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Go greener... go anhydrous!

Choose sustainability and leave water concerns behind.

Many research and production applications rely on dipolar aprotic solvents, including cross-coupling reactions, peptide synthesis, and graphene ink printing. However, traditional petroleum-based solvents like DMF (*N,N*-Dimethylformamide) and NMP (1-Methyl-2-pyrrolididinone) are highly toxic, and the European Chemicals Agency (ECHA) classifies them on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) list of substances of very high concern, limiting the use of these solvents.

Protect both yourself and the planet by switching to our growing portfolio of safer, greener solvents, such as γ-Valerolactone and Dimethyl isosorbide, which have been designed to minimize risk and maximize performance. Now in Sure/Seal™ system, you can trust that your solvents will be free of water and securely sealed, reducing the risk of leakage, contamination, and product loss. Ensure that your moisture-sensitive chemistry will not be compromised, and you can achieve accurate and consistent results for your research.

γ-Valerolactone (GVL)

CAS No.: 108-29-2
Alternative for: NMP, DMF and DMA

Features & Benefits

γ-Valerolactone is a dipolar aprotic, bio-based, fully degradable and non-toxic green solvent. It has low volatility (VOC), good thermal stability, high boiling and flash points. It is considered a more sustainable alternative to traditional solvents such as NMP and DMF.

- Bio-based
- Non-toxic solvent
- Biodegradable
- Low vapor pressure
- Safer solvent and auxiliary
- Anhydrous – water content <50ppm

Applications

- Peptide synthesis[1]
- Cross-coupling reactions[2]
- Nonaqueous redox-flow batteries[3]
- Polymerization reactions[4]
- Extraction[5]

Cat. No.		Product Description
933856		γ-Valerolactone, BioRenewable, anhydrous
918660		γ-Valerolactone, BioRenewable, ReagentPlus®

Want to know more about γ-Valerolactone?

Check our Cyrene™ γ-Valerolactone Blend and discover one more NMP and DMF substitute.

Dimethyl isosorbide (DMI)

CAS No.: 5306-85-4
Alternative for: NMP and DMF

Features & Benefits

Dimethyl isosorbide (DMI) is a bio-based green solvent used in a wide range of applications. It is a more sustainable alternative to NMP and DMF, and suitable for organic synthesis, such as cross-coupling reactions, peptide synthesis and Baylis–Hillman reactions.

- Bio-based
- Non-toxic solvent
- High solubility potential
- High boiling point
- Anhydrous – water content <50ppm

Applications

- Polymer membranes preparation[6]
- Peptide synthesis[1]
- Cross-coupling reactions[7]
- Used as co-solvent to improve solubility of nonpolar compounds
- Lithium battery recycling[8]

Cat. No.		Product Description
933864		Dimethyl isosorbide, BioRenewable, anhydrous
906832		Dimethyl isosorbide, BioRenewable

References

1. Al Musaimi, O., de la Torre, B. G., & Albericio, F. (2020). Greening Fmoc/tBu solid-phase peptide synthesis. Green Chemistry, 4.

   For GVL: Al Musaimi, O., El-Faham, A., Basso, A., de la Torre, B. G., & Albericio, F. (2019). c-Valerolactone (GVL): An eco-friendly anchoring solvent for solid-phase peptide synthesis. Tetrahedron Letters, 60(15), 1058.
2. Strappaveccia, G., Luciani, L., Bartollini, E., Marrocchi, A., Pizzo, F., & Vaccaro, L. (2015). γ-Valerolactone as an alternative biomass-derived medium for the Sonogashira reaction. Green Chemistry, 17, 1071.
3. Gong, K., Fang, Q., Gu, S., Li, S. F. Y., & Yan, Y. (2015). Nonaqueous redox-flow batteries: organic solvents, supporting electrolytes, and redox pairs. Energy & Environmental Science, 12.
4. Shen, X., Xia, D., Xiang, Y., & Gao, J. (2019). f-valerolactone (GVL) as a bio-based green solvent and ligand for iron-mediated AGET ATRP. e-Polymers, 19, 323-329.
5. Dantas, C. E. S., & Ceriani, R. (2022). γ-Valerolactone as a Green Solvent for Extracting Carboxylic Acids and Alcohols from n-Tetradecane: Equilibrium Data for Model Systems at 298.15 K. J. Chem. Eng. Data, 67(6), 1460-1473.
6. Russo, F., Galiano, F., Pedace, F., Aricò, F., & Figoli, A. (2020). Dimethyl Isosorbide As a Green Solvent for Sustainable Ultrafiltration and Microfiltration Membrane Preparation. ACS Sustainable Chem. Eng., 8(1), 659-668.
7. 1 – Wilson, K. L., Murray, J., Sneddon, H. F., Jamieson, C., & Watson, A. J. B. (2018). Dimethylisosorbide (DMI) as a Bio-Derived Solvent for Pd-Catalyzed Cross-Coupling Reactions. Synlett, 29(17), 2293-2297.

   2 – Su, M., Huang, X., Lei, C., & Jin, J. (2022). Nickel-Catalyzed Reductive Cross-Coupling of Aryl Bromides with Vinyl Acetate in Dimethyl Isosorbide as a Sustainable Solvent. Organic Letters, 24, 354-358.
8. Buken, O., Mancini, K., & Sarkar, A. (2021). A sustainable approach to cathode delamination using a green solvent. RSC Advances, 11, 27356.

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MS_FL12722EN Ver. 1.0 51207 02/2024