



UCON™ Lubricants

As Basestocks or Components for Spin Finish Lubricants

Description

UCON™ lubricants are used as base stocks for spin finish lubricants for man-made fiber production. The wide range of physical properties available gives the formulator of spin finishes freedom to choose the right lubricant for a given application.

Features and Benefits

UCON lubricants offer the following combination of properties:

- Fully water-soluble
- Most UCON lubricants exhibit a cloud point. They are soluble in cold water but will separate out at high temperature.
- Low to high viscosity range
- Ease of application at controlled rates, due to carefully controlled viscosity and the wide solubility parameters – including water solubility
- Favorable combination of frictional properties for high processing speeds and stable package winds
- Clean burn-off, resulting in low accumulation on heater surfaces
- All UCON fluids are hygroscopic, helping to control static and lessen the severity of antistat requirements
- Control of polymer penetration due to the wide range of molecular weights and solubilities available
- Ease of removal of water-soluble UCON fluids in aqueous scouring; reducing finish associated dyeing problems

The finish formulator can use the wide varieties of UCON lubricants to achieve an optimum balance of properties to meet downstream requirements in drawing, texturing fabrication and wet processing.

Typical Physical Properties of UCON 75-H Lubricants⁽¹⁾

UCON 75-H lubricants provide maximum viscosity range and water solubility.

	75-H-450	75-H-1400	75-H-90,000
Appearance	Colorless	Colorless	Pale Yellow
Percent Actives	100	100	100
Viscosity			
cSt at 100°F	98	303	19500
SUS at 100°F	450	1400	90000
Pour Point, °C(°F)	-15(5)	4(40)	4(40)
Specific Gravity, 20/20°C (68/68°F)	1.0971	1.0995	1.0894
Water Solubility, Room Temperature	Miscible	Miscible	Miscible
pH, 10% Aqueous Solution	5.5-7.5	5.5-7.5	10.0-11.0
Flash Point, °C(°F) Cleveland Open Cup	240(465)	271(520)	281(538)
Cloud Point, °C(°F) 1% Aqueous	100(212)	>90(>195)	83(182)
Surface Tension, 0.1%, 25°C, dynes/cm	50.0	50.0	50.9

⁽¹⁾The data represent typical physical properties only and should not be construed as product specifications.

The high cloud point of these materials and their water miscibility at temperatures below the cloud point provide ease of applications at controlled rates from aqueous media, as well as

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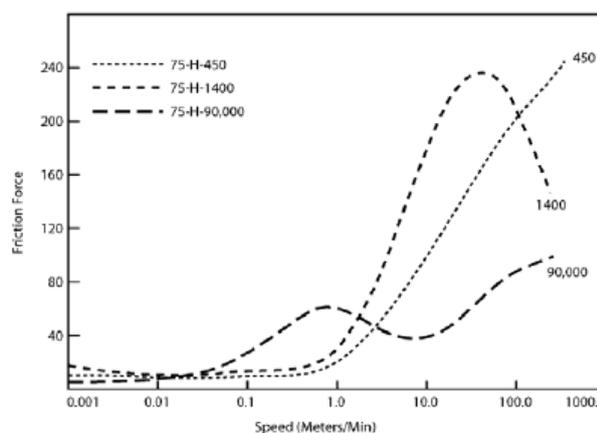
ease of completeness of removal under mild aqueous scouring conditions.

Frictional Properties of UCON 75-H Lubricants

Yarn/metal frictional properties¹ for the various UCON 75-H lubricants applied to 150- denier/30 filament polyester yarn is presented in Figure 1. Of particular interest are the speed-dependence of the friction curves, and the variation in the position of the maximum in the friction vs. speed curves with molecular weight of the UCON 75-H lubricant. At the high sliding speeds of several hundred meters per minute, the friction force is either increasing (as is the case of UCON 75-H-1400 lubricant), or plateauing or passing through a second maximum at a relatively low level of friction (as with UCON Lubricant 75-H-90,000). The position and the magnitude of friction maximum will vary depending on the surface roughness of friction surfaces: metal, ceramic and fibers. Blends of UCON 75-H lubricants or blends with other lubricant materials, such as fatty acid esters, may be employed to give a particular level and type of frictional behavior.

The low level of friction at high speeds, coupled with the good cohesiveness of the UCON 75-H lubricants gives an unusually good combination of frictional properties. The cohesiveness and moderate stick-slip friction at low sliding speeds shown by these lubricants gives good stability to yarn-yarn contacts under static conditions, allowing large yarn packages to be wound with good stability and relative freedom from "sloughing". The low high-speed friction provides low running tensions when the yarn is properly guided. These properties, plus the relatively low volatility and residue formation, have led to the usage of the UCON 75-H lubricants as spin.

Figure 1 • Yarn/Metal Friction Properties¹ of UCON 75-H Lubricants



¹ Measured on Atlab Friction Tester (Custom Scientific Inc., Whippany, NJ), 65 percent RH and 70°F; loading for measurement is 1.0 percent owf. Pretension employed is 5.0 gms.

Application of UCON 75-H Lubricants

Good results are obtained in application of lubricant formulations based on UCON 75-H lubricants from kiss-roll applications, as well as wicks or direct metering application devices. The addition of a surface active agent is recommended to facilitate rapid spreading on low energy fiber surfaces such as polypropylene or polyethylene.

Typical Physical Properties of UCON 50-B Lubricants⁽¹⁾

UCON 50-B lubricants are the preferred basestocks for spin finishes in the production of textured PES and PA yarns.

	50-HB-55, Inh.	50-HB-100	50-HB-170	50-HB-260	50-HB-660
Appearance	Colorless	Colorless	Colorless	Colorless	Colorless
Percent Actives	100	100	100	100	100
Viscosity					
cSt at 100°F	8.8	20.5	36.3	56.0	142
SUS at 100°F	55	100	170	260	660
Pour Point, °C(°F)	-62(-80)	-48(-54)	-38(-36)	-38(-36)	-37(-35)
Specific Gravity, 20/20°C (68/68°F)	0.9785	1.0114	1.0277	1.0358	1.046
Water Solubility, Room Temperature	Miscible	Miscible	Miscible	Miscible	Miscible
pH, 10% Aqueous Solution	5.5-7.5	5.5-7.5	5.5-7.5	5.5-7.5	5.5-7.5
Flash Point, °C(°F) Cleveland Open Cup	129(265)	196(385)	204(400)	238(460)	229(445)
Cloud Point, °C(°F) 1% Aqueous	>90(>194)	79(174)	66(151)	60(140)	569(133)
Surface Tension, 0.1%, 25°C, dynes/cm	30.3	32.7	34.0	34.8	35.5

⁽¹⁾The data represent typical physical properties only and should not be construed as product specifications.

Characteristics of UCON 50-HB Lubricants in Fiber Finishes

UCON Lubricant	Yarn-to-Metal Friction		Yarn-to-Yarn	
	Low Speed	High Speed	Static Generation	Stick-Slip ⁽¹⁾
50-HB-55, Inh.	Low	Low	Very Low	Moderate
50-HB-100	Low	Low	Very Low	Moderate
50-HB-170	Low	Moderate	Low	Moderate
50-HB-260	Low	Moderate	Low	Moderate
50-HB-660	Moderate	High	Low	Moderate

⁽¹⁾The difference between static and kinetic friction.

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