

Multiflash™

Thermophysical Properties for MATLAB®



Adding Infochem's powerful industry standard Multiflash properties package to the general-purpose calculation, graphics and simulation environment that is MATLAB and Simulink, provides all that is needed for a wide range of calculations and dynamic simulation for Chemical, Process and Mechanical Engineering design. Now rigorous models can be implemented directly in Simulink—without the need for complex linking and embedding of specialist chemical engineering simulation packages.

Multiflash for MATLAB combines the standard version of Infochem's renowned *Multiflash for Windows* product and the *Multiflash Interface for MATLAB*, developed and marketed in conjunction with Infochem. Existing Multiflash users can upgrade with a simple license extension.

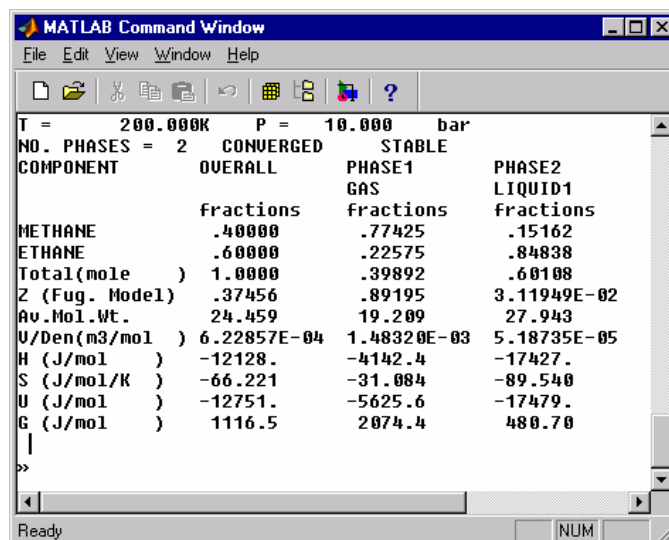
Multiflash for MATLAB will be invaluable to Process Control Engineers, Chemical Engineers, Mechanical Engineers and all MATLAB and Simulink users requiring rigorous models for design calculations and static or dynamic simulations for a wide range of chemical and mechanical processes and equipment.

OVERVIEW

The heart of any software for chemical engineering modelling and simulation is a comprehensive, flexible and proven thermodynamics and physical properties package. Multiflash is an established package that enjoys wide general use in the oil, gas, and petrochemical industries, as well as in more specialist applications, such as fuel-cell development. Multiflash is already the properties package of choice for a number of commercially available dynamic simulation packages aimed especially at the Chemical Engineer.

Multiflash is founded on two databases: an extensible database of physical and thermodynamic properties for inorganic and organic chemical components including petroleum products, and a database with a range of thermodynamic, physical and transport models for both pure components and mixtures.

The Multiflash user selects components from the property database. Phases may be selected from: gas, vapour, liquid, solid, hydrate wax and



```
MATLAB Command Window
File Edit View Window Help
Ready NUM

T = 200.000K P = 10.000 bar
NO. PHASES = 2 CONVERGED STABLE
COMPONENT OVERALL PHASE1 PHASE2
              fractions GAS LIQUID1
              fractions fractions
METHANE      .40000 .77425 .15162
ETHANE       .60000 .22575 .84838
Total(mole)  ) 1.0000 .39892 .60108
Z (Fug. Model) .37456 .89195 3.11949E-02
Av.Mol.Wt.   24.459 19.209 27.943
V/Den(m3/mol) 6.22857E-04 1.48320E-03 5.18735E-05
H (J/mol)    -12128. -4142.4 -17427.
S (J/mol/K)  -66.221 -31.084 -89.540
U (J/mol)    -12751. -5625.6 -17479.
G (J/mol)    1116.5 2074.4 480.70
|
>>
```

asphaltene¹. Mixing rules and thermodynamic and transport property models may be specified differently for each phase.

In addition to the return of single-phase properties for components and mixtures, Multiflash is also able to carry out flash (phase-equilibrium) calculations, to determine which phases are present and their properties under specified conditions. The solution may include the presence of vapour, multiple immiscible liquid phases (such as oil and water) and solid phases (such as a ice and hydrates).

Of particular interest to the modeller and simulation engineer is Multiflash's ability to carry out flash calculations for specified overall conditions of specific volume and specific internal energy – such as arise in differential equation modelling of accumulations of material and energy.

KEY FEATURES

Key features of *Multiflash for Windows*, the basis of the *Multiflash for MATLAB* product, are obtainable direct from Infochem (details below).

The Multiflash Interface for MATLAB provides the MATLAB user and programmer with the functional equivalent of the standard Multiflash Interface for Microsoft Visual Basic; but with the power and convenience of MATLAB syntax and vector and matrix extensions.

¹ Hydrate, wax and asphaltene models are an optional extra.

The Simulink user is supported with 'streams' and purpose-designed Simulink blocks that allow the return into the Simulink simulation of all the thermodynamic and transport properties that are typically required in dynamic simulation.

Streams in Multiflash allow for the individual labelling and specification of local subsets of the specified components, phase and model specifications.

For example: an LNG process plant simulation might require the simulation in different parts of the plant of pure propane, a mixed refrigerant (MR) and water/steam. This objective could be achieved with the specification in Multiflash of an overall component list that includes propane, water and the constituents of the MR. Three individual streams could then be defined, comprising pure propane, pure water and the MR; with appropriate choices of modelling.

The standard version of Multiflash includes:

Databanks:

- Infochem: INFODATA
- Petroleum fractions correlations.
- Binary interaction parameters.

Thermodynamic models:

- Equations of state (EOS):
 - Ideal gas, RK, RKS, RKS (API), PR
 - Advanced RKS and PR EOS (which include options for fitting to the known vapour pressure, the Peneloux density correction and specialised mixing rules)
 - PSRK, LKP and BWRS

Activity models:

- Ideal liquid, WilsonE, WilsonA, UNIQUAC, NRTL.

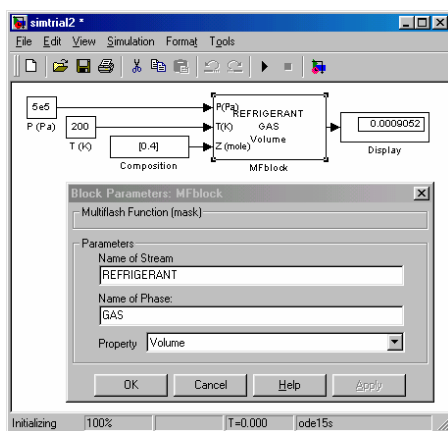
UNIFAC

- Pure solid freeze-out model.
- COSTALD liquid density model.
- Hayden O'Connell model.

Transport property models:

- LBC, Pedersen and Twu viscosity models.
- CLS thermal conductivity model.
- Macleod-Sugden surface tension model.

The standard capabilities of Multiflash may be extended by optional additional licenses, such as for the DIPPR database and Infochem's Chemreact (chemical-equilibrium) and models for hydrates, waxes and asphaltenes.



DOCUMENTATION

Multiflash for MATLAB is supplied with a full set of Infochem documentation for Multiflash for Windows. The separate Multiflash Interface for MATLAB User's Guide includes a complete reference for all the functions available for interfacing between Multiflash and MATLAB.

SYSTEM REQUIREMENTS

Multiflash for MATLAB is available as standard for supported versions of Windows including Windows Windows-2000/XP. MATLAB for Windows is required. Single user or network licenses are available.

Please enquire for availability on other platforms.

APPLICATION SUPPORT

It is possible for the functionality of Multiflash and the Multiflash Interface for MATLAB to be modified to suit specific customer requirements. Both Infochem and KHACE offer a professional consulting and application development service.

FURTHER INFORMATION

Additional information, including a complete copy of the Multiflash Interface for MATLAB User's Guide and software, with a full list of functions, and links to details of application support services, is available on-line at:

<http://www.khace.com/products/multiflash>

Further information about Multiflash itself, including a list of standard components optional additional databases and functions, is available on-line at:

<http://www.infochemuk.com>

For other information, including pricing for commercial and educational users, please contact us directly at the address below, or contact Infochem Computer Services Ltd.:

Phone: +44 (0)20 7357 0800
 Fax: +44 (0)20 7407 3927
 E-mail: all@infochemuk.com

	Kelvin Hales Associates Ltd.
	16 Rusham Park Avenue,
	Egham, Surrey, TW20 9NB
	England
	Phone: +44 (0)1784 473153
	Fax: +44 (0)7050 699984
E-mail: multiflash@khace.com	
Web: http://www.khace.com	