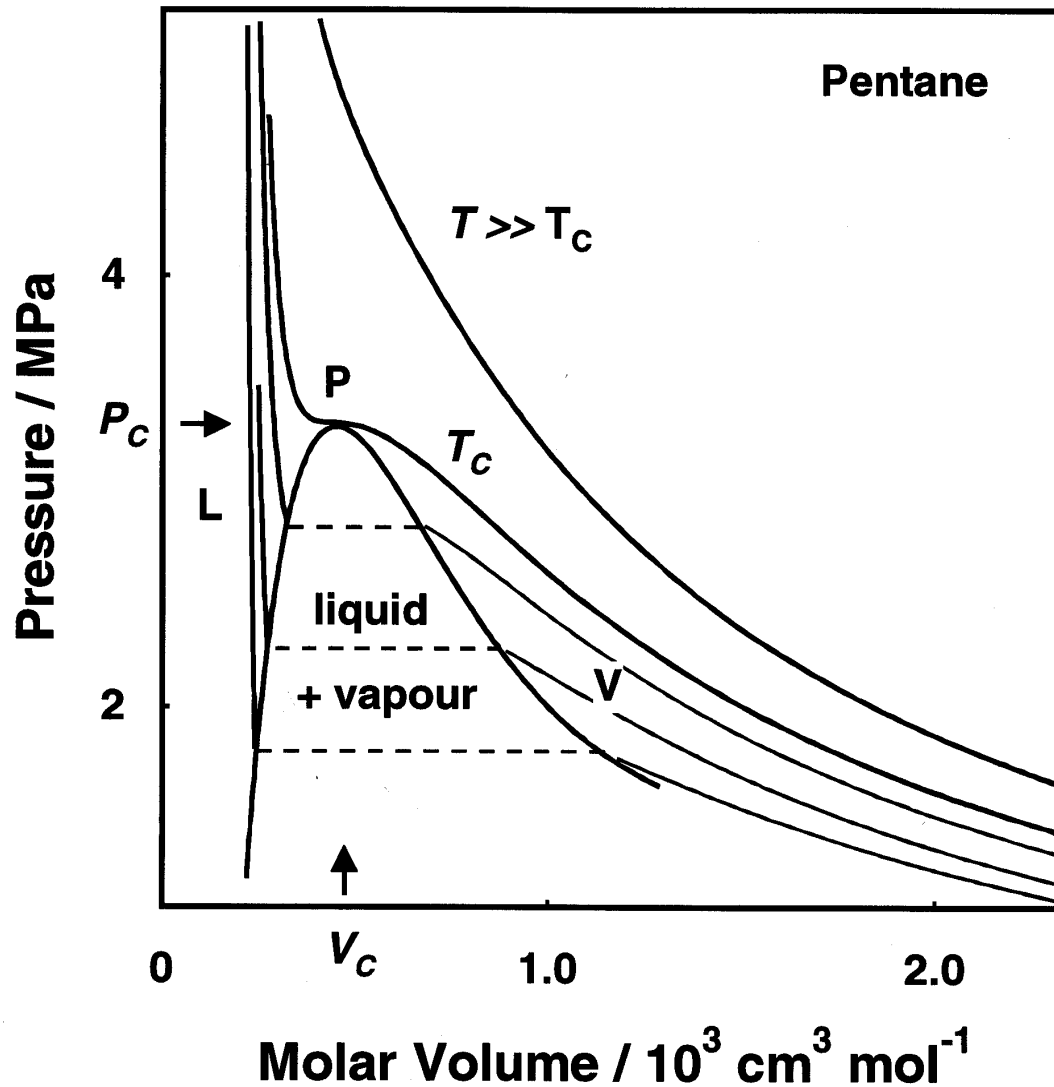
# Why IUPAC ?

- internationally-agreed values are needed, with an assessment of uncertainties
- an international team of experts in this area is necessary to critically evaluate all experimental values
- the IUPAC stamp of approval aids global acceptance of the recommendations

# Methods of Critical Point Determination

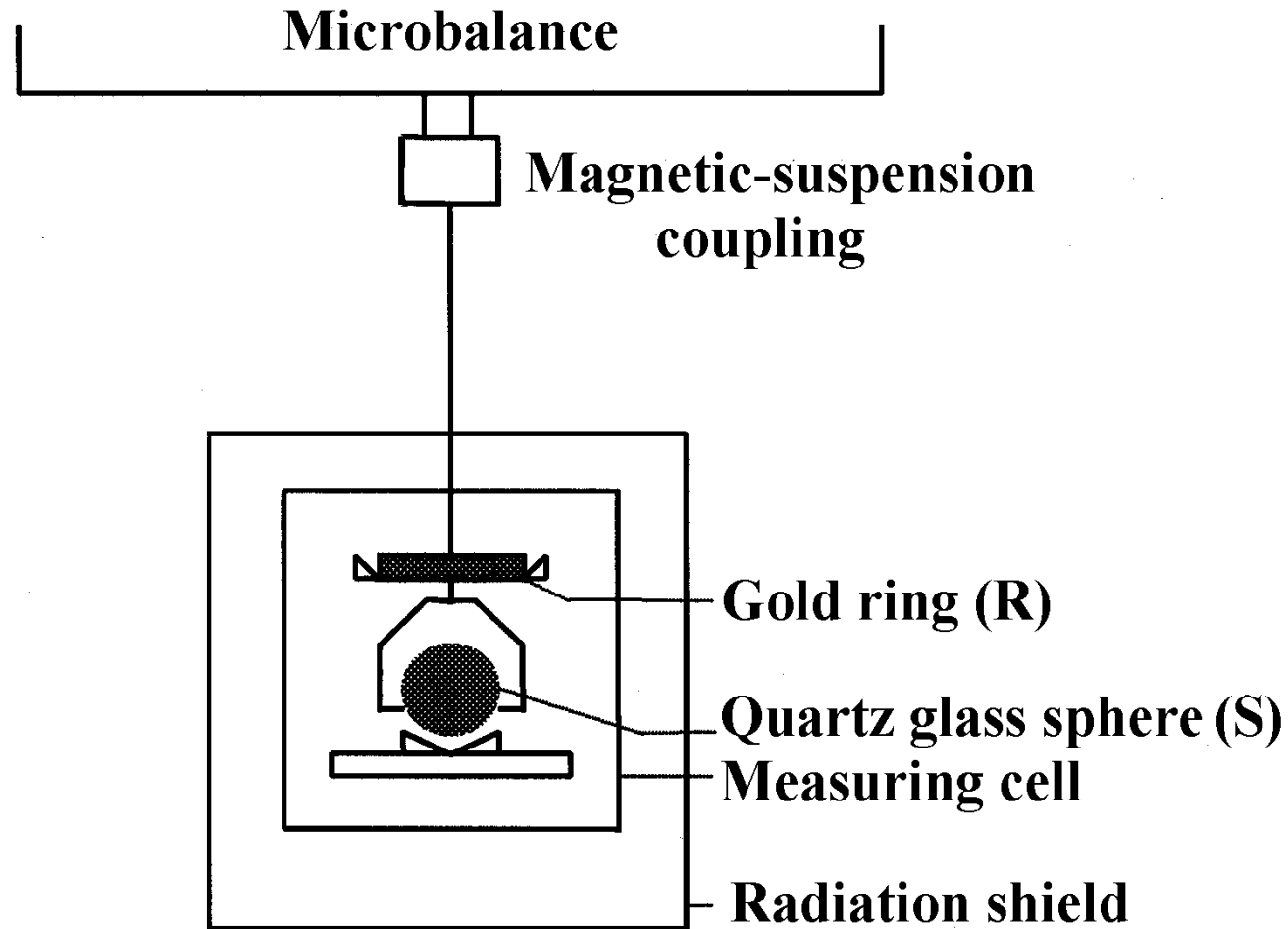
- visual - in glass tube
- visual - in cell with windows
- non-visual -  $pVT$  measurements
- $p_c$  from vapour pressure measurements
- orthobaric density measurements
- from other physical properties

# Visual observation of disappearing meniscus at P



# Modern $pVT$ apparatus

Density balance: R. Kleinrahm & W. Wagner



$$\text{Density } \rho = (\Delta F / g) / (V_S - V_R)$$

# Sample recommendations

	<b>Hexane</b>	<b>Methanol</b>
$T_c / \text{K}$	$507.6 \pm 0.2$	$512.5 \pm 0.2$
$p_c / \text{MPa}$	$3.025 \pm 0.02$	$8.084 \pm 0.02$
$V_c / \text{cm}^3 \text{ mol}^{-1}$	$368 \pm 5$	$117 \pm 1$

# Publications - *J. Chem. Eng. Data*

- 1 An introductory survey
- 2 Normal alkanes
- 3 Aromatic hydrocarbons
- 4 Aliphatic alkanols
- 5 Branched alkanes and cycloalkanes
- 6 Unsaturated aliphatic hydrocarbons
- 7 Oxygen compounds other than alkanols and cycloalkanols

[for details : see the IUPAC website]



# *In press and in course of preparation*

- Organic sulfur, silicon and tin compounds
- Nitrogen-containing compounds
- Halogen-containing compounds
- Miscellaneous compounds

Elements and inorganic compounds have been covered by

J.F. Mathews, *Chem. Rev.* 1972 **72** 71-100.

# Acknowledgement

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