Technical Data Sheet

UCARSOL™ NH Series Solvents

For Ammonia Synthesis Gas Treating

Introduction

UCARSOL™ NH 605, NH 607, and NH 608 Solvents are three products in a series of advanced performance gas treating solvents offered by The Dow Chemical Company. They are specifically designed for carbon dioxide (CO2) removal in ammonia synthesis facilities. A low heat of reaction, combined with a reduced solvent sensible heat requirement, allows the processor to reduce energy consumption at comparable gas flow rates, while maintaining the treated gas specification to less than 100 ppm CO2 in the product stream. UCARSOL™ NH Series Solvents provide significant operating cost benefits compared with other solvents used in ammonia processing facilities.

Special Features and Benefits

UCARSOL™ Solvents offer these important advantages versus generic gas treating solvents:

- Significant energy savings through reduced reboiler duty, decreased pumping requirements because of lower solvent circulation, and elimination of the need for solvent reclaiming
- Reduced solvent losses because of low foaming tendency and lower solvent vapor pressure
- Increased acid gas processing ability with existing facilities
- Local technical support assures ongoing trouble-free operation
- Elimination of the need for corrosion inhibitor addition
- Supported by Dow Oil & Gas, the global leader in providing gas treating processors with specialized technologies and services

Physical Properties

UCARSOL™ NH 605, NH 607 and NH 608 Solvents can be used as aqueous solutions in various concentrations; however, a 40 wt%-50 wt% aqueous solution has been found to offer optimal performance. Physical property data for pure and 50 wt% aqueous solutions of UCARSOL™ NH 605, NH 607 and NH 608 Solvents have been developed and are presented below.

Table 1: Physical Properties of UCARSOL™ NH 605 and NH608 Solvents

Test[1]	Property	Unit	NH 605		NH 608	
			Pure	50 wt% Aq	Pure	50 wt% Aq
	Average Weight per Gallon at 20°C	lb	8.71		8.73	
	Average Weight per Liter at 20°C	Kg	1.04		1.049	
	Δ Density/Δ T at 20°C	lb/gal/°C	0.0064		0.00644	
	Δ Density/Δ T at 20°C	kg/L/°C	0.00077		0.00077	
	Volumetric Thermal Expansion Coefficient					
	At 20°C	1/°C	0.00072		0.00073	
	At 55°C	1/°C	0.00078		0.00078	
	Boiling Point					
	at 760 mm Hg	°C (°F)	149.0 (300.2)	103.4 (218.1)	138.60 (281.48)	104.1 (219.4)
	at 50 mm Hg	°C (°F)	74.9 (166.3)	41.3 (106.3)	68.63 (155.53)	41.8 (107.2)
	at 10 mm Hg	°C (°F)	44.8 (112.6)	15.2 (59.4)	38.60 (101.48)	14.9 (58.8)
	Pour Point	°C (°F)	-51.1 (-60)		-46 (-50.8)	
	Cloud Point	°C (°F)		-14.0 (6.8)		5.5 (41.9)
	pH		10.8	11.4	11.2	11.2
	Specific Gravity, T at 20°C		1.0483	1.0467	1.0445	1.0433
	Solubility					
	in Water at 20°C	wt %	100	Complete	100	100
	of water at 20°C	wt%	100	Complete	100	100
	Flash Point					
ASTM D93	Pensky-Martens Closed Cup	°C (°F)	None		102 (216)	
ASTM D92	Cleveland Open Cup	°C (°F)	132 (270)		132 (270)	

1. ASTM: American Society for Testing and Materials

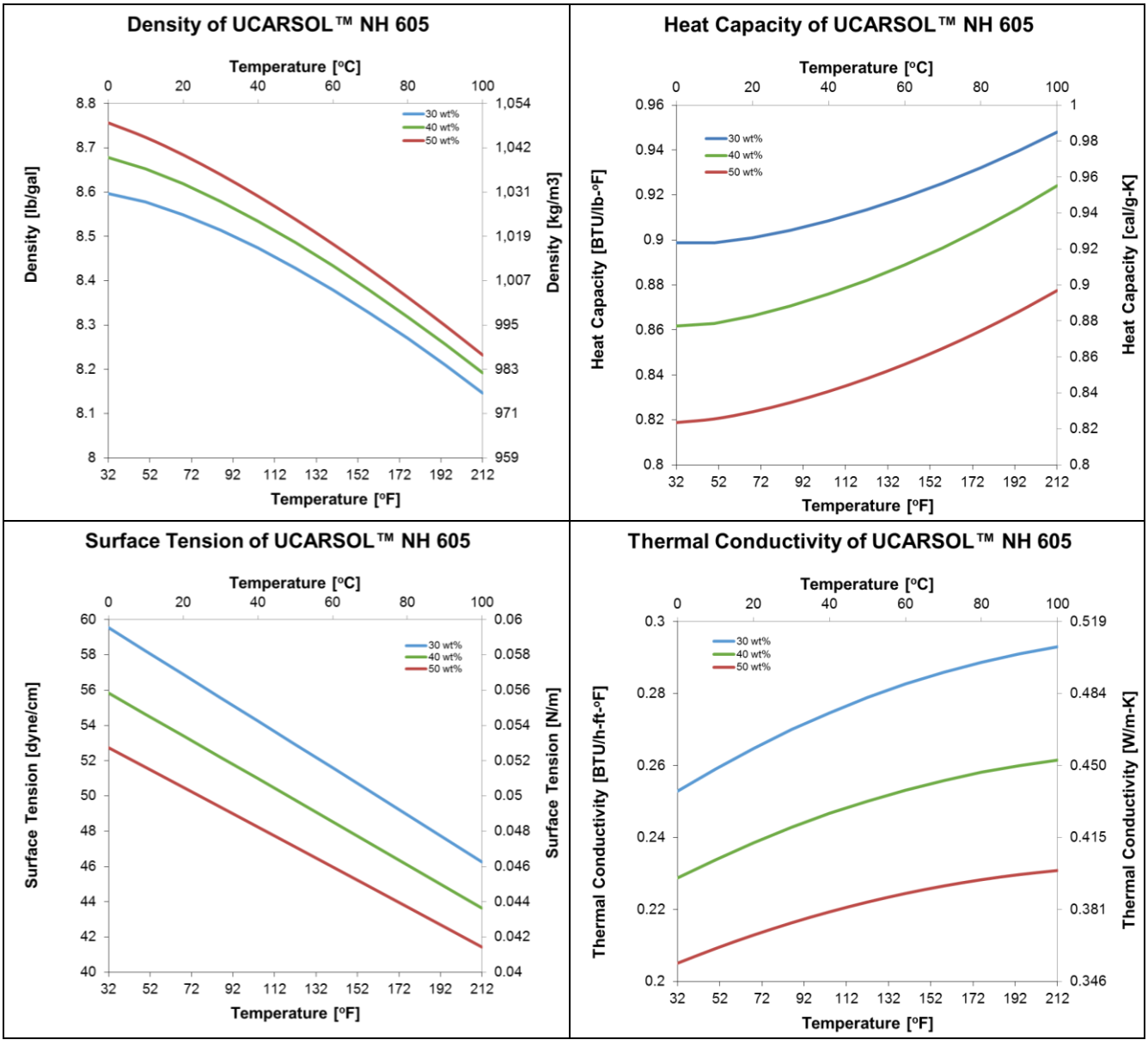
Physical Properties (Cont.)

Table 2: Physical Properties of UCARSOL™ NH 607 Solvent

Test[1]	Property	Unit	NH 607	
			Pure	50 wt% Aq
	Average Weight per Gallon at 20°C	lb	8.71	
	Average Weight per Liter at 20°C	Kg	1.04	
	Δ Density/Δ T at 20°C	lb/gal/°C	0.0061 per °C	
	Δ Density/Δ T at 20°C	kg/L/°C	0.00073 per °C	
	Volumetric Thermal Expansion Coefficient			
	At 20°C	1/°C	0.00070 per °C	
	At 55°C	1/°C	0.00083 per °C	
	Boiling Point			
	at 760 mm Hg	°C (°F)	121.0 (250)	103.8 (218.8)
	at 50 mm Hg	°C (°F)	67.1 (152.7)	41.0 (105.8)
	Pour Point	°C (°F)	-48 (-54)	
	Cloud Point	°C (°F)		28.7 (83.7)
	pH			11.4
	Specific Gravity, T at 20°C		1.044	
	Solubility			
	in Water at 20°C	wt %	100	Complete
	of water at 20°C	wt%	100	Complete
	Flash Point			
ASTM D93	Pensky-Martens Closed Cup	°C (°F)	None	
ASTM D92	Cleveland Open Cup	°C (°F)	113 (235)	

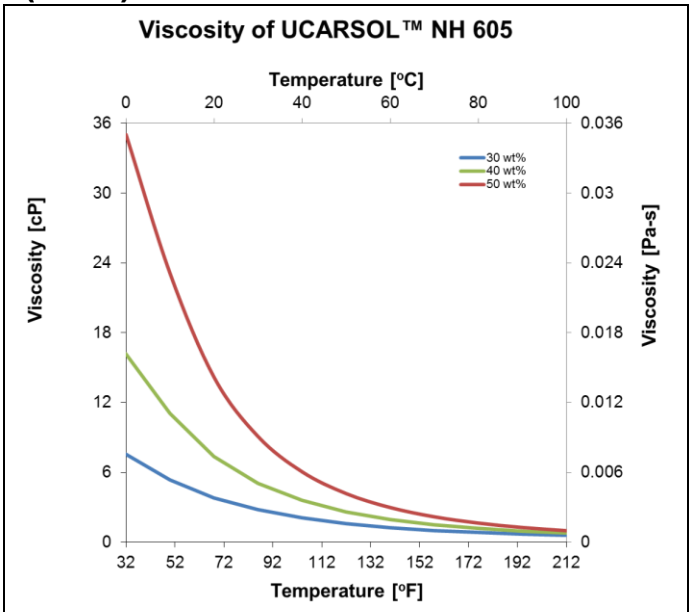
1. ASTM: American Society for Testing and Materials

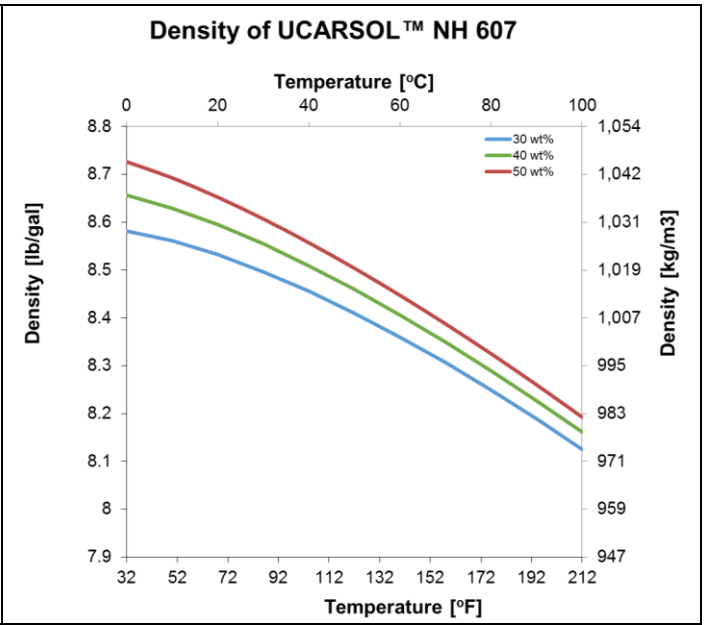
Physical Properties (Cont.)

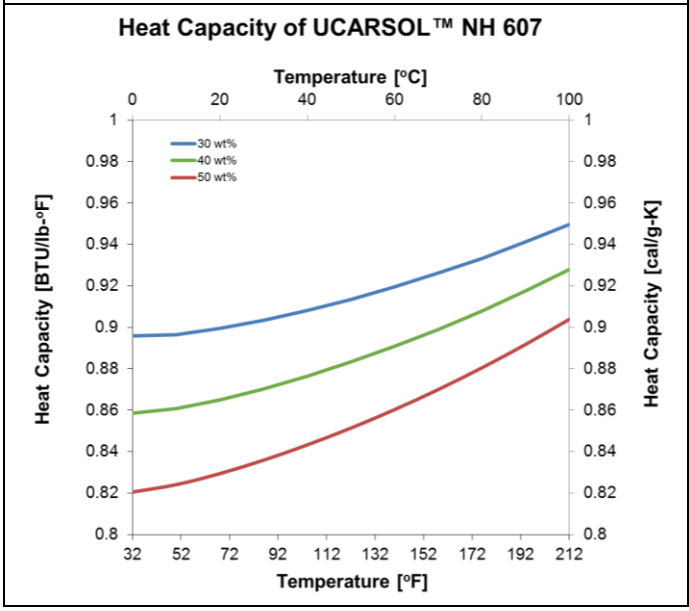


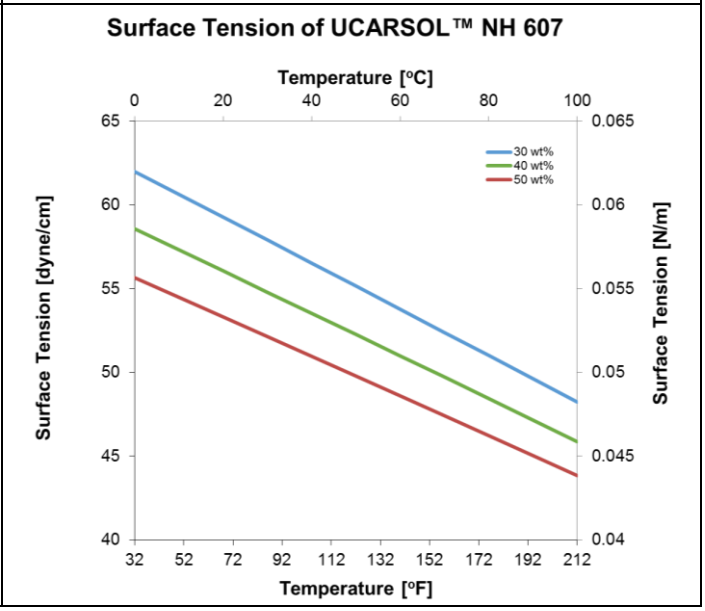
*Predicted properties

Physical Properties (Cont.)









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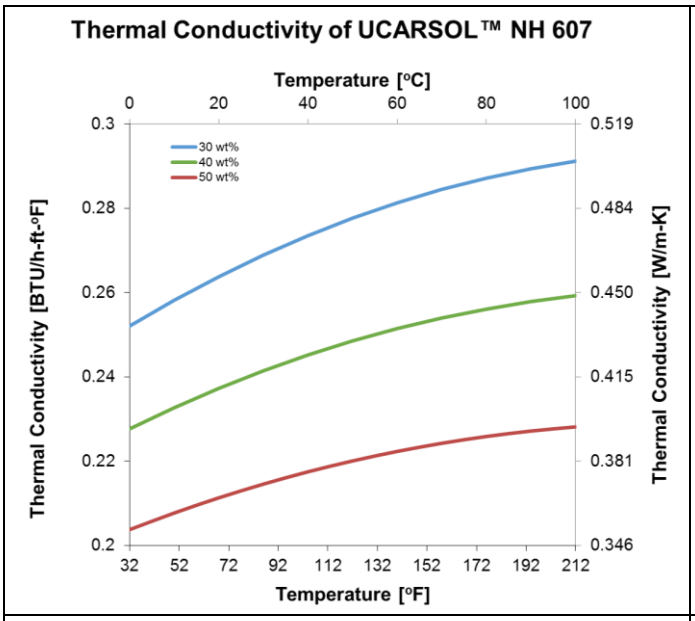
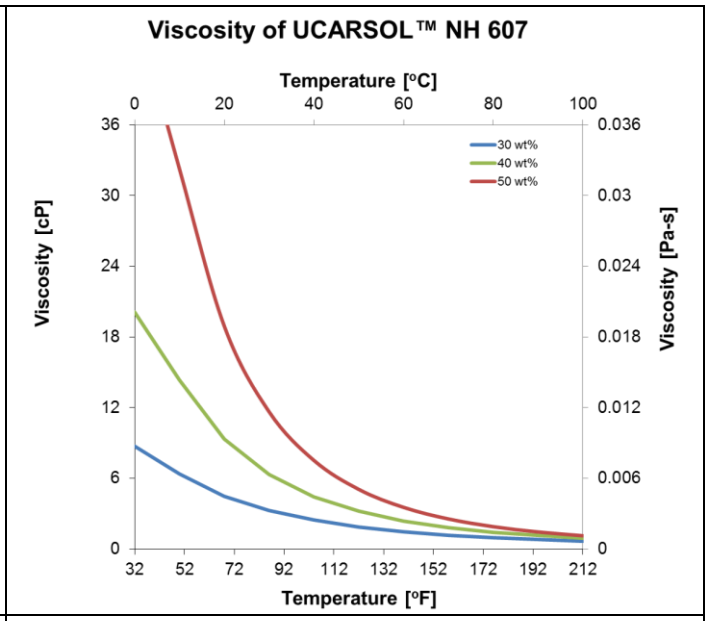
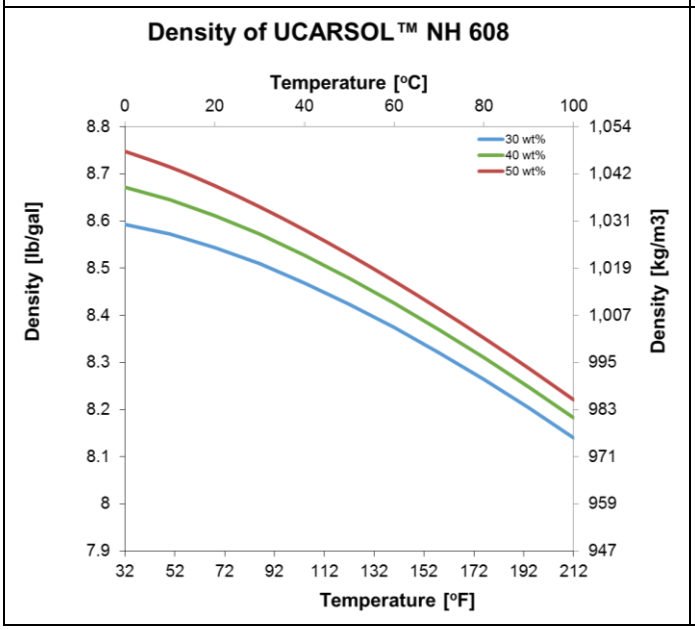
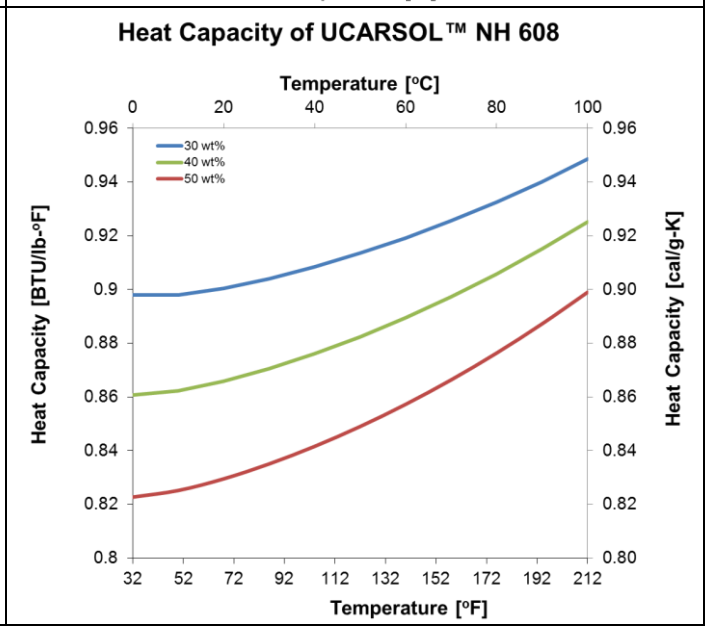
Physical Properties (Cont.)









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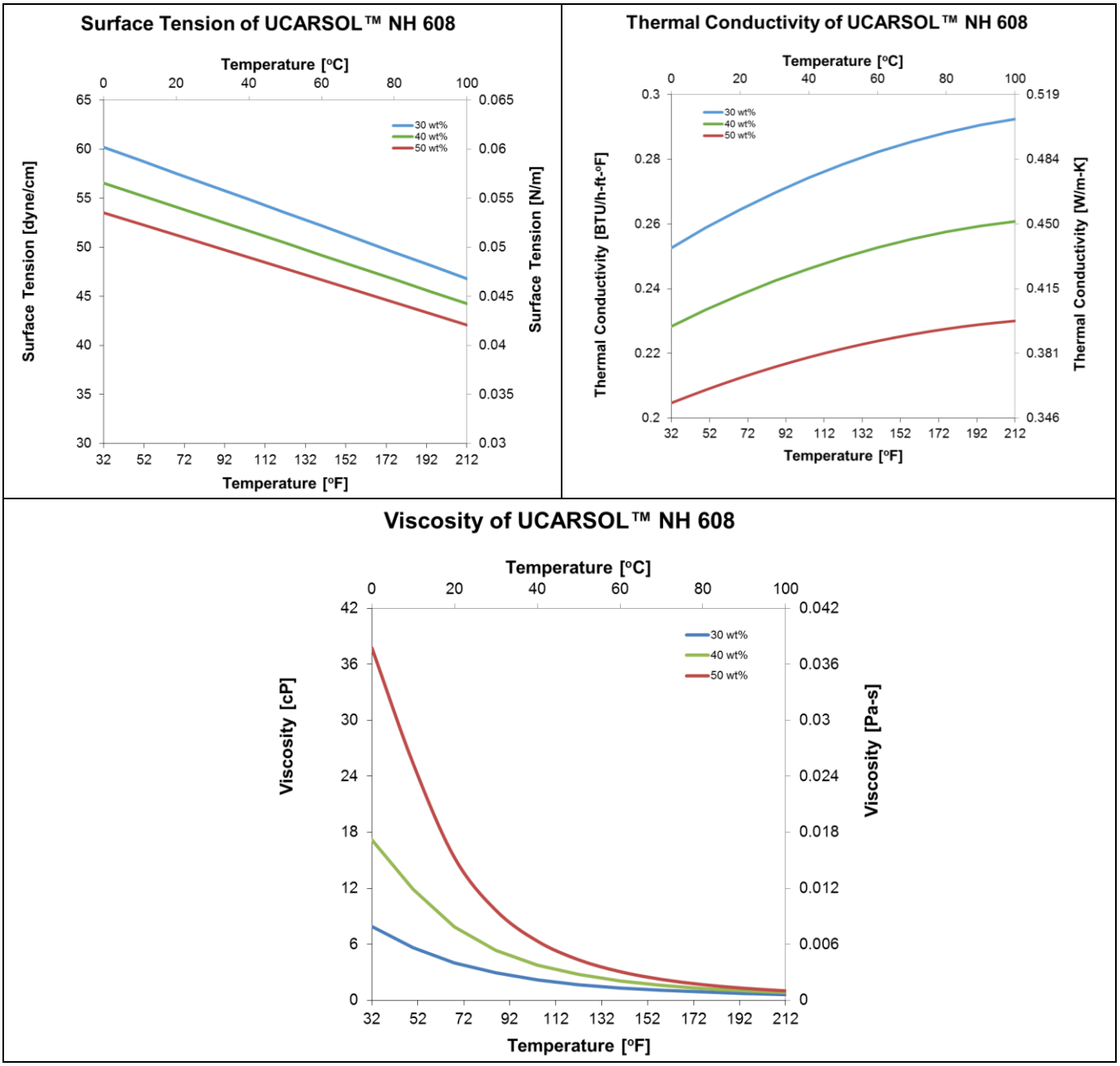
Physical Properties (Cont.)



*Predicted properties

Physical Properties (Cont.)

Additional information on UCARSOL™ NH 605, NH 607 and NH 608 Solvents, their properties and advantages, is available upon request. To explore more specifically what UCARSOL™ NH 605, NH 607 and NH 608 Solvents can do for an existing or proposed gas treating unit, contact a Dow representative.

Storage and Handling

UCARSOL™ NH 605, NH 607 and NH 608 Solvents are usually stored and handled in steel equipment. They are also compatible with stainless steel. Zinc or galvanized steel and copper and its alloys should not be used. Materials of construction guidelines for specific plant areas are available upon request.

These products become viscous at low temperatures (e.g. winter conditions) and have a freezing point of -23°C. Therefore, storage inside a warm building or in a heated, insulated tank may be desirable. A centrifugal pump is suitable for transfer service, assuming the temperature of the product is sufficiently above its pour point. A rotary or gear pump is suggested for low-temperature transfers.

Piping should be of adequate size to handle the maximum viscosity expected to be encountered. Valves, piping, etc. are usually of steel construction. Type 304 stainless steel, spiral-wound GRAFOIL gaskets for flanges and GRAFOIL packing for valves are recommended. For O-rings, ethylene propylene rubber (EPR) is recommended below 50°C, and Kalrez elastomers or equivalent above 50°C. Do not use Viton or Buna N elastomers.

Gas Treating Services

Dow offers a unique sample kit. Completely self-contained, the kit provides everything necessary — from containers to labels — to obtain lean and rich amine samples , and seal and safely ship them to the Dow analytical lab for routine analysis.

Dow is a worldwide leader in providing gas treating processors with specialized technology and services. To aid in both plant design and operation, UCARSOL™ Solvents are supported by advanced simulation capabilities, state-of-the-art laboratories, field test equipment, analytical procedures and an optimization program. The services Dow provides encompass preliminary assessments, start-up services, continual monitoring, and follow-up services. Included in this total support program are the training for people in the field, regular sample testing and performance evaluation. To ensure complete customer protection and satisfaction, Dow is there every step of the way – before, during, and after installation.

Note: This guide is designed as a general product overview. Please contact your local Dow Oil & Gas representative for up-to-date, detailed technical information including registrations and use limitations and to discuss individual applications or requirements.

Contact:
www.dow.com/contact