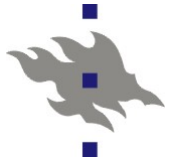




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Think of possible reasons for the RH-dependence of nucleation events







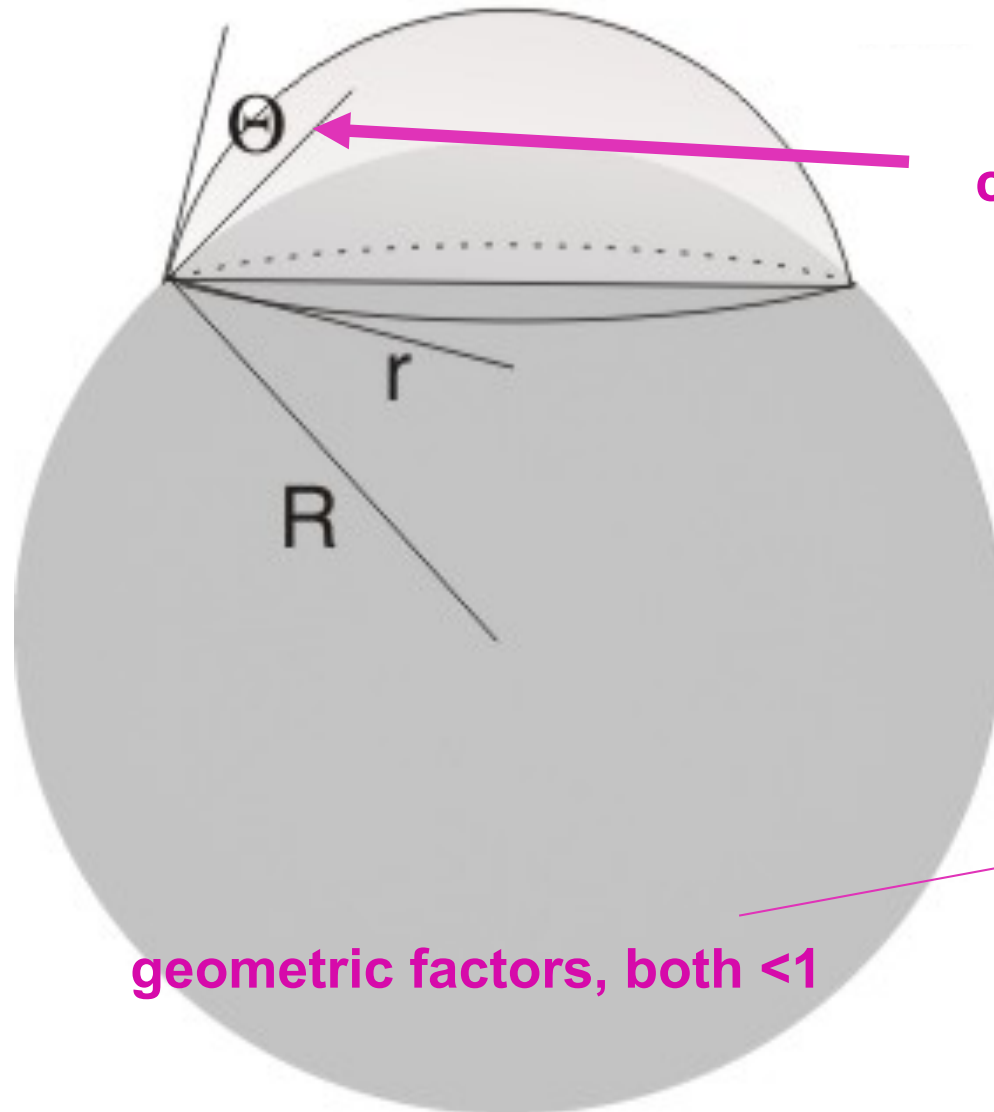
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Heterogeneous nucleation





When cluster forms on a seed particle, the geometry is different: cluster not spherical



contact angle

$$r_{het}^* = r_{hom}^* = \frac{2\sigma v}{kT \ln S}$$

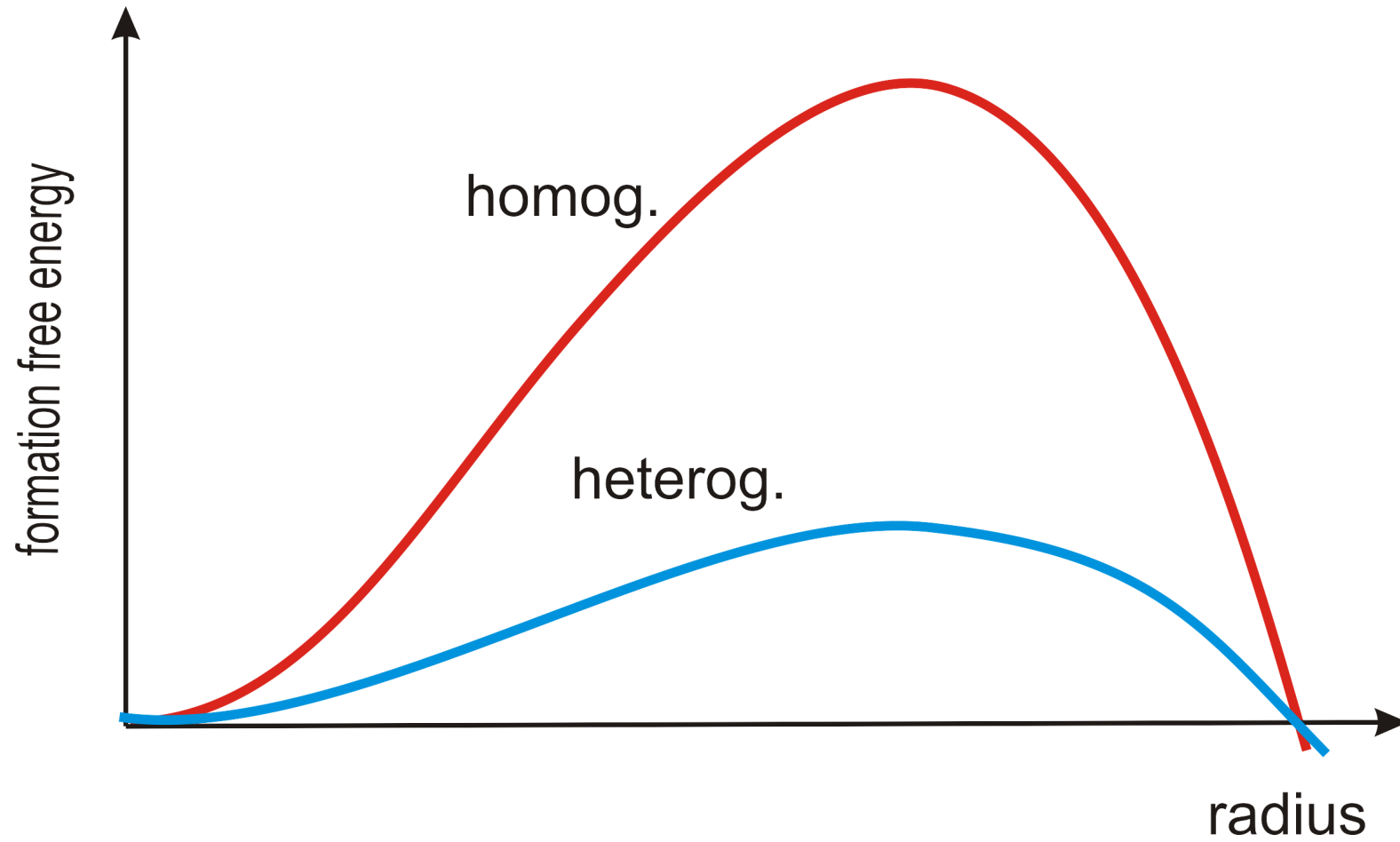
$$\Delta G_{het}^* = f_G \Delta G_{hom}^*$$

$$N_{het}^* = f_N N_{hom}^*$$

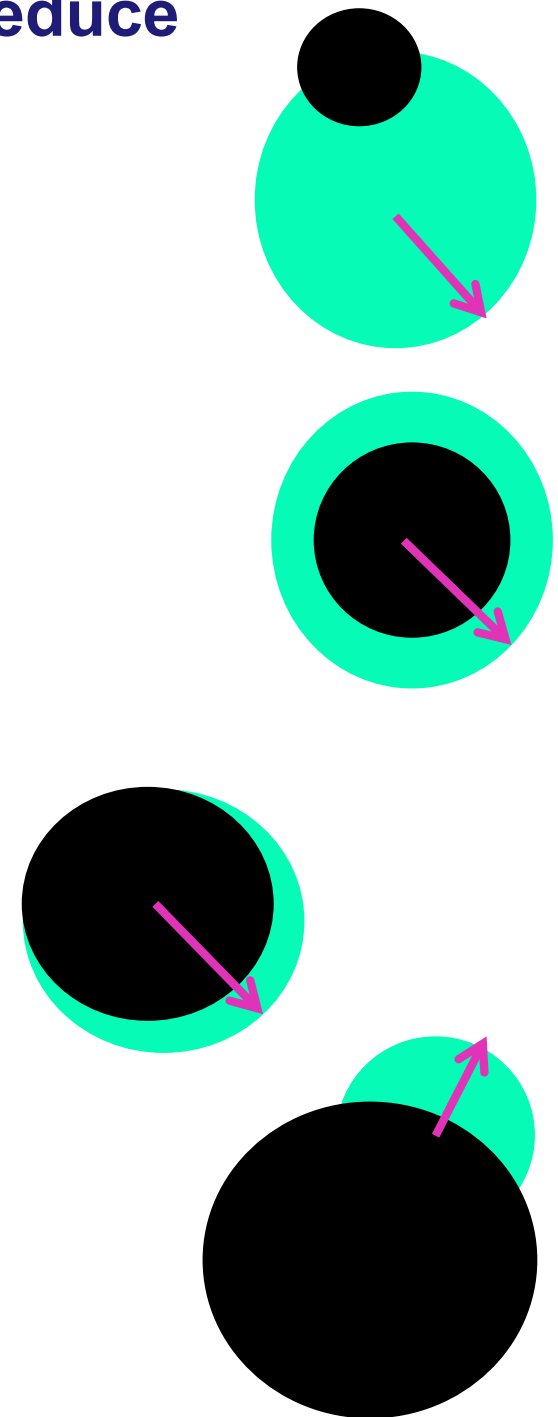
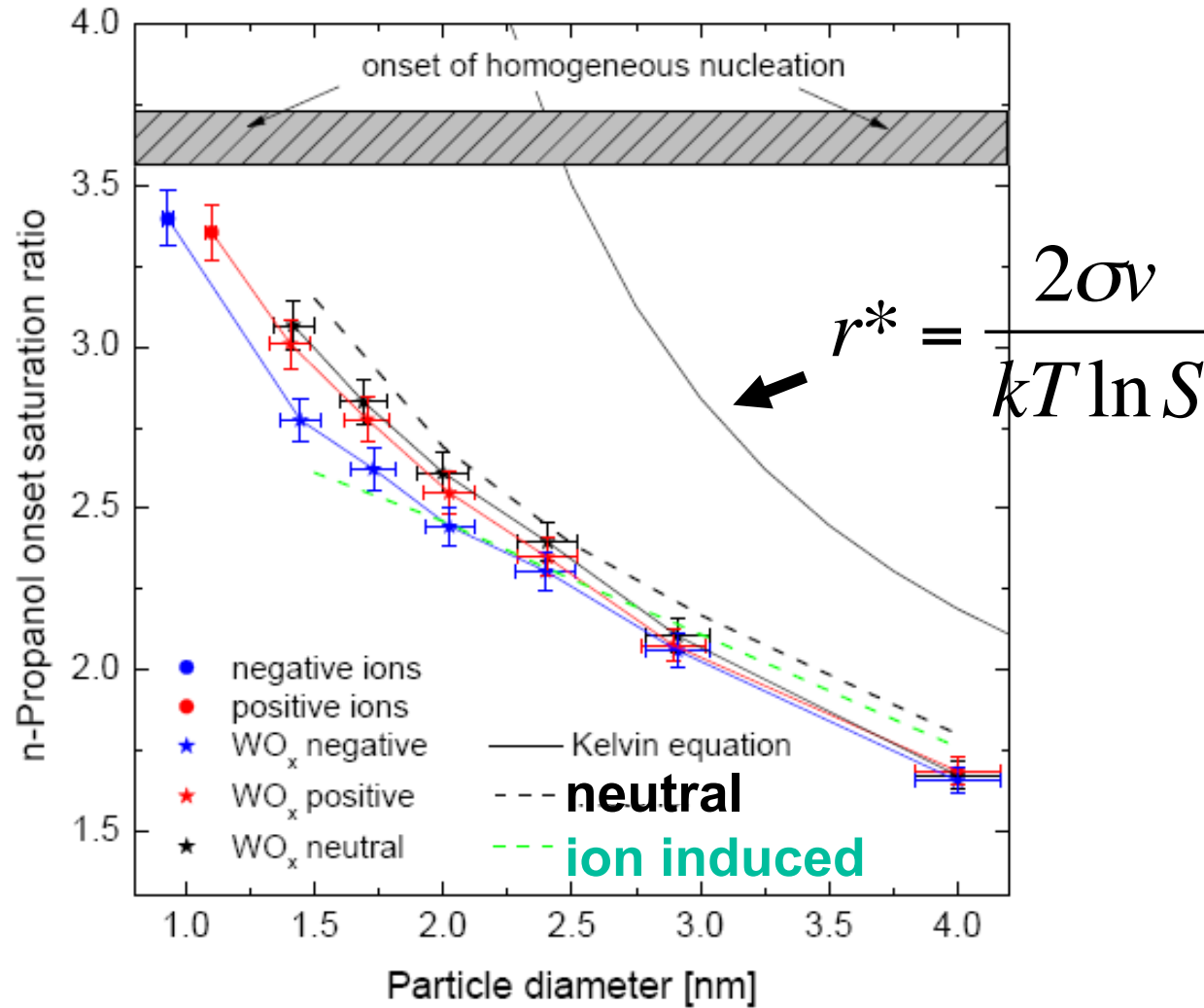
geometric factors, both <1



Effect of the nucleation seed on the free energy curve



Even very small seed particles reduce nucleation barrier significantly





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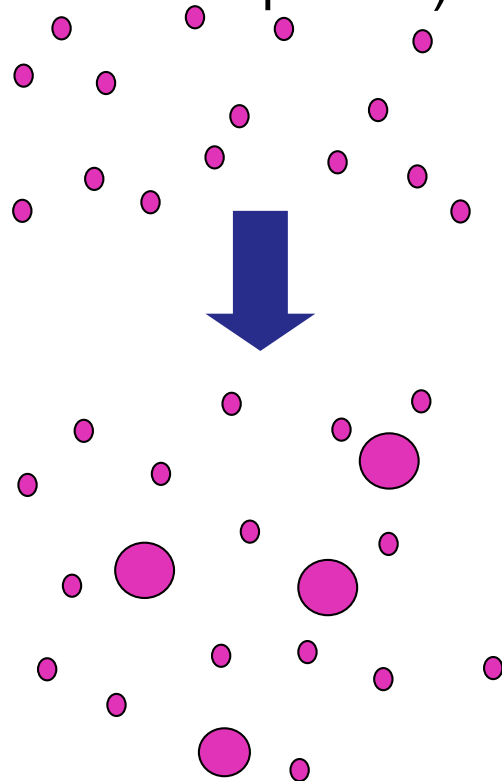
Homogeneous nucleation or cluster activation?



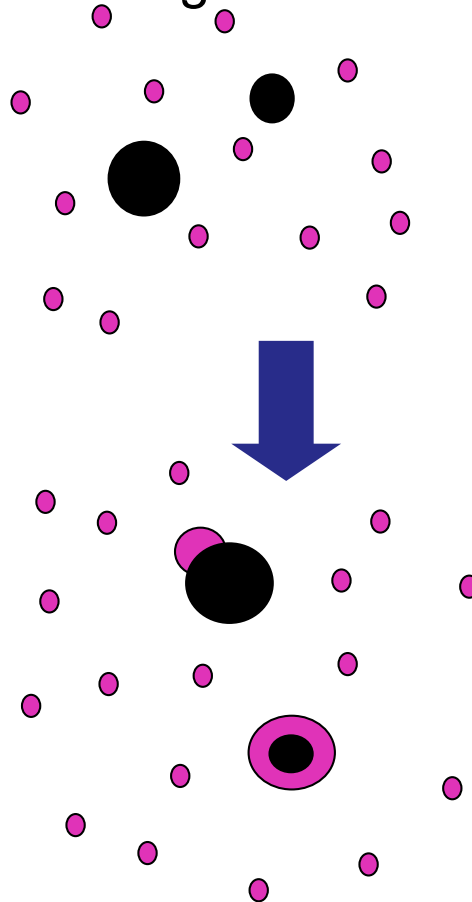
Classification of nucleation / particle formation processes:



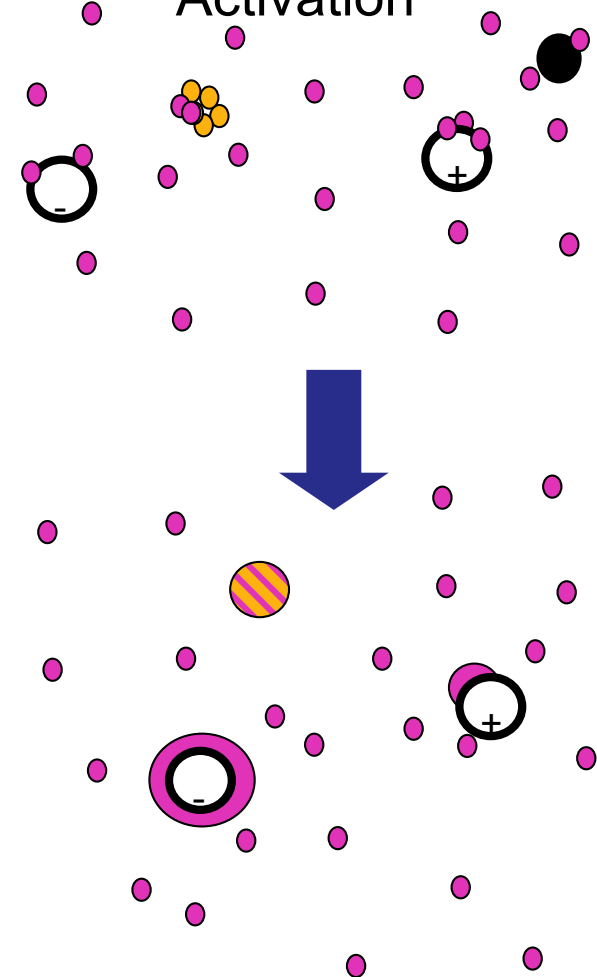
Homogeneous
(one- or
multicomponent)



Heterogeneous



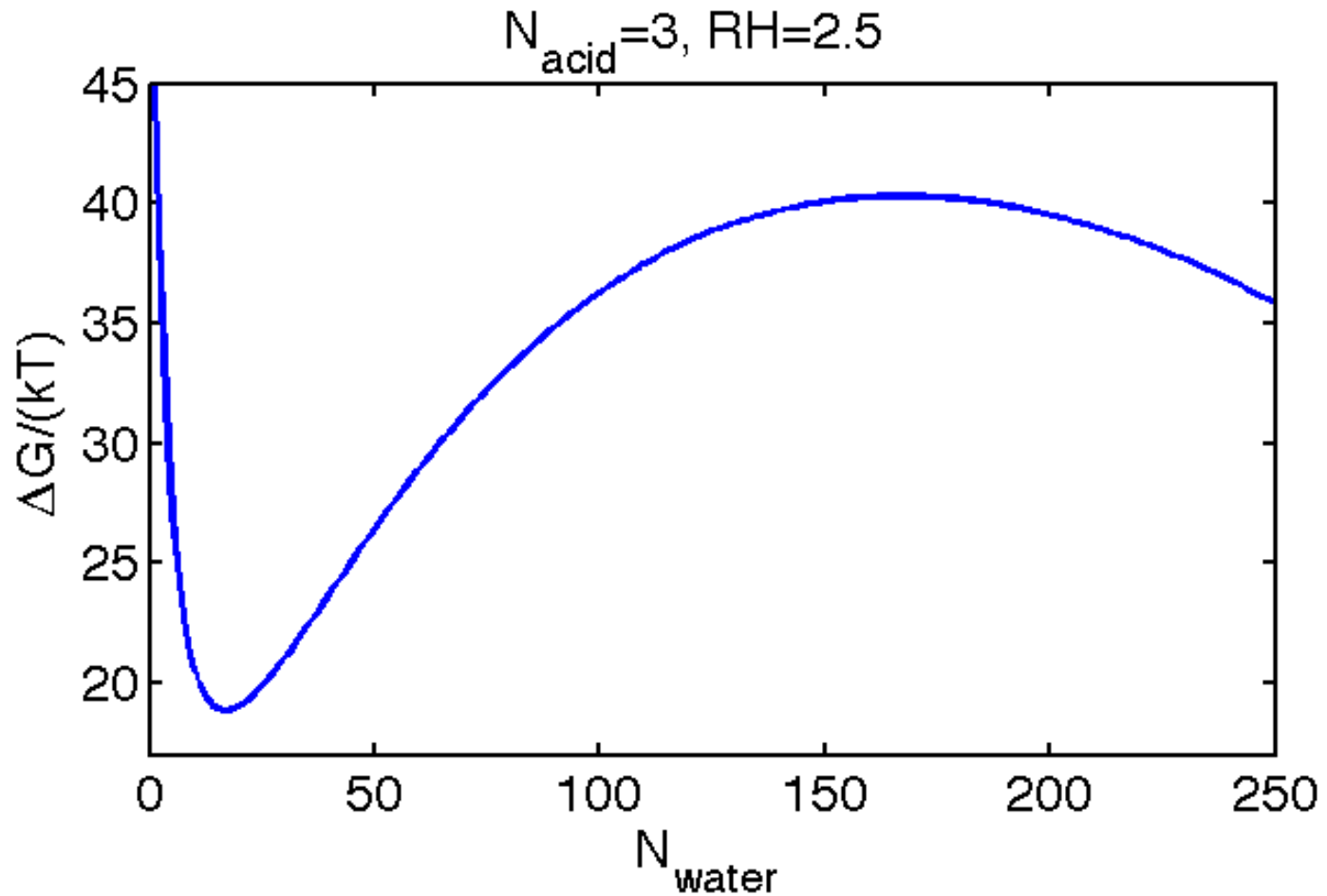
Activation



These processes involve a barrier

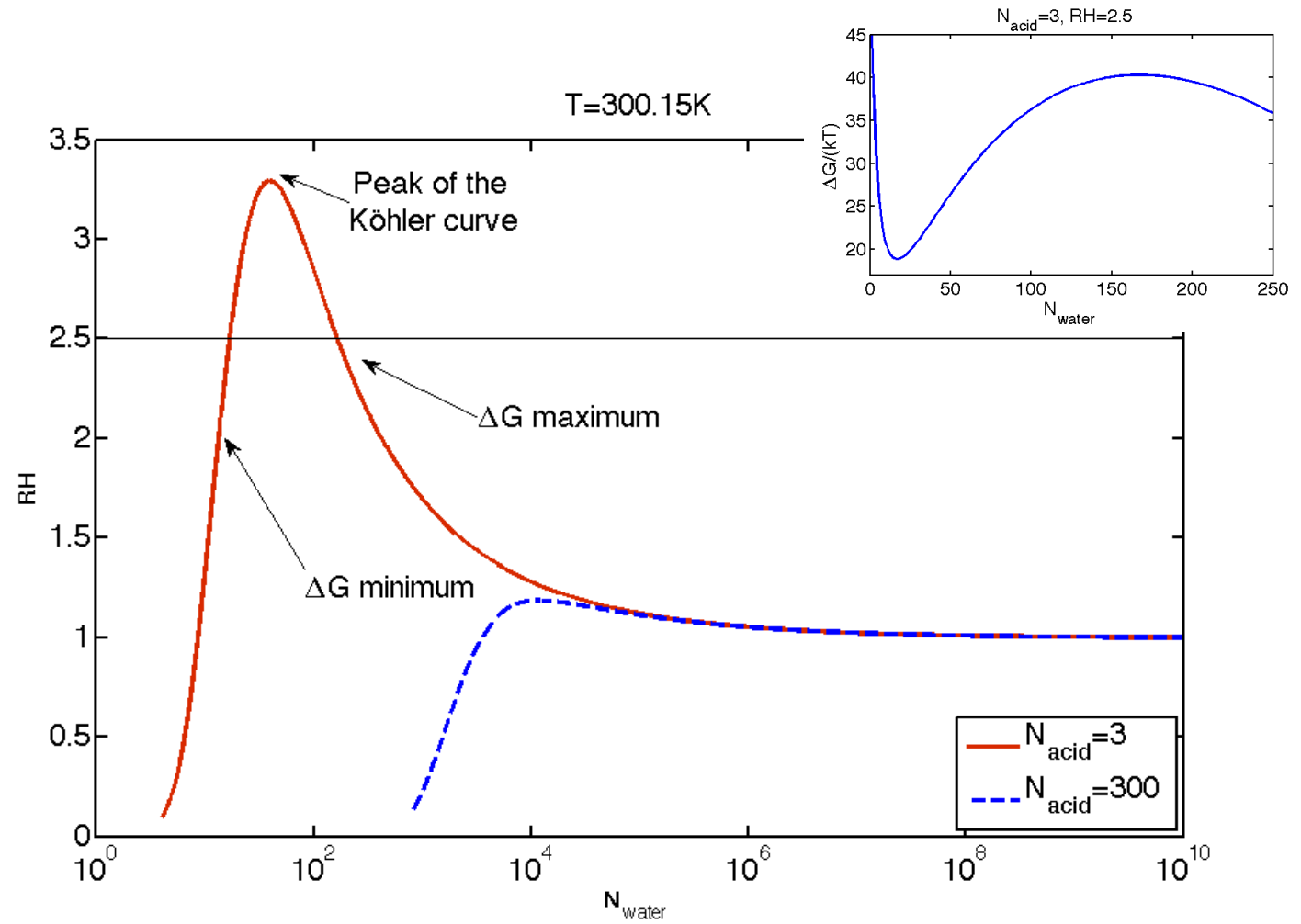


Formation free energy curve in activation





Analogy to the Köhler curve -cloud droplet activation





Pre- nucleation molecular clusters

- Can enhance nucleation of atmospheric vapours
 - Clusters can act as seeds or building blocks of the forming particles
- Can hinder nucleation when nucleation-eager molecules drop to the free energy minimum
- Both of these opposing effects can be at work simultaneously