



## EXPEDITIOUS SYNTHESIS, PROPERTIES & APPLICATIONS OF DEEP EUTECTIC SOLVENTS

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**Abstract:** The research paper reports the innovative synthesis of deep eutectic solvents by the reaction of glucose, urea/thiourea and inorganic salts. DES are providing to be increasingly promising as variable media for not only potentially “green synthesis” but also for the better applications in terms of producing bulk product as well as for enhancing the rate of the reaction. The utilization and synthesis of such deep eutectic solvents should facilitate further development of green chemistry and green chemical synthesis.

**KEYWORD:**-Deep eutectic solvents, green synthesis, Diels-alder reaction, glucose, inorganic salts, urea.

**Introduction:** A large number of organic solvents are been used in the chemical synthesis at large scale and small scale as well. However these organic solvents have a high tendency to escape into the environment either through evaporation or by leakage and that’s why the reduction of use of organic solvents is one goal in current efforts towards more environment friendly green chemical process. One of the

options is to use water as a solvent but its use is limited because most organic compounds do not dissolve in pure water. Hence it’s an initiative to develop the deep eutectic solvents that can be used as green solvent rather than using toxic solvents that has hazardous effect on environment and is much better in case of forming bulk product and reaction time is comparatively less.

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**Method and Materials:**

Sugar+Urea/Thiourea+Inorganic Salts →Deep Eutectic Solvent

Total eight deep eutectic solvents were prepared in the laboratory by consideration of mixture of compounds like urea/thiourea, glucose and inorganic salts. Three of them were taken in the

ratio 1:1:1 respectively i.e., 0.5g each. The inorganic salts that were used were  $\text{NiCl}_2$ ,  $\text{CaCl}_2$ ,  $\text{FeCl}_3$ ,  $\text{NaCl}$ . In addition the mixtures were heated for 1 hour at water bath. The solvents that were obtained at the end of preparation were present in semisolid form. The following changes were observed:-

**Table1:** Changes in the deep eutectic solvents

Time	Observations
After 10 minutes	Reaction mixture starts melting
After 30 minutes	Colour of reaction mixture changes
After 1 hour	The reaction mixture changes into semisolid form

**Results and Discussion:** The solvents that were prepared were used for the preparation of the Schiff base respectively and hence all the eight

**Table2:** Comparison between deep eutectic solvent and chloroform

Name of solvent	Amount required	Melting point of product obtained	Reaction time	Yield of product
Chloroform	8ml	122C	35 MINUTES	3.8 gm
Deep eutectic solvent	1.6gm	105C	26 MINUTES	4.7 gm

**Conclusion:** We have reported the use of low-melting mixtures of sugar, urea, thiourea, and inorganic salts as a reaction media for the production of Schiff's base. This nontoxic reaction media was successfully qualified as green solvent. Their application as reaction media for other organic transformations and as a substitute to ionic liquids may be envisaged.

#### References

- 1) J.D.Holbrey, M.B. Turner and R.D.Rogers (2003); Ionic liquids as green solvents, ACS Symposium series,.
- 2) Giovanni imperator, Ernst eibler(2004): Low melting solvents-urea-salt mixtures, Giovanni imperator, Ernst eibler, received in (Cambridge, UK).
- 3) S.T.Handy, M. Okelloan. Dickension (2003): There are exceptions, e.g. ionic liquids based on fructose, org.lett., 2513-2515.
- 4) Emma.l. Smith, Andrew E.Abbo t(2014): DES and their applications, Nottingham NG11 8NS, United kingdom. *Chem. Rev.*, 114 (21), pp 11060-11082.