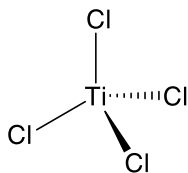


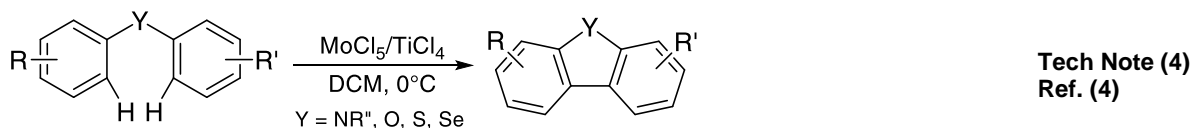
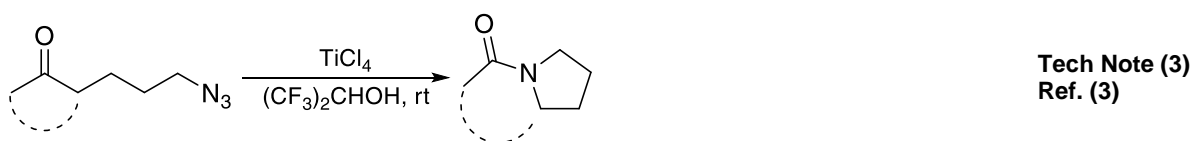
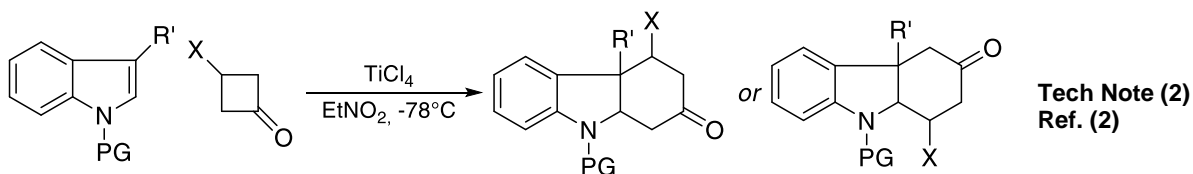
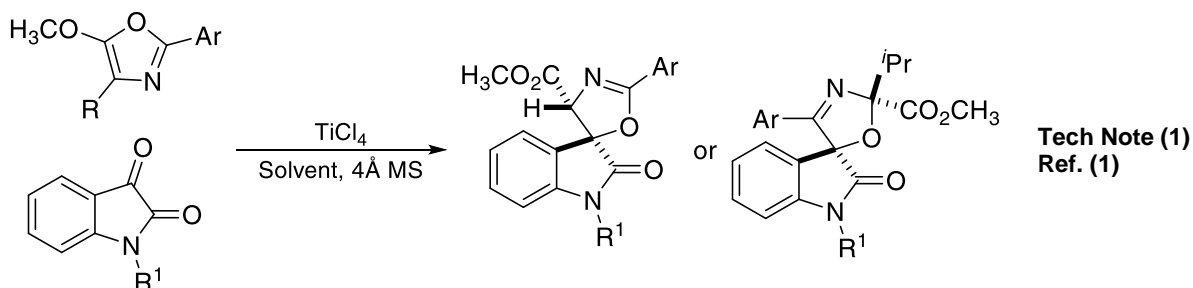
Catalog # 22-1155 Titanium(IV) chloride, (99.99+% Ti) PURATREM

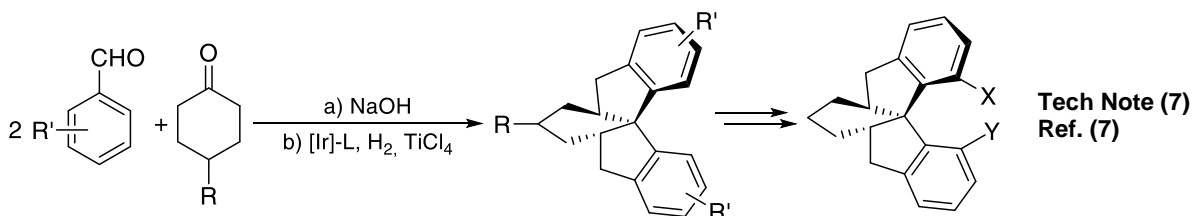
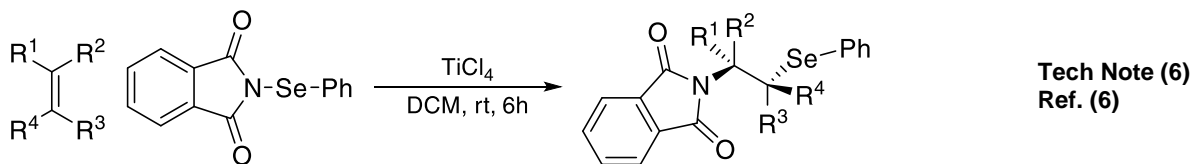
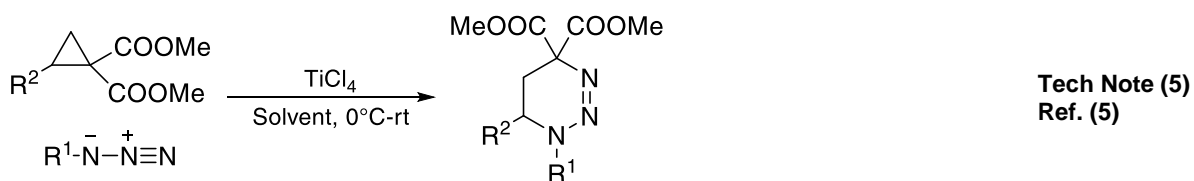


### Catalysis Applications

#### Technical Notes:

1. Catalyst used for stereoselective synthesis of spirooxindole oxazolines.
2. Catalyst for the regioselective inter- and intramolecular formal [4+2] cycloaddition of cyclobutanones with indoles.
3. Catalyst for the intramolecular Schmidt reaction of alkyl azides and ketones.
4. Used in the oxidative coupling reaction MoCl<sub>5</sub>/TiCl<sub>4</sub> catalyzed synthetic access to 9-heterofluorenes.
5. Catalyst for the formal [3+3] cycloaddition of cyclopropane 1,1-diesters with azides.
6. Catalyst used for atom-economic amidoselenenylation of simple alkenes under mild conditions.
7. Used in the Ir-catalyzed synthesis of chiral cyclohexyl-fused 1,1'-spirobiindanes.





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## CVD/ALD Applications

## Thermal Behavior:

- Melting point: -25°C
- Boiling point: 136°C
- Vapor pressure: 9 Torr/20°C; 15.75 Torr/20°C; 41 Torr/20°C; 75 Torr/20°C

## Technical Notes:

1. ALD precursor thin titanium containing film deposition.

Target Deposit	Deposition Technique	Delivery Temperature	Pressure	Co-reactants	Deposition Temperature	Ref.
Ti	PE-ALD ALD	RT	30-100 mTorr 4.5-7.5 Torr	<sup>PL</sup> H <sub>2</sub> TMS-CHD or TMS-DHP	20-200°C	1 2
		RT			180-240°C	
TiO <sub>x</sub>	ALD	-	1 Torr	H <sub>2</sub> O <sub>2</sub>	100°C	3
	ALD	RT	-	H <sub>2</sub> O	85°C, 135°C	4
	ALD	RT	-	H <sub>2</sub> O	200°C	5
	PE-ALD	RT	-	<sup>PL</sup> O <sub>2</sub> , <sup>PL</sup> H <sub>2</sub> O	30-180°C	6
	ALD	RT	-	O <sub>3</sub>	225-600°C	7

TiN <sub>x</sub>	ALD	0°C	-	NH <sub>3</sub>	500°C	8
	PE-ALD	-	-	<sup>P</sup> LH <sub>2</sub> /N <sub>2</sub>	350-400°C	9
	ALD	-	-	N <sub>2</sub> H <sub>4</sub>	100-300°C	10
TiS <sub>x</sub>	ALD	21°C	7.5 Torr	H <sub>2</sub> S	400°C	11
	ALD	20°C	0.75-2.25 Torr	H <sub>2</sub> S	150-300°C	12
TiO <sub>2-x</sub> N <sub>x</sub>	ALD	21°C	7.5 Torr	H <sub>2</sub> O, NH <sub>3</sub>	500°C	13
TiPO <sub>x</sub>	ALD	RT	-	(EtO) <sub>3</sub> PO	200°C	14

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