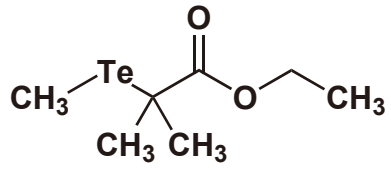
New

MATERIALS

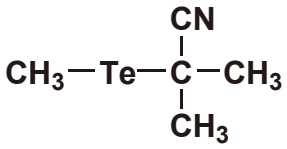
Controlled Radical Polymerization Chain Transfer Agents for TERP

Organotellurium-mediated radical polymerization (TERP), developed by Yamago *et al.*, is a type of controlled radical polymerizations (CRPs) also known as reversible-deactivation radical polymerizations. CPRs provide polymers with narrow molecular weight distributions, allows easy control of molecular weights, and enables the synthesis of block copolymers. In addition, TERP is advantageous for the development of functional polymers due to its wide monomer functional groups scope and the possibility of end group transformations. Furthermore, compared to reversible addition-fragmentation chain transfer (RAFT) polymerization, TERP offers a broader range of monomers that can be controlled with the same chain transfer agent.

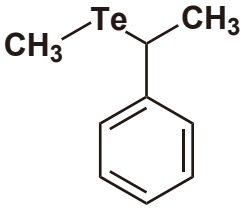
Chain Transfer Agents (CTAs)



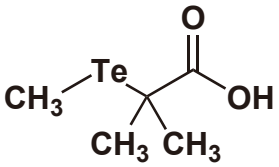
Ethyl 2-Methyl-2-(methyltellanyl)-propanoate
100mg / 1g
New [E1508]



2-Methyl-2-(methyltellanyl)-propanenitrile
100mg / 1g
New [M3520]



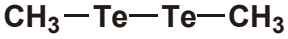
Methyl(1-phenylethyl)tellane
100mg / 1g
New [M3521]



2-Methyl-2-(methyltellanyl)-propanoic Acid
100mg
New [M3728]

Related Products

Reaction Additives



Dimethyl Ditelluride
100mg / 1g
New [D6090]

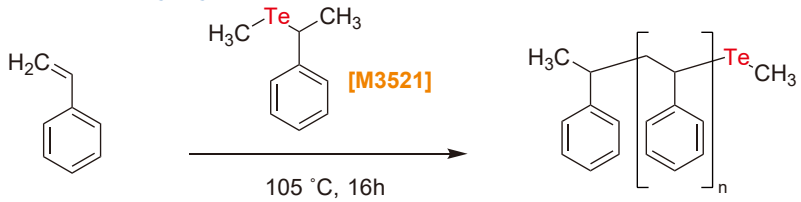
Diphenyl Ditelluride
1g / 5g
[D2718]

Controlled Radical Polymerization Chain Transfer Agents for TERP

Applications

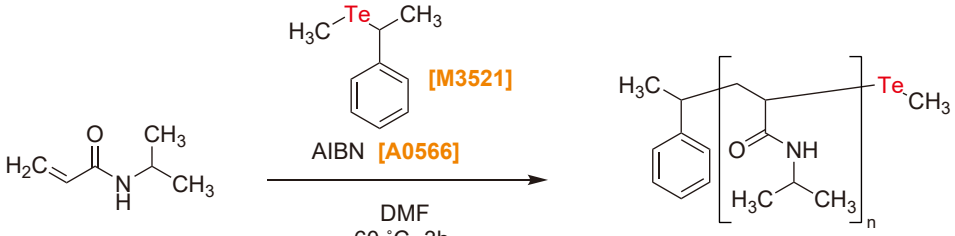
Polymerization by TERP can be carried out by thermal condition (Scheme 1), thermal condition with radical initiators (Scheme 2), or photoirradiation condition. For the polymerization of methacrylates, the addition of ditellurides is effective to improve the control of the molecular weight distribution (Scheme 3).
M3728, which is a chain-transfer agent having a carboxy group, is suitable for emulsion polymerization in aqueous media.[5)]

Scheme 1. Synthesis of polystyrene [3)]



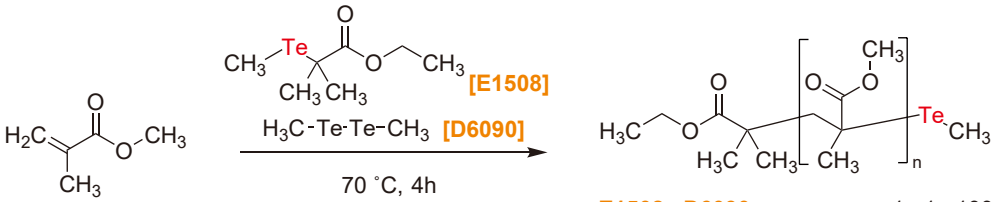
M3521 : monomer = 1 : 1000
M_n = 9,200 M_w/M_n = 1.17

Scheme 2. Synthesis of poly(*N*-isopropylacrylamide) [3)]



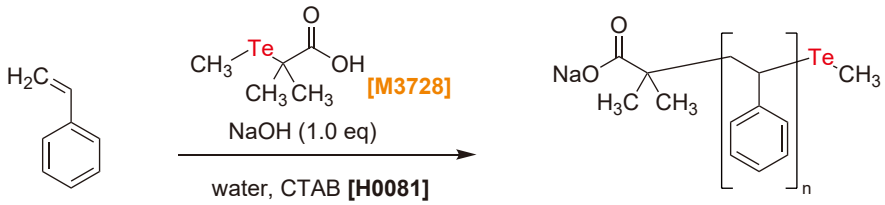
M3521 : AIBN : monomer = 1 : 0.5-1 : 100
M_n = 30,600 M_w/M_n = 1.09

Scheme 3. Synthesis of poly(methyl methacrylate) [4)]



E1508 : **D6090** : monomer = 1 : 1 : 100
M_n = 9,500 M_w/M_n = 1.18

Scheme 4. Synthesis of polystyrene via emulsion polymerization [5)]



M3728 : monomer = 1 : 1000
M_n = 100,000 M_w/M_n = 1.16

References
1) S. Yamago, *Chem. Rev.* **2009**, *109*, 5051. https://doi.org/10.1021/cr9001269
2) S. Yamago, *Bull. Chem. Soc. Jpn.* **2020**, *93*, 287. https://doi.org/10.1246/bcsj.20190339
3) S. Yamago, *J. Polym. Sci. A Polym. Chem.* **2006**, *44*, 1. https://doi.org/10.1002/pola.21154
4) S. Yamago *et al.*, *Beilstein J. Org. Chem.* **2013**, *9*, 1607. https://doi.org/10.3762/bjoc.9.183
5) S. Yamago *et al.*, *ACS Macro Lett.* **2022**, *11*, 1331. https://doi.org/10.1021/acsmacrolett.2c00594

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