The anthropogenic climate changes caused by meeting the energy demands of society by use of fossil fuels render the development of benign alternatives imperative. Probably, the most promising alternative is generating energy by means of power units driven by, e.g., solar, wind, water, etc., and then storing the energy that is not immediately used in battery type devices. Such a device might consist of hydrogen chemically stored as alcohol(s). The advantage of this method is that it allows gaseous hydrogen to be stored much more efficiently when liquefied as an alcohol. Moreover, as will be shown in this review, it is possible to release the hydrogen under mild conditions when employing homogeneous catalysis. This review considers the kinetic aspects of homogeneously catalysed acceptorless alcohol dehydrogenation reactions. For clarity, the sections are divided according to alcohol substrate, and each metal are described and discussed in subsections. Moreover, the kinetic information in the homogeneously catalysed AAD is traditionally provided simply as the turnover frequency, and more in-depth studies on the actual kinetic parameters are to date still largely elusive.