

2.3.3 Sabatier's principle

The interaction between the catalyst and the substrate should be not too weak but not too strong.

If the interaction is too weak, the reactive intermediate is not stabilized.

If the interaction is too strong, the reactive intermediate is too stable and will not react.

This leads to so-called **Volcano plots** (the activity goes through a maximum according to bonding strength).

For ex.: Ammonia synthesis (N_2 dissociation is the RDS): $\text{N}_2 \rightarrow 2 \text{N}^*$

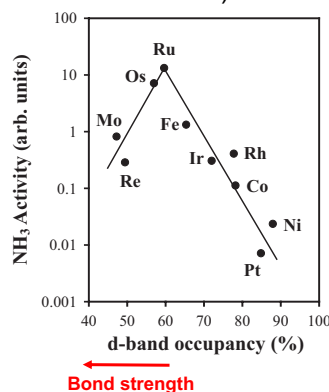


Image source: Concepts of Modern Catalysis and Kinetics, Wiley, 2007

3

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For ex.: Hydrogen evolution in an acidic electrolyte: $2 \text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2$

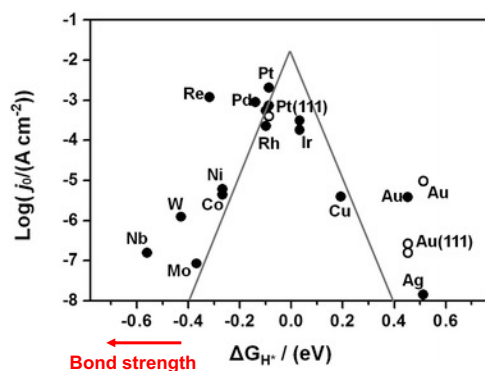


Image source: Zeng and Li, J. Mater. Chem. A, 2015

4