



# HydraFLASH

Hydrate and PVT Prediction Software

## Challenge

- Gas hydrates are a major challenge in oil and gas production systems
- Dehydration and/or injection of thermodynamic inhibitors are widely used to reduce the risk of hydrate formation
- Accurate knowledge of hydrate phase equilibria is crucial to avoid formation and to design/optimize production, transportation and processing facilities
- Reliable prediction of phase behaviour, in particular in the presence of an aqueous phase, is crucial in the design and operation of production facilities
- Predictive models should cover a wide range of temperature and pressure conditions

## History of HydraFLASH

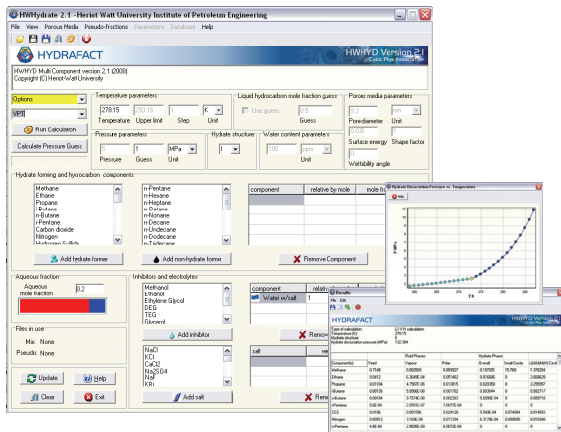
- The development of HydraFLASH (formerly HWHYD) began in 1986
- HydraFLASH is a comprehensive tool capable of modelling a wide range of scenarios in reservoir fluid systems
- HydraFLASH is continuously evaluated and improved using experimental data (mainly unpublished) generated at Heriot-Watt University and Hydrafact
- HydraFLASH is currently used by a large number of major oil, gas and service companies



Gas hydrate and PVT research at Heriot-Watt University

## Benefits of HydraFLASH

- Capable of modelling various systems including: oil, gas, water, salt, alcohols, glycols, hydrates and ice
- Reliable, robust and rapid
- User friendly – easy to operate
- Comprehensive manual for installation, use and trouble-shooting
- Training courses available on how to tailor the software for specific systems
- Premier customer care providing technical support, training, software patches and upgrades
- Compatible with various PC operating systems and devices
- Input/output data compatible with other thermodynamic packages (ECLIPSE, PVTP, ..).



HydraFLASH main Windows interface

*“Comparative assessment of the model predictions with those of other commercial hydrate programs by industrial clients have repeatedly demonstrated the superior versatility and reliability of the HydraFLASH model for simulating challenging production scenarios.”*

# HydraFLASH - add control to your PVT and flow assurance toolbox



## HydraFLASH – Main Features

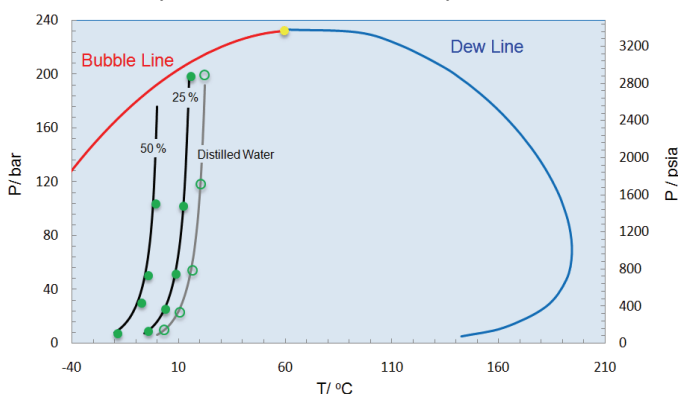
HydraFLASH can be used by chemical, process, reservoir, and production engineers for a variety of phase equilibria calculations, covering systems with and without gas hydrates. Recent advances include modelling CO<sub>2</sub>-rich system for CO<sub>2</sub> transport and storage schemes. More than 170 components, various alcohols/glycols and 19 electrolytes are included in the database and can be used for modelling purposes.

Available Salts		Available Alcohols/Inhibitors
NaCl	HCOONa	Methanol
KCl	HCOOK	Ethanol
CaCl <sub>2</sub>	K <sub>2</sub> CO <sub>3</sub>	Ethylene Glycol
Na <sub>2</sub> SO <sub>4</sub>	CaBr <sub>2</sub>	DEG
NaF	HCOOCs	TEG
KBr	KOH	Glycerol
MgCl <sub>2</sub>	ZnCl <sub>2</sub>	i-Propanol
SrCl <sub>2</sub>	ZnBr <sub>2</sub>	n-Propano
BaCl <sub>2</sub>	C <sub>2</sub> H <sub>3</sub> NaO <sub>2</sub>	Propylene Glycol
NaBr		

Available EoS
• SRK (With and without Volume Shift)
• PR (With and without Volume Shift)
• VPT (Valderrama modification of the Patel-Teja EoS)
• CPA (the Cubic-Plus-Association EoS)
• PC-SAFT

### Hydrate point / line:

This option calculates, at specified temperatures, the hydrate dissociation pressure in systems with water and/or oil and/or vapour present and possible presence of salts and chemical inhibitors. This option automatically distinguishes the actual number of phases present in the equilibrium condition and also the stable hydrate structure in the system.



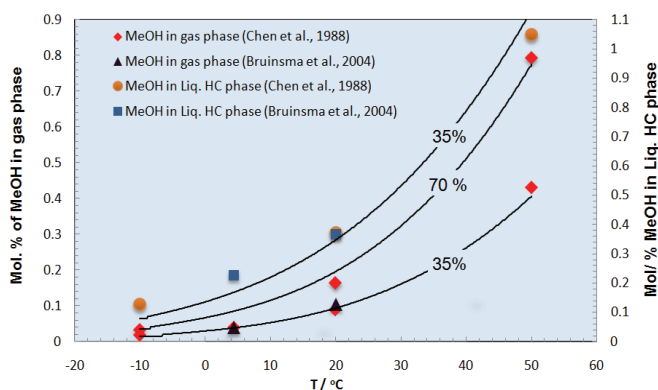
Experimental and predicted hydrate dissociation conditions and predicted phase envelope for a gas condensate in the presence of MEG aqueous solutions (Experimental data from Ng et al., 1985).

### Low water content point / line:

This option calculates the hydrate dissociation pressure at specified temperatures in systems containing a vapour phase at a specific water content. This calculation is essential for determining dehydration requirements for a gas system in order to prevent hydrate formation.

### Salting-out:

This option calculates the maximum salt solubility in aqueous solution. Salt precipitation can result in serious flow assurance issues due to potential plugging in the well-bore, tubing and pipelines. Furthermore, the loss of salt from the aqueous phase may also reduce the hydrate preventative characteristics of the system.



Predicted methanol content in the gas and liquid hydrocarbon phases of a synthetic gas-condensate at 69 bar / 1000 psia in the presence of 35 and 70 wt% methanol aqueous solutions.