1. Record Nr. UNINA9910437798103321

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Titolo	Novel synthetic chemistry of ureas and amides : doctoral thesis accepted by the University of Bristol, UK / / Marc Hutchby
Pubbl/distr/stampa	Heidelberg, : Springer, 2012, c2013
ISBN	1-283-63167-9 9786613944122 3-642-32051-1
Edizione	[1st ed. 2013.]
Descrizione fisica	1 online resource (178 p.)
Collana	Springer theses : recognizing outstanding Ph.D. research, , 2190-5053
Disciplina	660.6
Soggetti	Organic compounds - Synthesis Chemical bonds Urea Amides
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references.
Nota di contenuto	Transition metal catalysis -- Palladium catalysis -- Pd(II) catalysed aminocarbonylation of alkenes -- Carbonylation of aryl ureas -- Urea Hydrolysis -- Amide hydrolysis.
Sommario/riassunto	In this thesis, the author investigates the chemistry and application of molecules containing urea and amide bonds. These bonds are some of the strongest known and are fundamental to biological processes. The author describes his discovery that sterically hindered ureas undergo solvolysis at room temperature under neutral conditions. This is a remarkable finding, since ureas are inert under these conditions and a general rule of chemistry is that hindered substrates are less reactive. Remarkably, the author translates these results to the correspondingly sterically hindered amides. This thesis has resulted in a number of outstanding publications in high profile journals. The unique method for breaking urea and amide bonds developed in this study is likely to have far reaching consequences for biological protein manipulation.