Vanadium-aminotriphenolate complexes as coordination receptors for Lewis bases in biomass valorization

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Oxo-vanadium-aminotriphenolate complexes (**V1**) represent a versatile class of Lewis-acidic systems in which the ligand framework plays a key role in controlling both structural and reactivity features.[1] Their coordination environment can evolve upon binding of an additional Lewis base, such as an alcohol-containing molecule. Accordingly, these complexes may be regarded as molecular receptors for such us functionalities, whit substrate coordination to the metal centre representing the first step toward selective activation (Figure 1a).

This receptor-like behaviour is particularly relevant for biomass valorization, especially in the case of lignin, one of the most abundant renewable sources of aromatic carbon on Earth.[2] Its alcohol functionalities can interact with the vanadium center, enabling substrate coordination[3] and subsequent activation under blue-light irradiation. This process can trigger chemical transformations of the coordinated substrate, including homolytic C-C bond cleavage, making lignin an attractive yet challenging platform for the production of value-added aromatic chemicals (Figure 1b).

In this communication, the ability of **V1** complexes to bind and activate lignin-related Lewis base molecules will be discussed. Under mild conditions (visible-light irradiation, room temperature and aerobic atmosphere) lignin and lignin model compounds undergo oxidative C-C bond cleavage, affording valuable low-molecular weight products such as aldehydes, carboxylic acids or phenolic derivatives with high selectivity. This approach provides access to aromatic molecules that are commonly obtained from petroleum-based sources, highlighting the potential of these systems for the sustainable valorization of lignin-derived feedstocks.

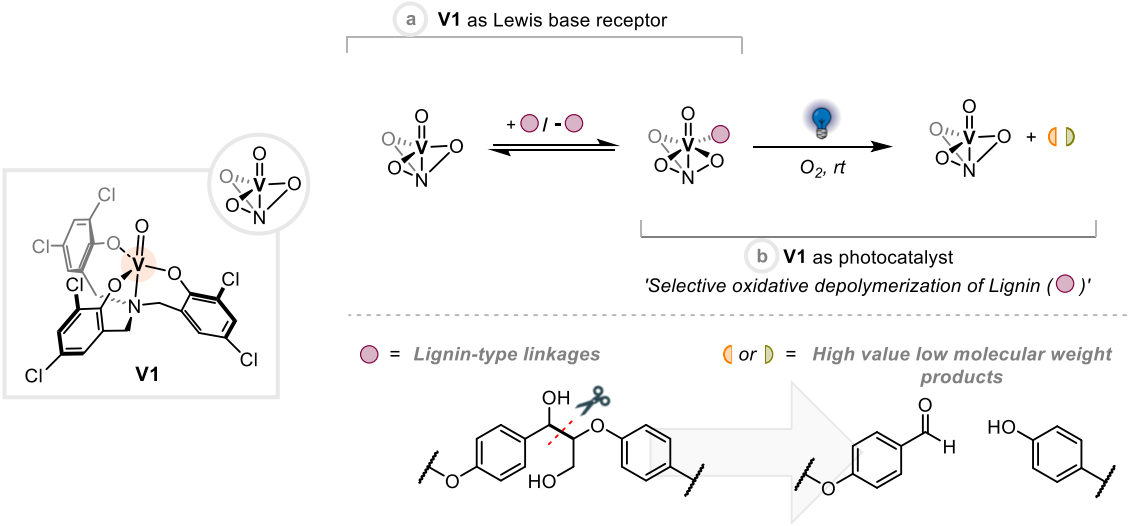

Figure 1: Schematic representation of **V1** as a receptor of Lewis-basic substrates, followed by blue-light-induced oxidative C-C bond cleavage under mild aerobic conditions.

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