

Selectivity models for chemical synthesis

Per-Ola Norrby^a and Anna Tomberg^b

^a *Pharmaceutical Sciences, AstraZeneca*, ^b *Discovery Sciences, AstraZeneca*
per-ola.norrby@astrazeneca.com

Selectivity is an essential component in planning a synthetic route to a target compound. A low selectivity implies a low yield and tedious purification. At AstraZeneca, we try to support the route finding process by making mechanistically based predictive tools available to synthetic chemists with no modeling experience. The current presentation will focus on two types of selectivity:

- Enantioselectivity is the crucial property of asymmetric catalysts. Using our Q2MM methods to create reaction-specific transition state force fields [1], we have created a virtual screening tool that calculates the expected selectivity for a given substrate with a pre-defined library of chiral catalysts [2].
- Regioselectivity is the ability to predict the reaction site when multiple positions can be attacked. This is especially a difficult task in C-H functionalization reactions, which are at the core of the late stage functionalization strategy (LSF). We are training machine learning models to predict sites of reactivity using computed descriptors [3]. With a sufficient number of reactions in the final tool, the chemists will be able to select the most well-suited reaction class for each desired C-H functionalization in complex scaffolds.

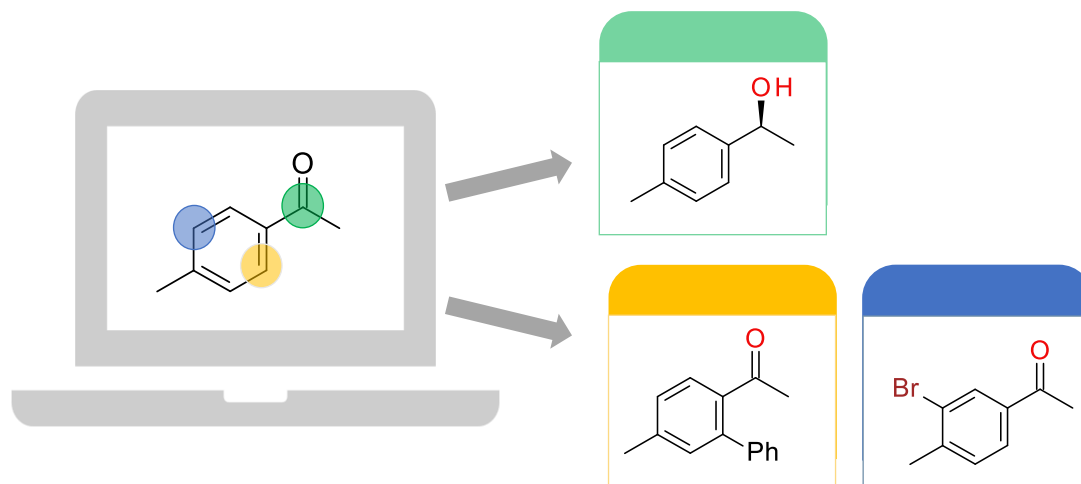


Figure 1: computational modelling of reaction selectivity.

References

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