



SOLVAY

asking more from chemistry®



SOLKANE®



SOLKANE® 365

A Green Solvent in Organic Chemistry

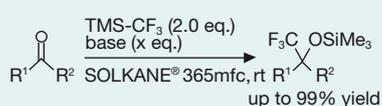
Increasingly tighter HSE restrictions on the use of organic solvents in industrial synthesis lead research groups to search for alternative solvents for organic reactions.

Although solvent-free conditions seem to be the most desirable option for green chemistry, in most cases, a solvent is required to assist in working up processes and for the transport of materials. The use of ionic liquids as alternative reaction media for organic chemistry as well as Fluorous technology is attractive from an environmental standpoint but quite expensive.

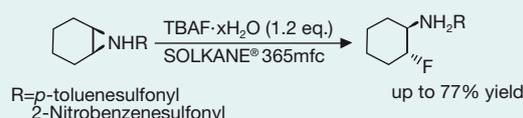
1,1,1,3,3-Pentafluorobutane (SOLKANE® 365) is already widely used as foam blowing agent for polyurethane (PU) production and as a solvent in precision cleaning industries. SOLKANE® 365 is competitively priced and applicable for a wide range of organic reactions, including nucleophilic trifluoromethylation, fluorination, Sonogashira and Suzuki cross-couplings as well as Michael addition reactions. Already tested reactions include:

Selected examples:

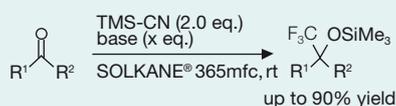
1. Nucleophilic Trifluoromethylation reaction of Carbonyl compounds



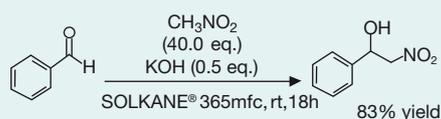
2. Nucleophilic ring-opening fluorination reaction of aziridines



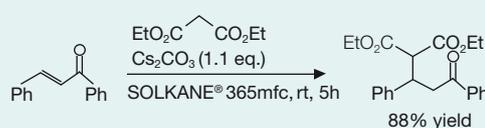
3. Cyanosilylation of carbonyl compounds



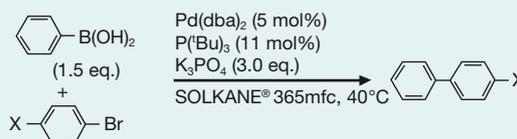
4. Henry reaction



5. Michael addition reaction



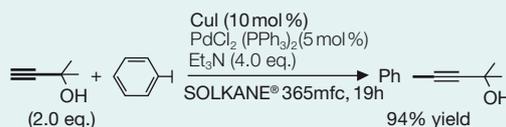
6. Suzuki-Miyaura coupling reaction



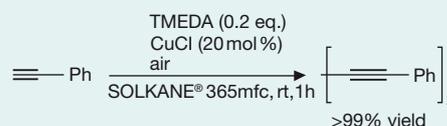
entry	x	time (h)	yield (%) ^a
1	Me	21	86
2	OMe	23	92
3	NO ₂	23	85
4	Ph	14	85

^aIsolated yield.

7. Sonogashira coupling reaction



8. Glaser coupling reaction



Summary taken out of the Journal Green Chemistry 2009.
Authors: Akihiro Kusuda, Hiroyuki Kawai, Shuichi Nakamura and Norio Shibata.
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In addition, SOLKANE® 365 is also successfully used as a non-reaction-participating-filling-medium in a catalytic fluorination reaction of haloalkanes in our laboratory.

**Chemical and
Physical Properties
of SOLKANE® 365**

Chemical formula	C ₄ H ₅ F ₅
Molecular weight [kg/kmol]	148.09
Density at 25 °C [kg/dm ³]	1.26
Boiling point [°C/1,013 mbar]	40.2
Freezing point [°C]	-35
Flammability limit LFL [Vol-%]	3.6
Flammability limit UFL [Vol-%]	13.3
Flashpoint [°C]	-27
Thermal conductivity vapor [mW/m.K; 25 °C]	10.7
Heat of vaporisation at bp. [kJ/kg]	177
Specific heat capacity liquid [kJ/kg.K; 25 °C]	1.41
Vapor pressure [kPa] at 0 °C	19
Vapor pressure [kPa] at 25 °C	53
Vapor pressure [kPa] at 50 °C	142
Solubility of water [mass-%; 20 °C]	0.09
Solubility in water [mass-%; 20 °C]	0.50
Surface tension [mN/m; 20 °C]	15.6
Viscosity liquid [mPa.s; 25 °C]	0.49
Dipole moment	3.80
Dielectric constant [25 °C]	12.30
Refractive index [20 °C]	1.28
Minimum ignition energy [mJ]	10.8
Autoignition temperature [°C; DIN EN 14522]	594
Evaporation rate [Diethylether = 1]	
MAK [ppm]	1,000



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