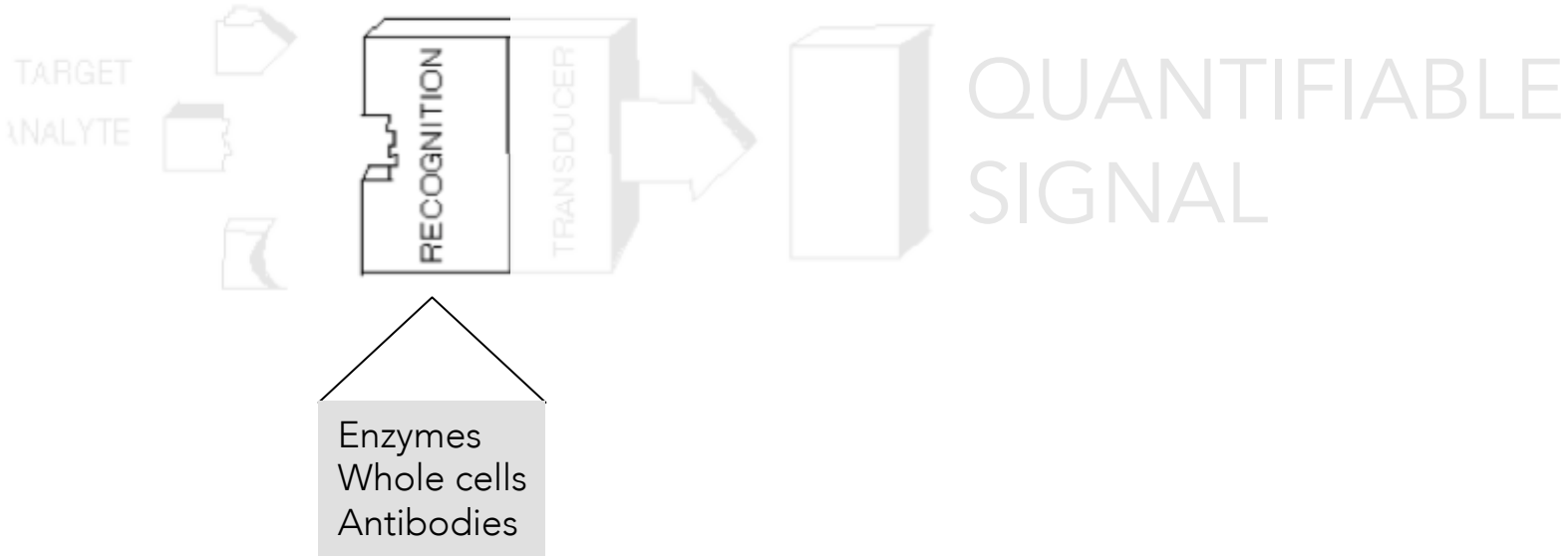
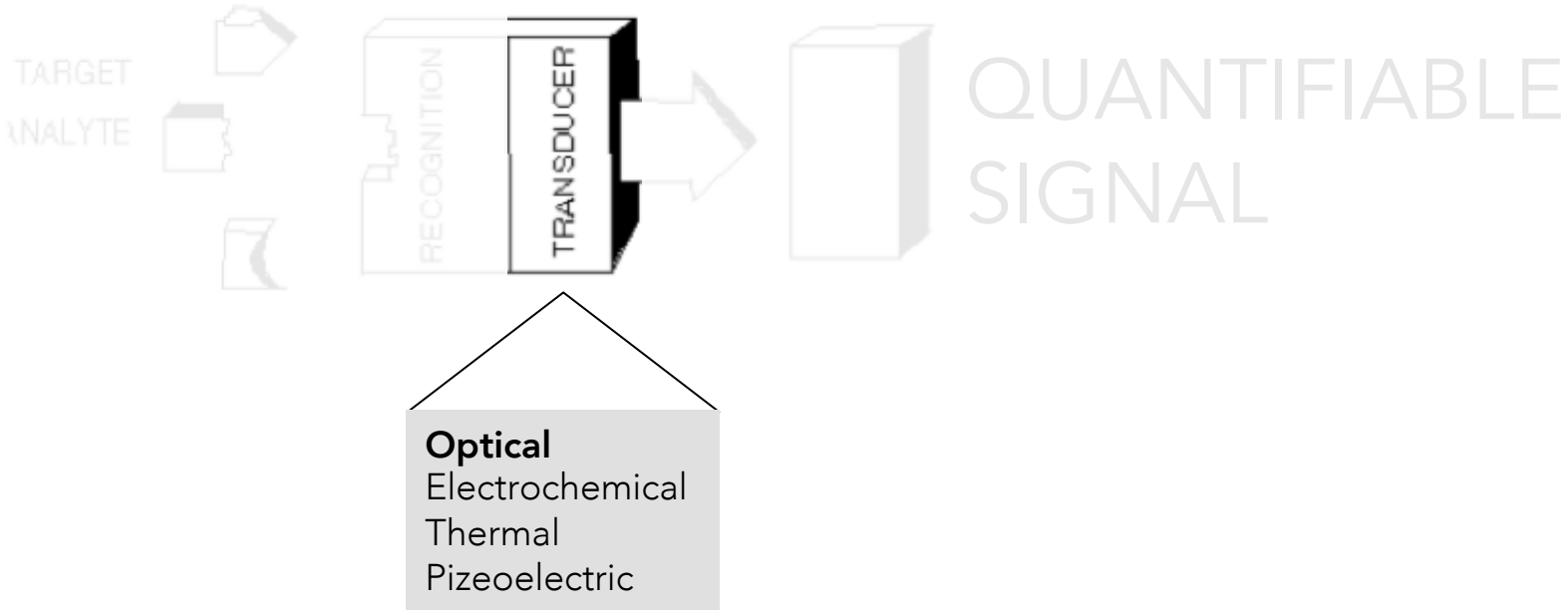

TARGET
ANALYTE
RECOGNITION
TRANSDUCER
QUANTIFIABLE
SIGNAL

QUANTIFIABLE SIGNAL

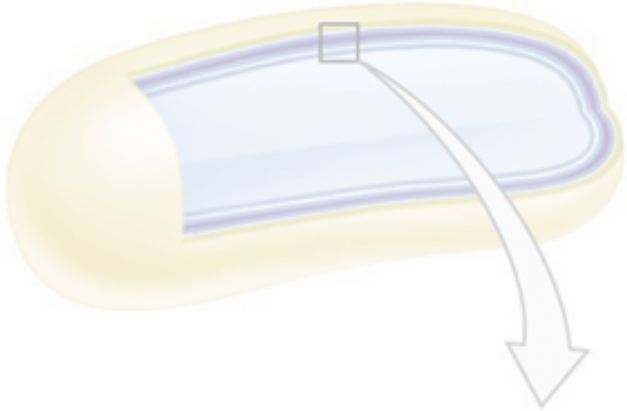

TARGET
ANALYTE
RECOGNITION
TRANSDUCER
QUANTIFIABLE
SIGNAL
Enzymes
Whole cells
Antibodies

Optical
Electrochemical
Thermal
Pizeoelectric

Enzymes
Whole cells
Antibodies


TARGET
ANALYTE
RECOGNITION
TRANSDUCER
QUANTIFIABLE
SIGNAL
Optical
Electrochemical
Thermal
Pizeoelectric


TARGET
ANALYTE
ENZYME
TRANSDUCER
QUANTIFIABLE
SIGNAL



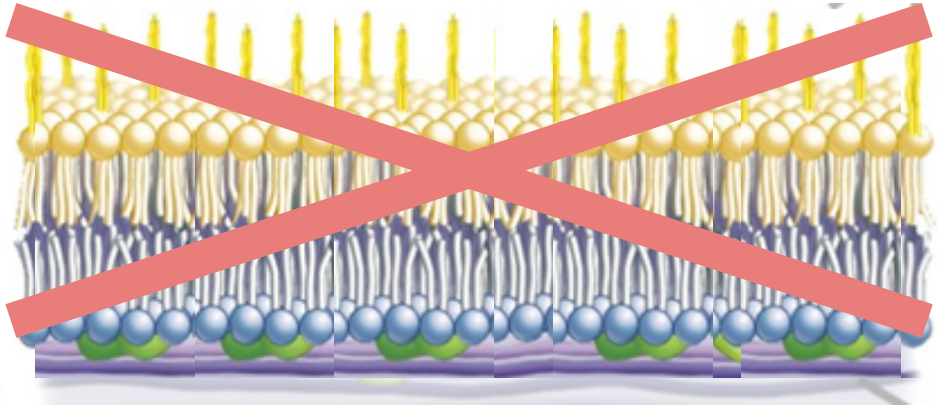
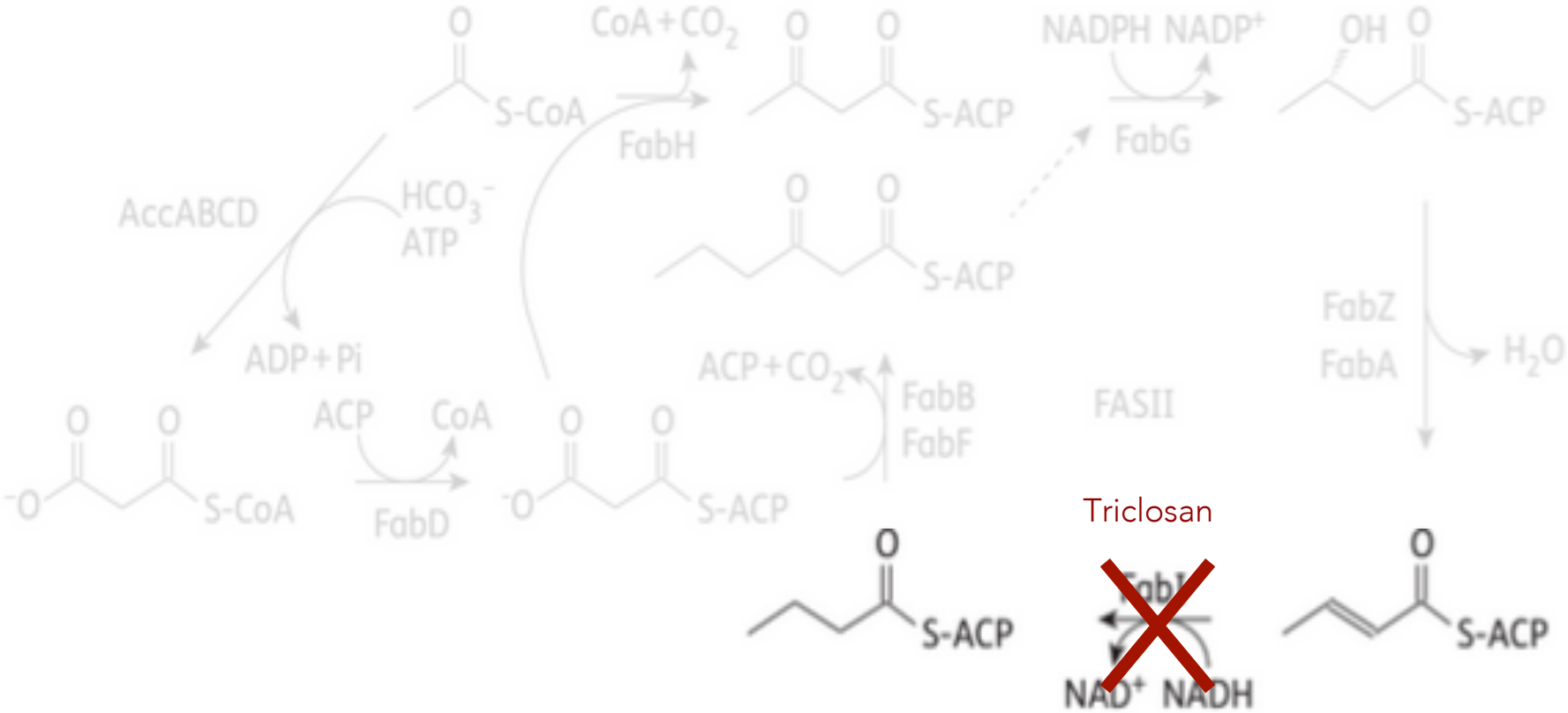
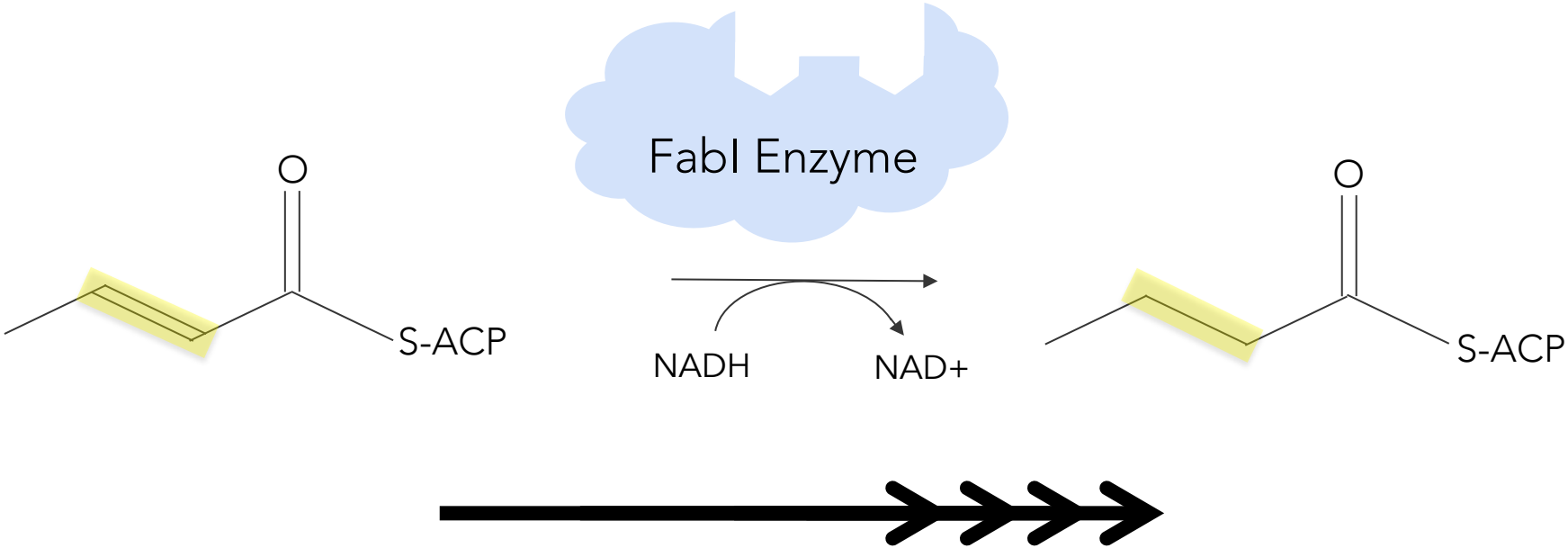
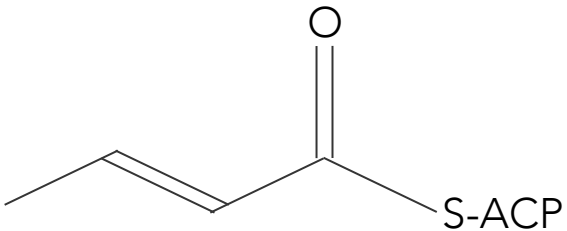
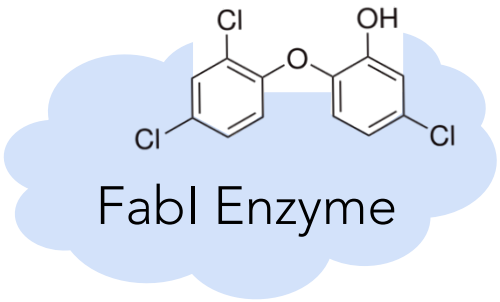


Figure 1. The *E. coli* fatty acid biosynthesis pathway.



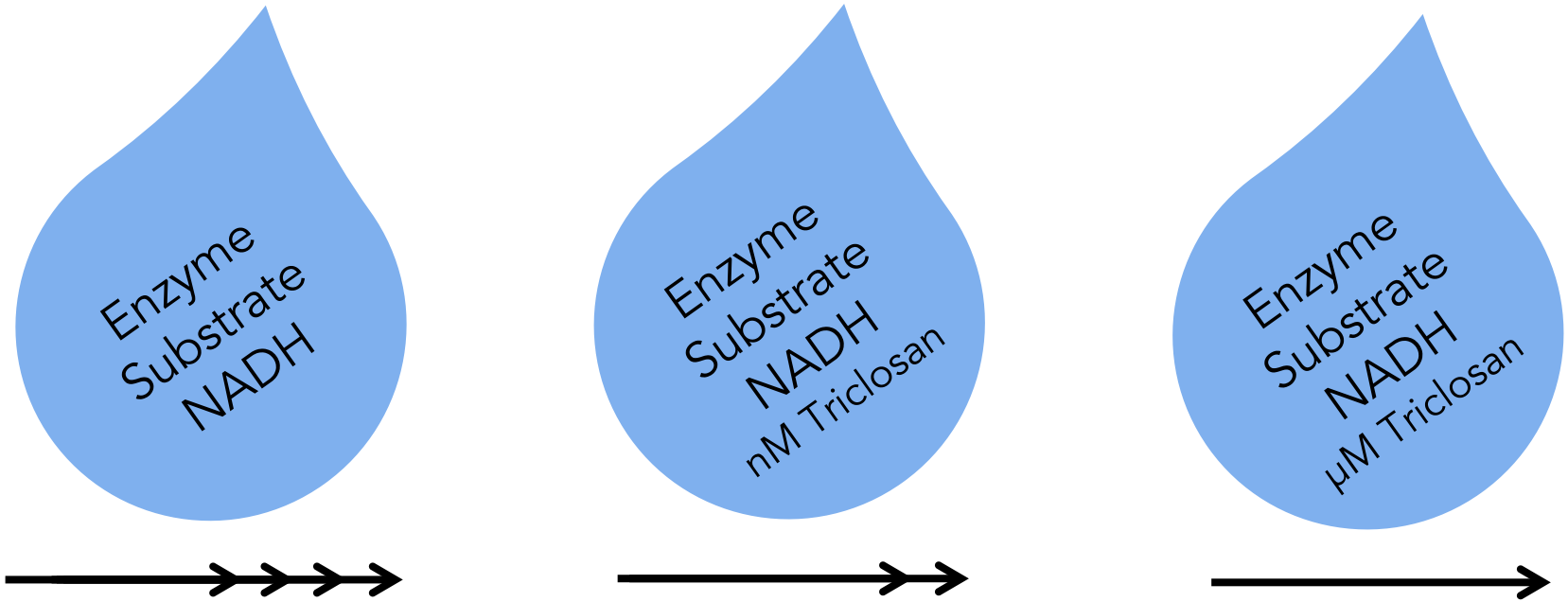

FabI Enzyme
O
S-ACP
NADH
NAD+
O
S-ACP

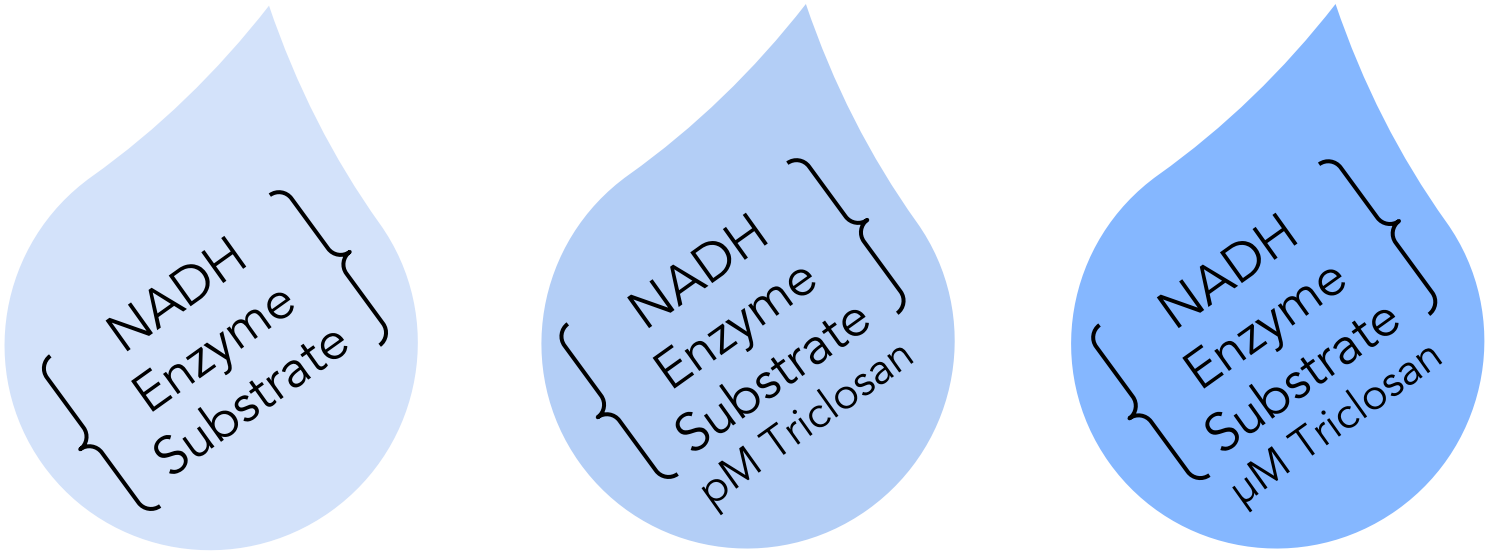

O
S-ACP


Cl
OH
O
Cl
Cl
FabI Enzyme
NADH
NAD+

O
S-ACP

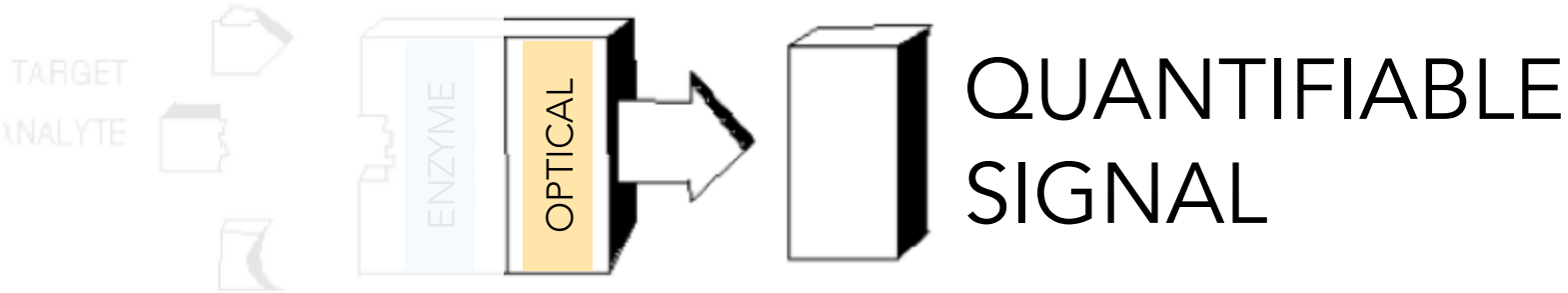
- Suggested question -


Enzyme
Substrate
NADH
Enzyme
Substrate
NADH
nM Triclosan
Enzyme
Substrate
NADH
µM Triclosan

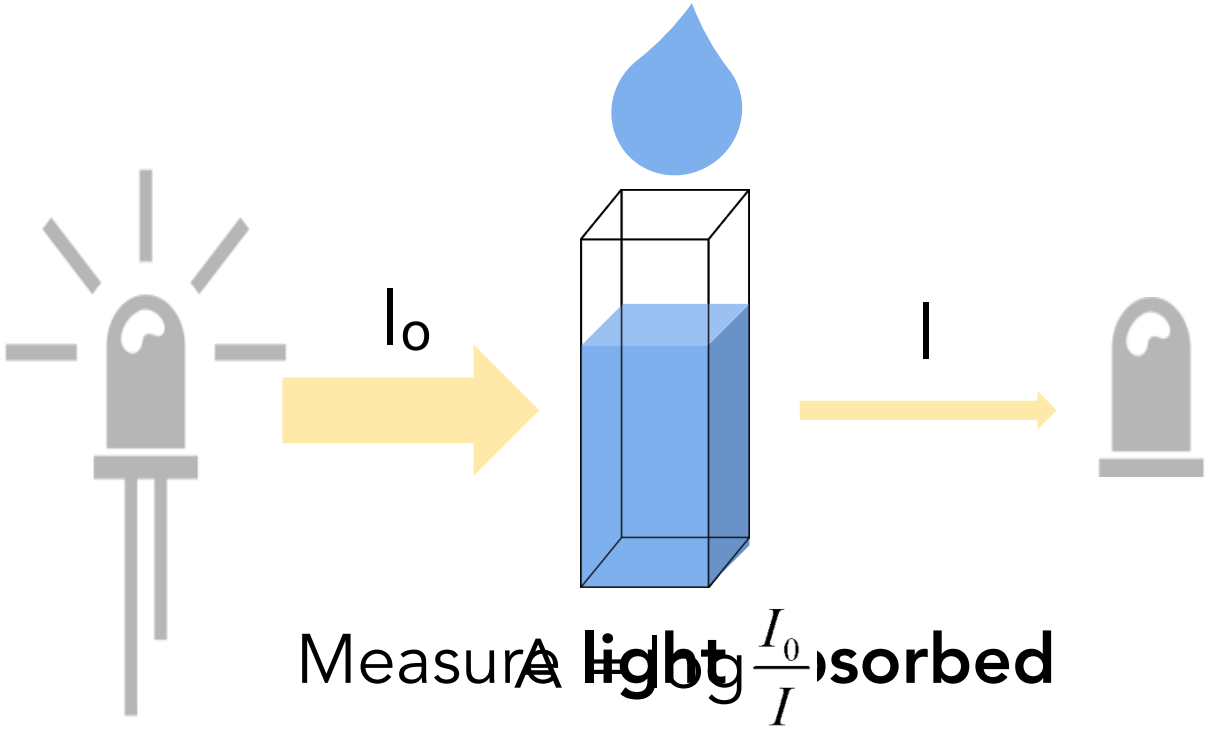


Difference in final [NADH] due to triclosan

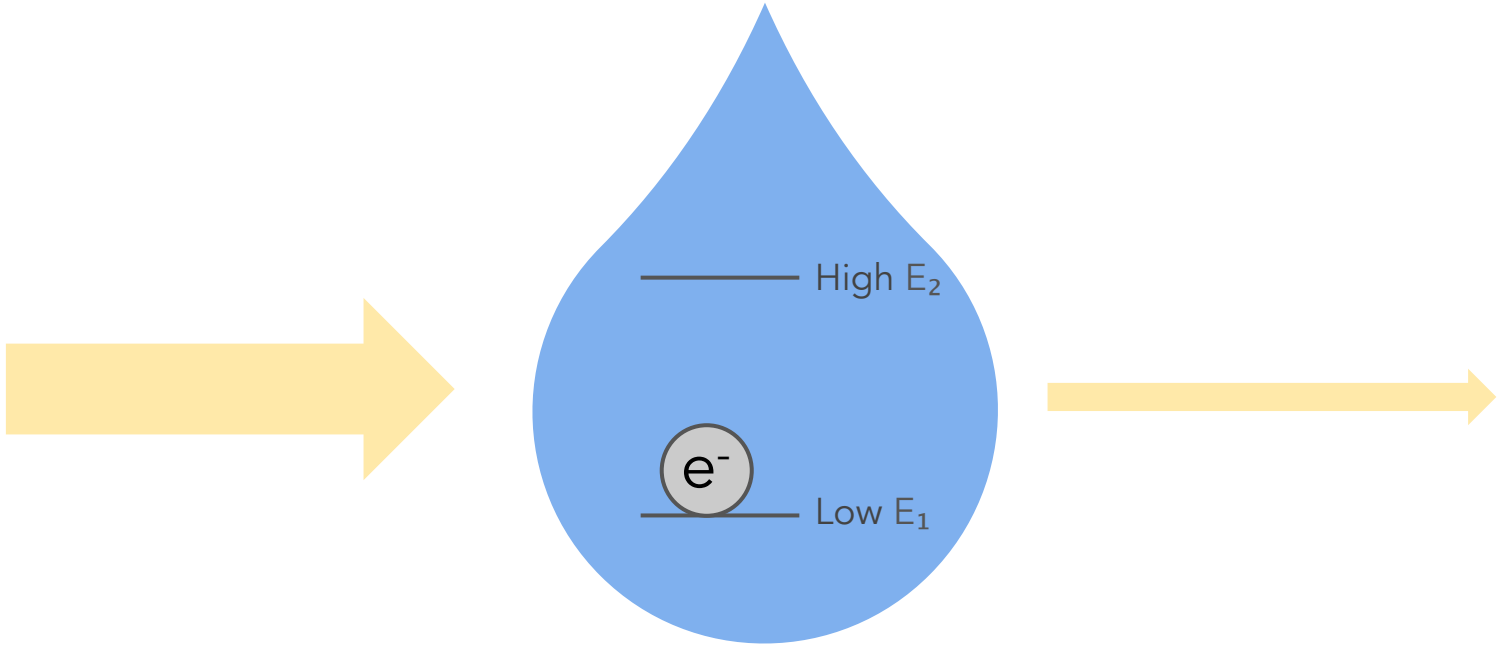
Determine triclosan by measuring NADH



How can we measure NADH?

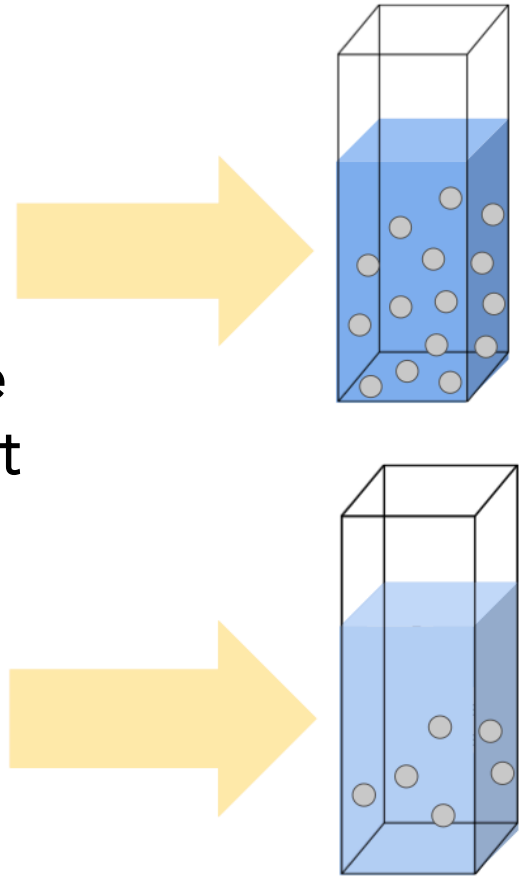


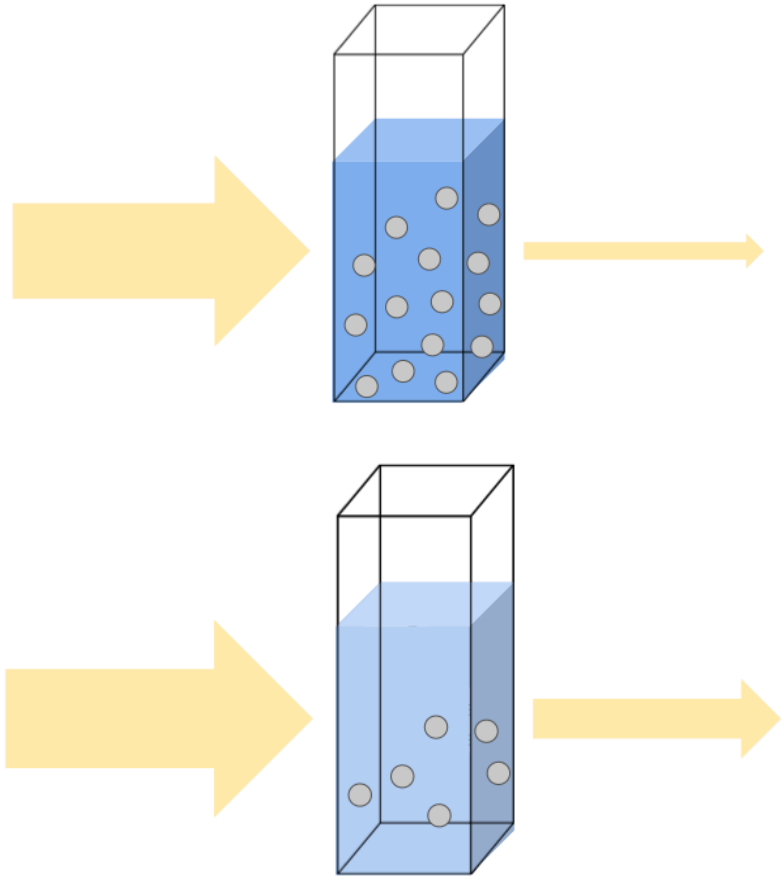
Measure **light absorbed** $\frac{I_0}{I}$

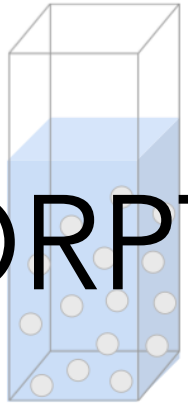

High E_2
e^-
Low E_1

- Suggested question -

Which of these solutions will let more light through?

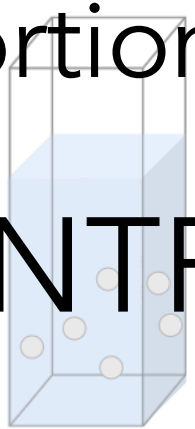






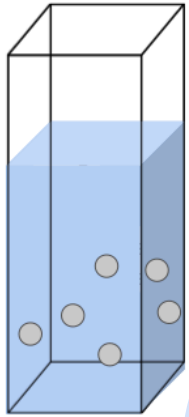
ABSORPTION

proportional to



CONCENTRATION

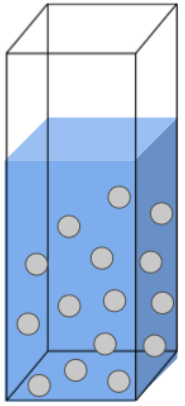
- Suggested question -



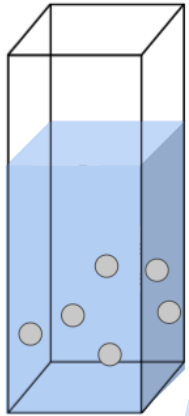
100 uM NADH

300 uM NADH

500 uM NADH



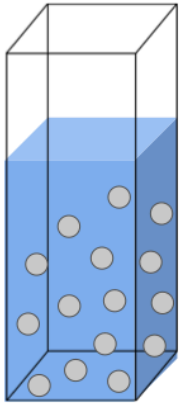
Which of these solutions will have a higher absorption value?



100 uM NADH

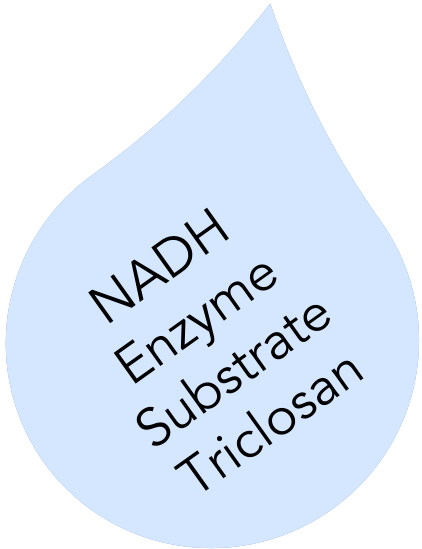
300 uM NADH

500 uM NADH

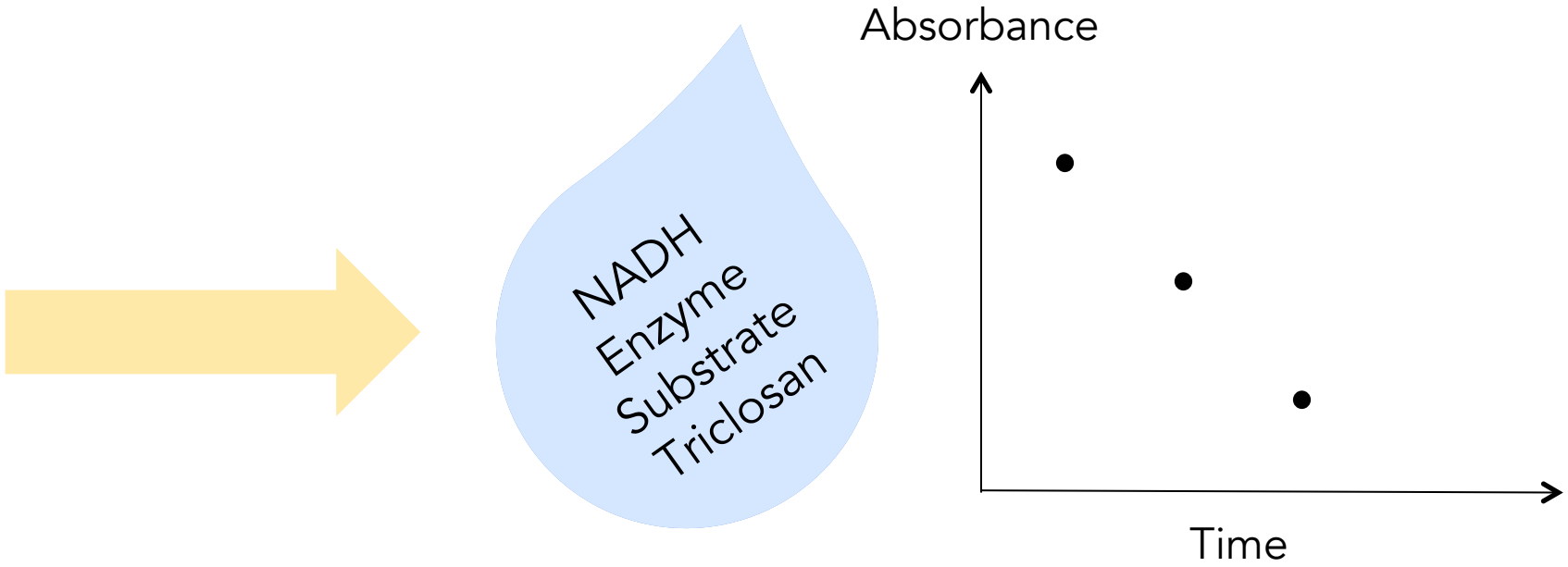


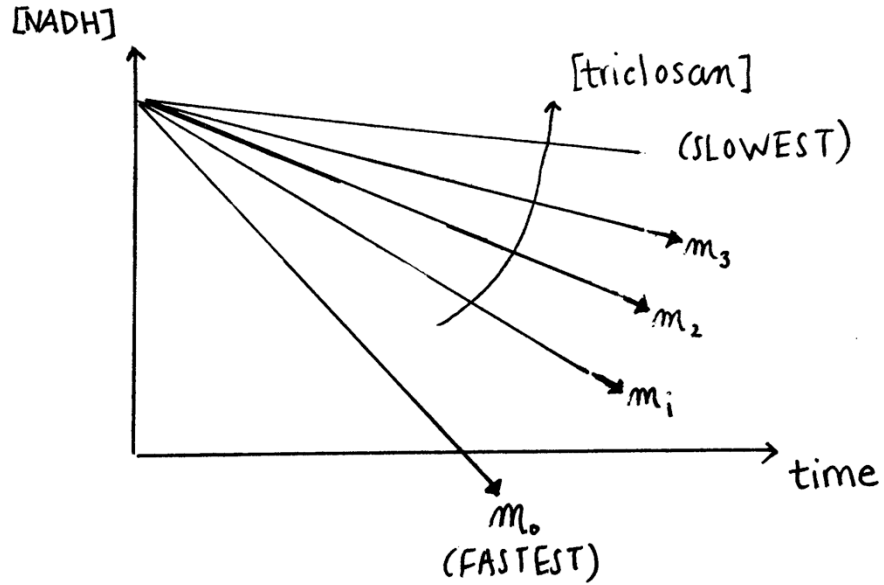
LOW ⟷ HIGH

- Suggested question -

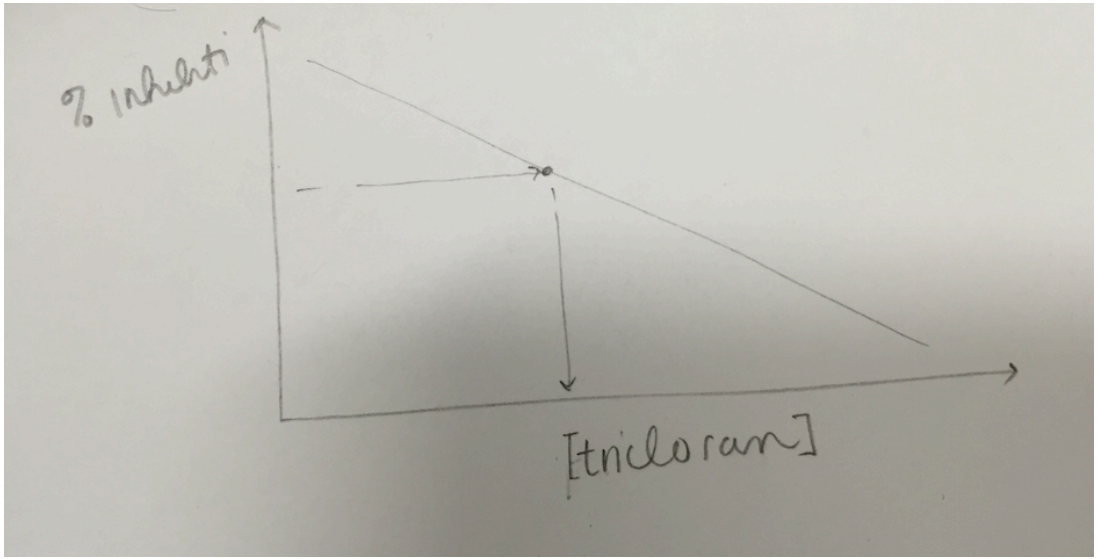


How might we represent this graphically?

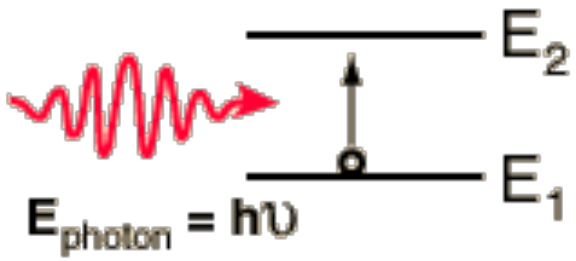

NADH
Enzyme
Substrate
Triclosan
Absorbance
Time



$$\% \text{ inhibition} = \frac{m_i - m_0}{m_0} \times 100$$

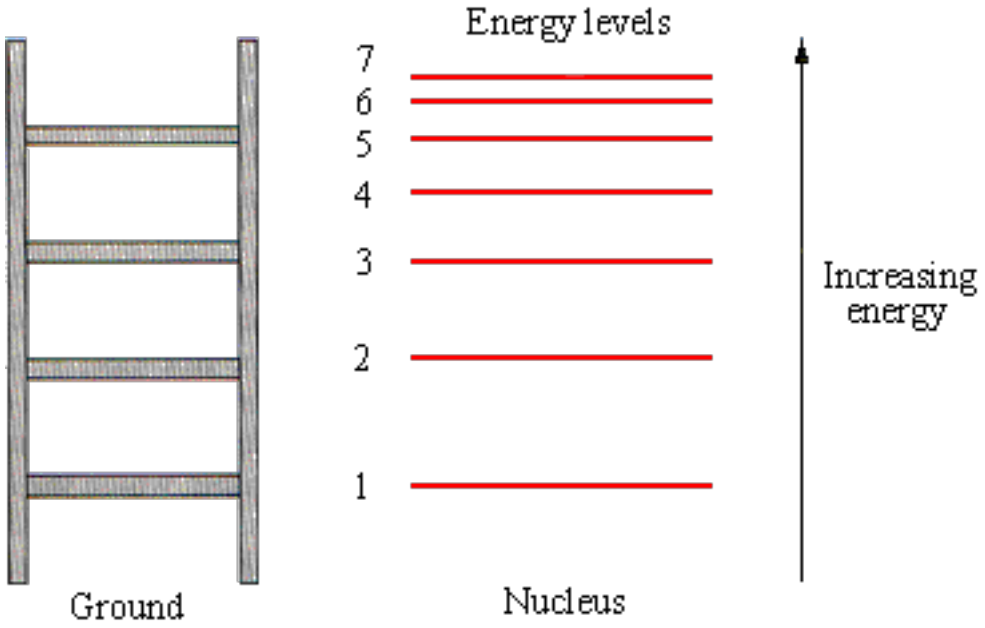

% inibiti
[triclosan]

- Suggested question -



Absorption can occur only when

$$\mathbf{\Delta E} = E2 - E1 = \frac{hc}{\boldsymbol{\lambda}}$$



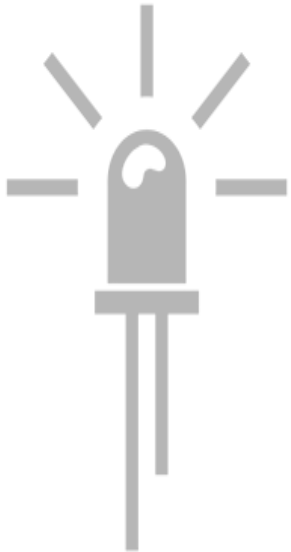
Energy is quantized

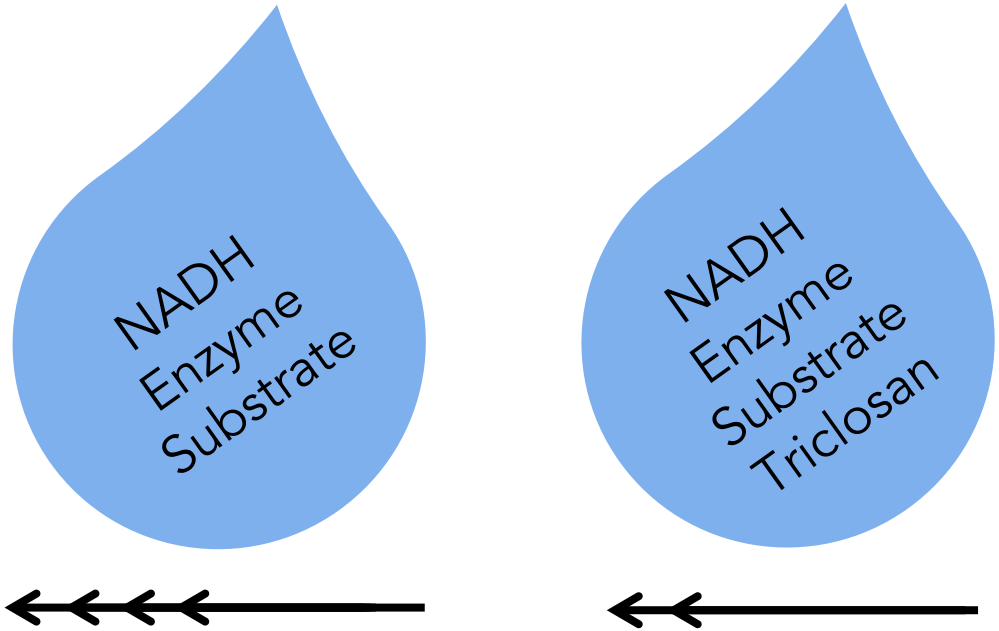
Every chemical has a unique electron orbital,

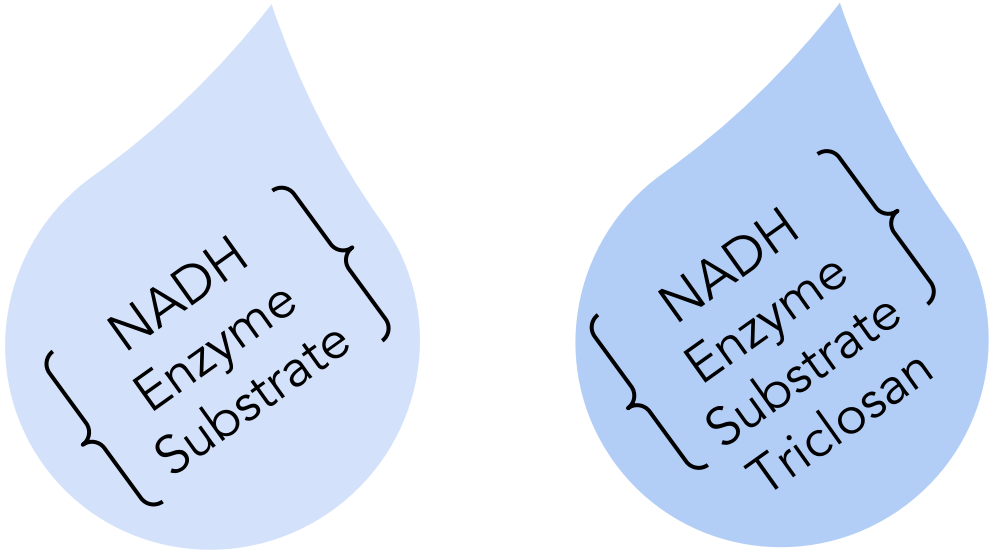
Thus each chemical has a specific energy required to bump its molecules to a higher orbital

Specific energy = specific wavelength

340 nm

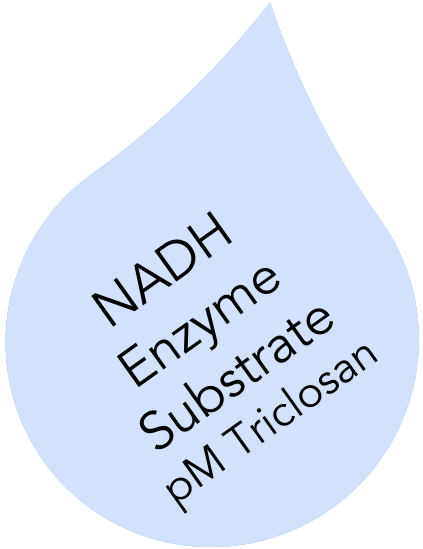



NADH
Enzyme
Substrate
NADH
Enzyme
Substrate
Triclosan

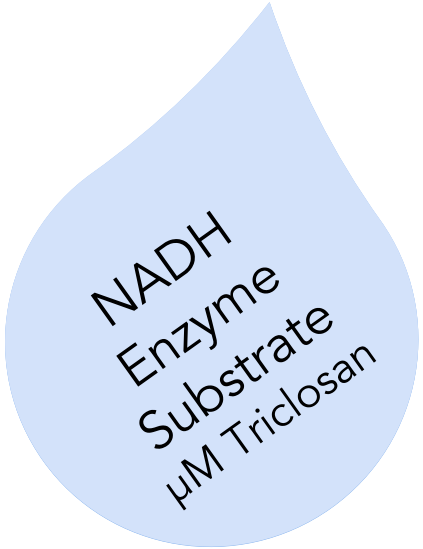


Difference in final [NADH] due to triclosan

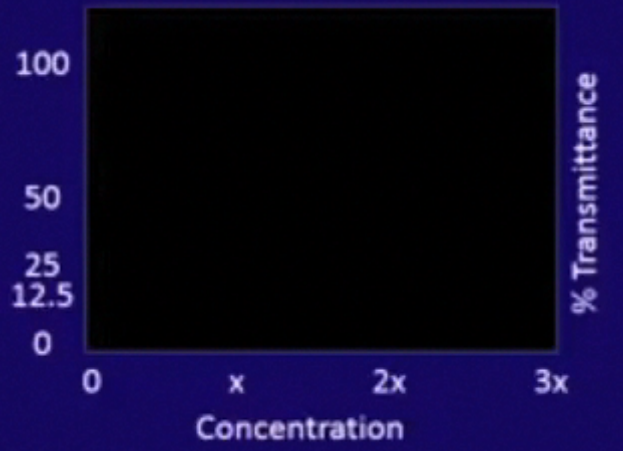
pM Triclosan

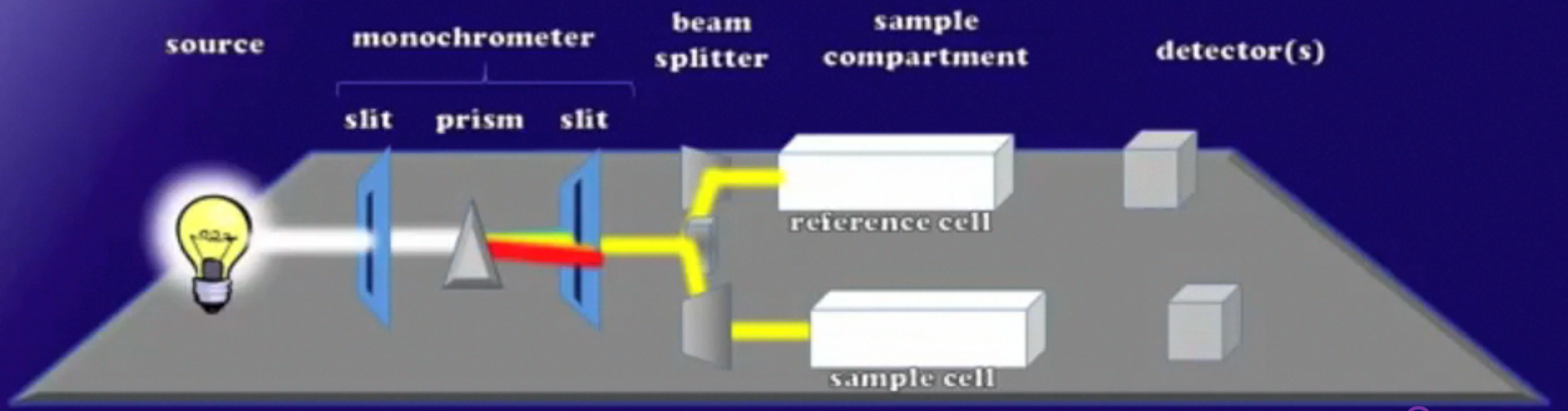


μM Triclosan



UV-visible Spectroscopy and the Beer-Lambert Law





Source