

DICYANAMIDE IONIC LIQUIDS

REFERENCES	IONIC LIQUIDS
Pyr0411c	1-Butyl-1-methylpyrrolidinium dicyanamide, 98% [BMPyrro][N(CN) ₂]
Im0411c	1-Butyl-3-methylimidazolium dicyanamide, 99% [BMI][N(CN) ₂]

Experimental aspect :

Dicyanamide ionic liquids are :

- colourless,
- hydrophilic,
- stable over time in contact with water and air, up to 250°C
- low-viscosity liquids, which makes them very easy to handle.

SOLVENT	MISCIBILITY
Water	Miscible
Methanol	Miscible
Acetonitrile	Miscible
Acetone	Miscible
Dichloromethane	Miscible
Tetrahydrofurane	Miscible
Toluene	Immiscible
Hexane	Immiscible

Examples:

Whether based on the imidazolium or pyrrolidinium cation, ionic liquids containing the dicyanamide anion have common properties making them very attractive. Their low viscosities render them easy to handle and facilitate operations such as mixing and filtering. Their thermal and electrochemical stabilities (-2 V to +1.5 V vs. Ag/Ag⁺ for 1-ethyl-3-methylimidazolium dicyanamide) allow them to be good alternatives¹ to organic solvents. But one of their major assets is their power of solubilisation of sugars² as well as their role as a catalyst in some reactions involving saccharides³.

Sugars are mainly soluble in solvents such as water, DMF, DMSO, and pyridine, which pose many implementation problems.

The following table indicates solubility values for various saccharides for some solvents at different temperatures.

SOLVENT	SACCHARIDES	SOLUBILITY (g/L)	TEMPERATURE (°C)
Water	Glucose	> 900	25
<i>tert</i> -butanol	Glucose	0,3	25
[BMI][PF ₆]	Glucose	< 0,5	25
[BMI][N(CN) ₂]	Glucose	145	25
[BMI][N(CN) ₂]	Sucrose	195	25
[BMI][N(CN) ₂]	Sucrose	282	60
[BMI][N(CN) ₂]	Lactose	51	25
[BMI][N(CN) ₂]	Lactose	225	75
[BMI][N(CN) ₂]	Cyclodextrine	750	75

Acetylation of hydroxy groups of sugars is a very commonly used reaction in protection strategies or for the isolation and identification of sugars. This reaction may take place in the presence of acetic anhydride, in pyridine or a derivative substance. If the reaction is carried out in the presence of [BMI][N(CN)₂], then this reaction is completed, regardless of the substrate (glucose, sucrose, raffinose, etc.), in the absence of a catalyst. Products from the reaction are simply isolated by precipitation, by adding water.

¹ D. R. MacFarlane, S. A. Forsyth, J. Golding, G. B. Deacon *Green Chem.*, 2002, 4, 444.

² Q. Liu, M. H. A. Janssen, F. van Rantwijk, R. A. Sheldon *Green Chem.*, 2005, 7, 39.

³ S. A. Forsyth, D. R. MacFarlane, R. J. Thomson, M. von Itzstein *Chem. Commun.*, 2002, 714