CATALYSTS

WHAT → INCREASES THE REACTION RATE without being consumed (but... reforming catalysts)

HOW → lowers the E_a

"provides an alternate pathway"

HETEROGENEOUS CATALYST

→ in a different phase than the reactants

→ solid catalyst w/ liquids, aq, gases

→ catalytic converter

$NO_x \longrightarrow N_2 + O_2$

$H_2O_2 \xrightarrow{Pt} H_2O + O_2$

Haber (NH_3) process Ostwald (HNO_3)

HOMOGENEOUS CATALYST → single phase

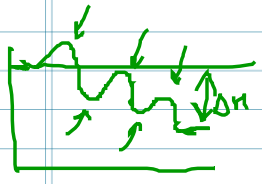
↳ often an acid or base

REDOX

ex: I^- catalyst decomp. H_2O_2

Mn^{2+}

$2\,Ce^{4+}_{(aq)} + Tl^{+}_{(aq)} \xrightarrow{Mn^{2+}} 2\,Ce^{3+}_{(aq)} + Tl^{3+}_{(aq)}$



$Ce^{4+} + Mn^{2+} \longrightarrow Ce^{3+} + Mn^{3+}$

$Mn^{3+} + Ce^{4+} \longrightarrow Ce^{3+} + Mn^{4+}$

$Mn^{4+} + Tl^{+} \longrightarrow Tl^{3+} + Mn^{2+}$

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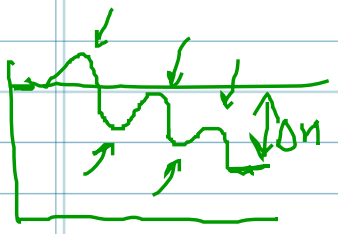

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BIOLOGICAL CATALYST ⟹ ENZYMES

"lock + key"

⇓

large protein

w/ "active sites"