

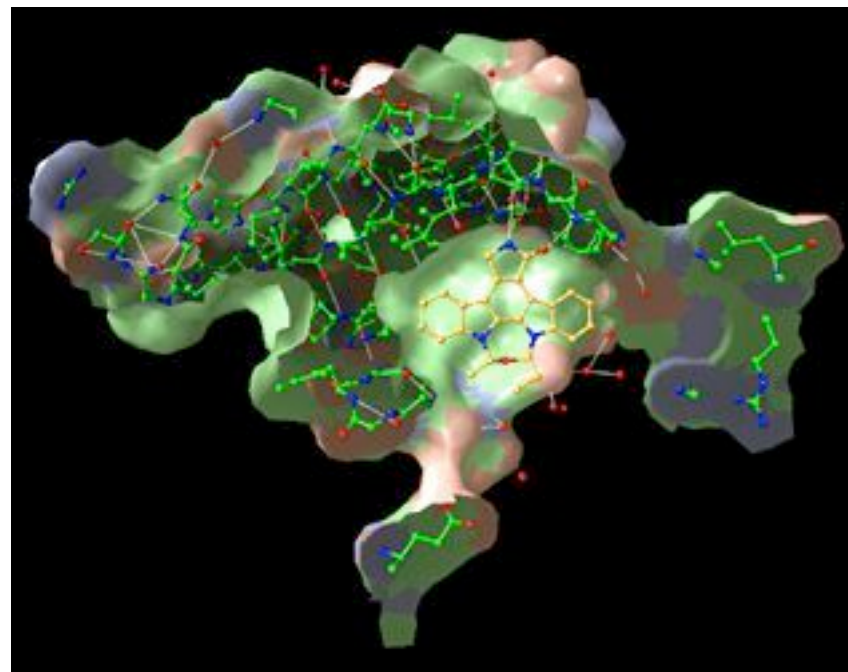
Enzymes

All life requires many chemical reactions

In fact, thousands of different chemical reactions can be
found
in every cell

Some of these reactions would never occur without special large molecules made of protein called **Enzymes**

Computer model
of an Enzyme



Catalyst

A **catalyst** is any substance that speed up chemical reactions

Since Enzymes speed up chemical reactions they are catalysts

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Since they are made from protein they are also organic

Therefore we can say enzymes are *organic catalysts*

How do they work?

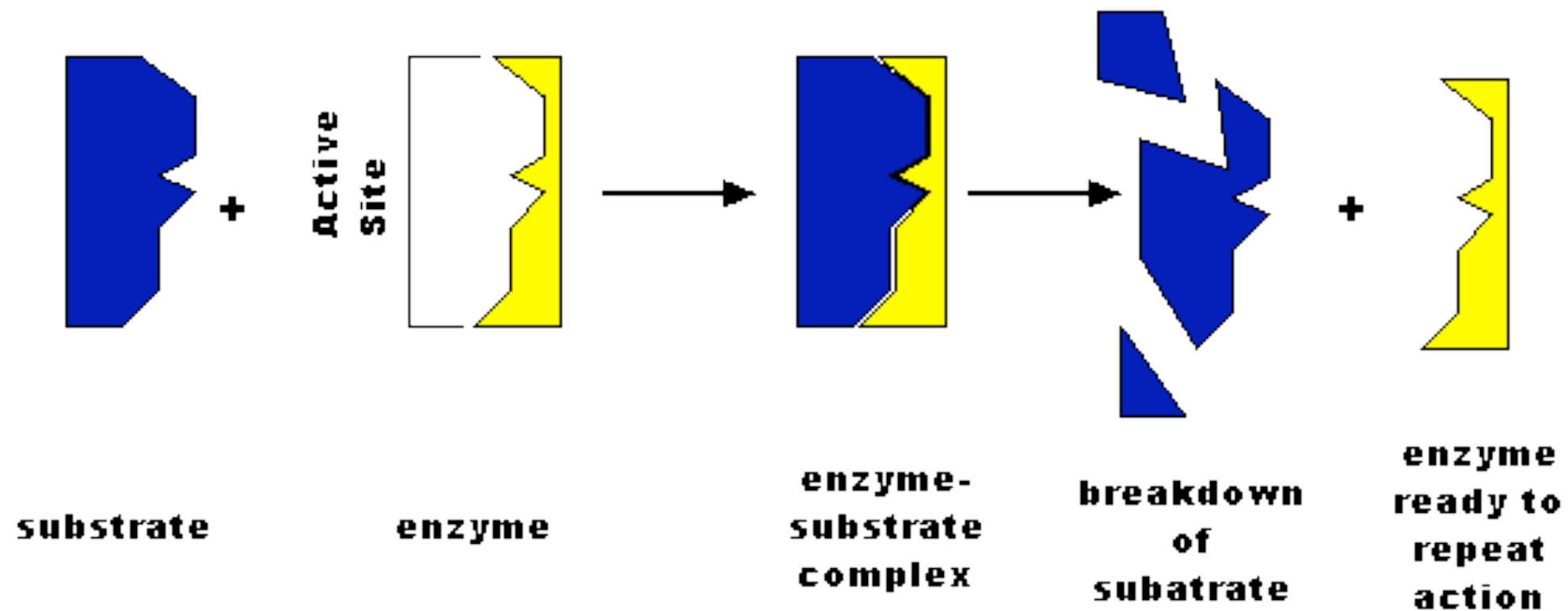
Enzymes combine with the molecules they work on
for a split second

During this split second a chemical reaction will happen

A chemical will be broken or a larger molecule
will
be made during this split second

The molecule that is worked on is called the
substrate

Let's take a look at the common way scientists think an enzyme works



The “Lock & Key Model”

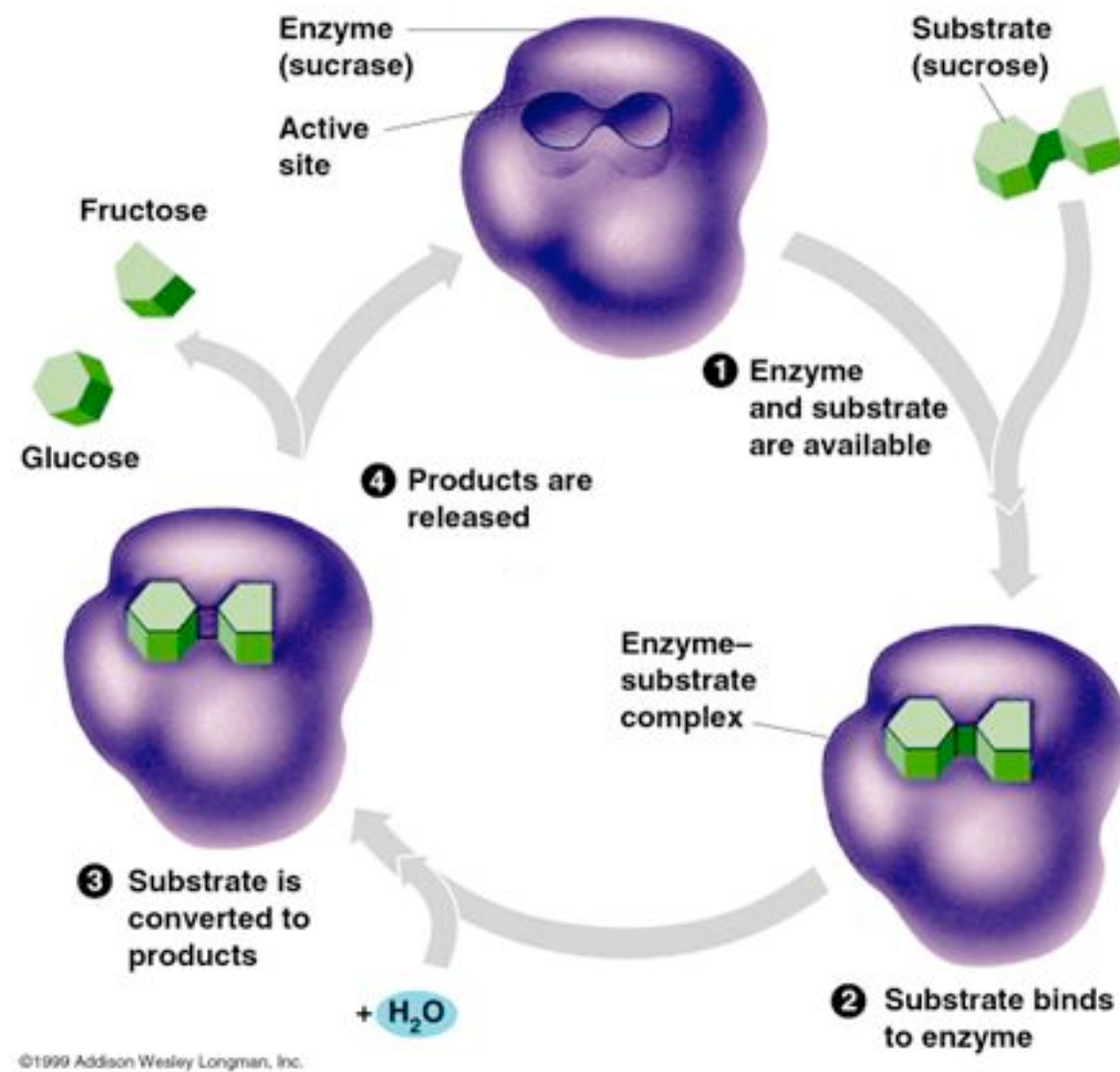
Can any kind of enzyme work on any kind of chemical reaction?

No

Every type of Enzyme can only work on a specific chemical reaction

As the name of the model implies...
just as every key works in a specific lock,
every enzyme works with a specific
substrate

Here is another model showing the same kind of interaction



Notice that in this case the substrate (green) is broken into smaller pieces

The place where the substrate connects with the enzyme is called the **active site**

See if you can find the active site in the previous slide

A single enzyme can perform numerous reactions without being affected by the chemical reaction

In other words, Enzymes are **not** used up during reactions.

They are **re-used** over and over performing thousands of reactions per second

Naming Enzymes

Enzymes are usually named after the substrate they interact with

Enzymes end with the suffix **-ase**

substrate name

Sucrose

enzyme name

Sucrase

Things that affect how fast Enzymes work

(rate of reaction)

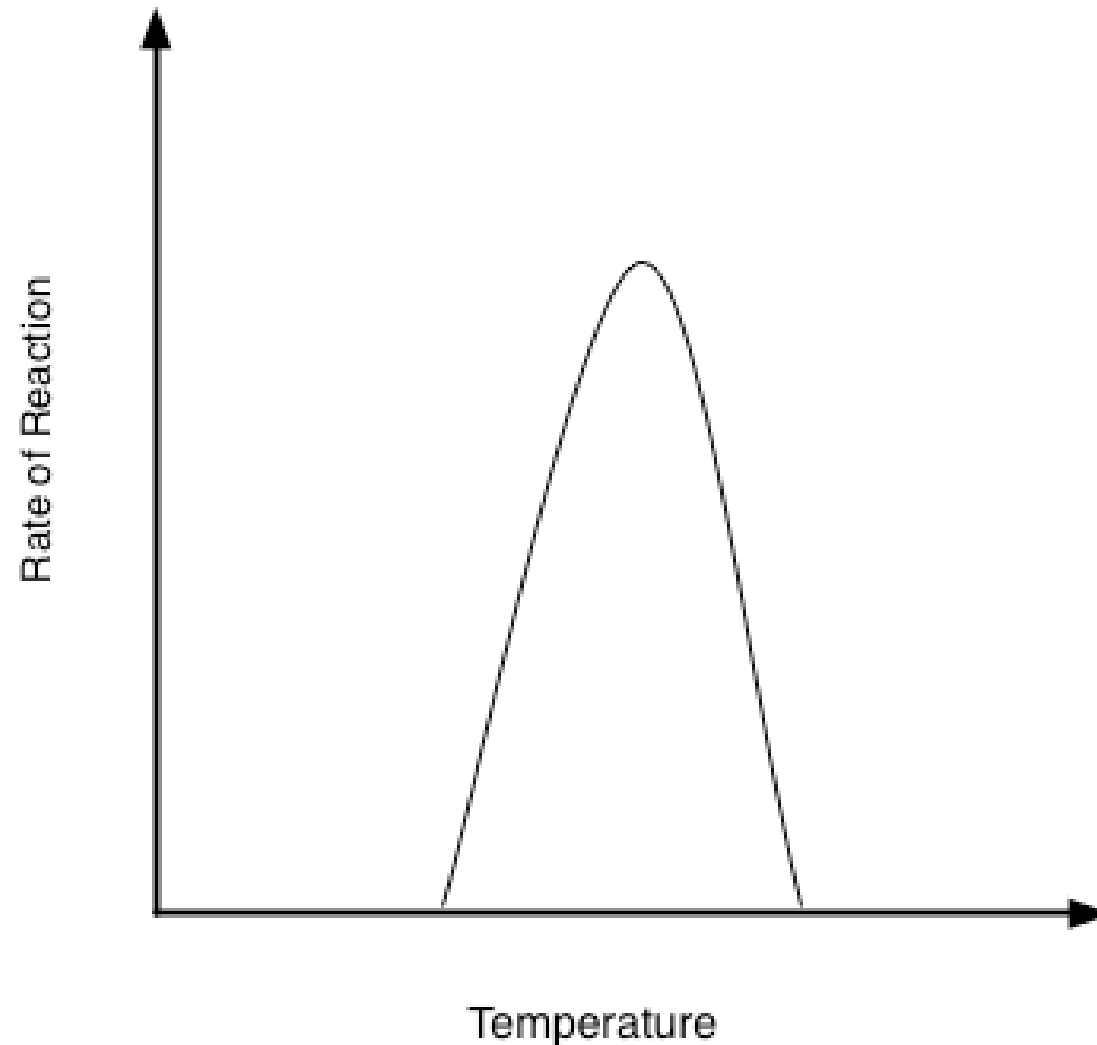
Temperature

pH

Amount of Enzyme

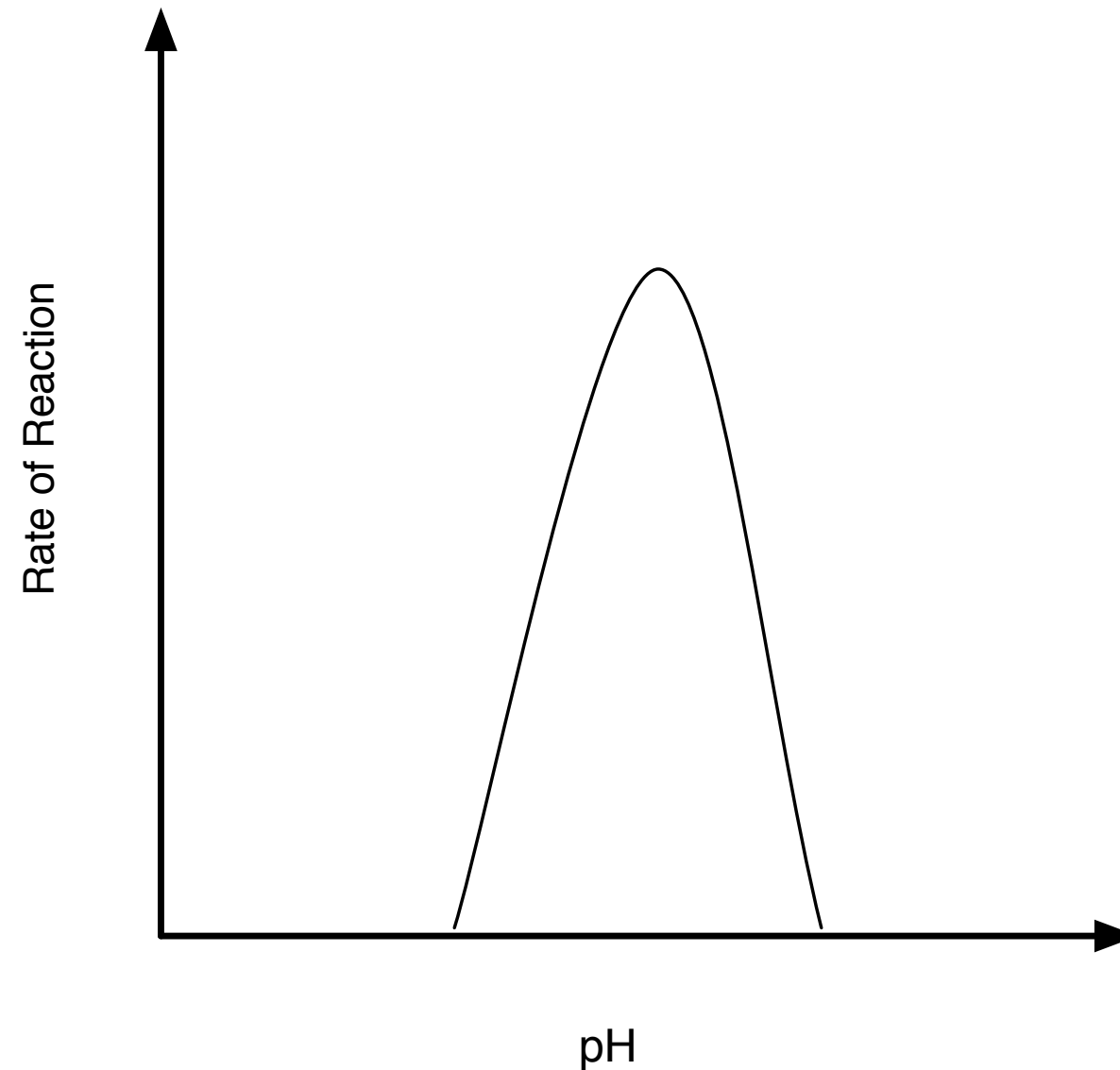
Amount of Substrate

Let's take a look at a graph that shows the relationship between **Temperature** and the Rate of enzyme catalyzed reactions



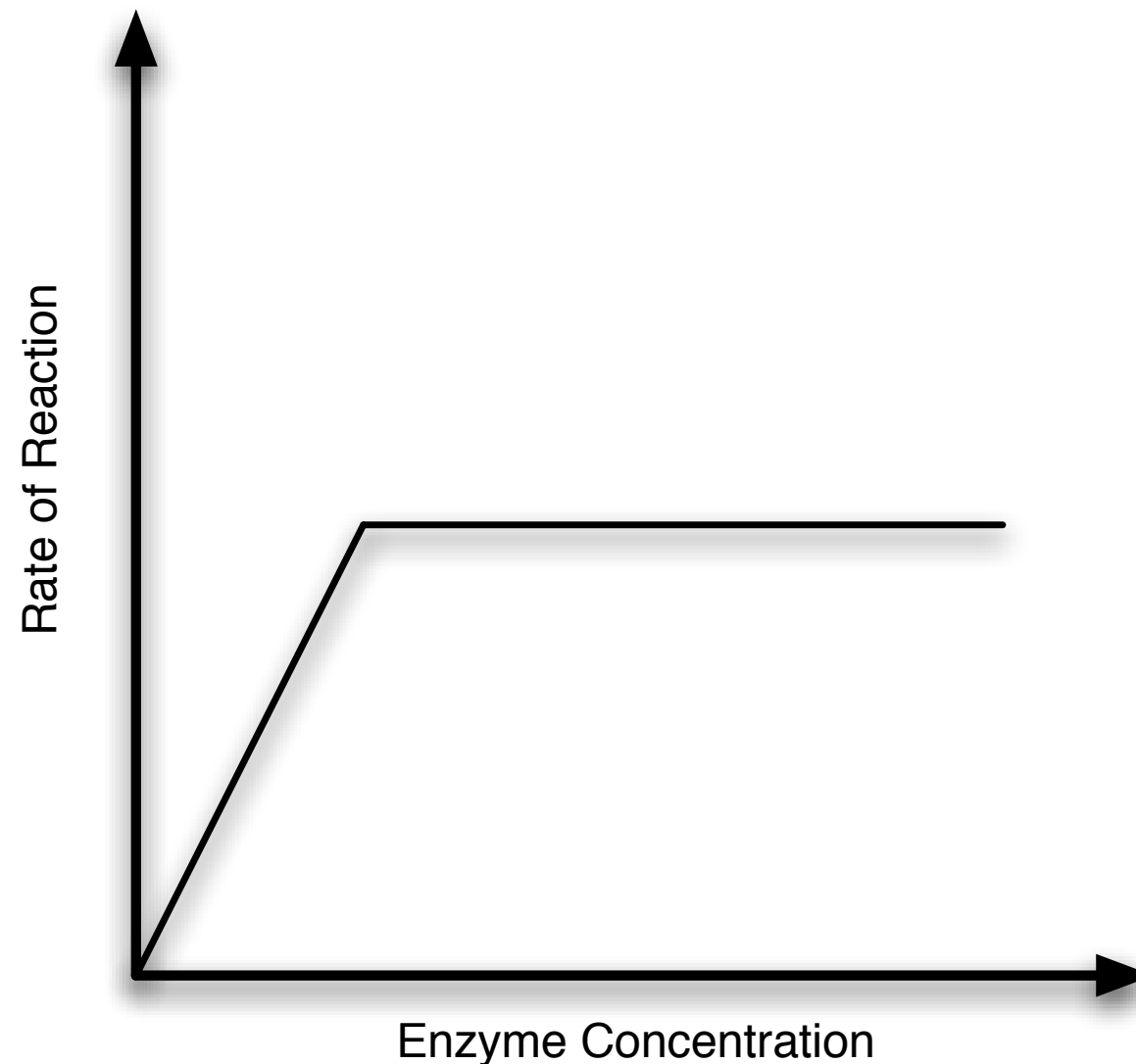
Every Enzyme has an ideal temperature. As you can see if the temperature is changed the rate diminishes quickly

Affect of pH change on the rate of reaction



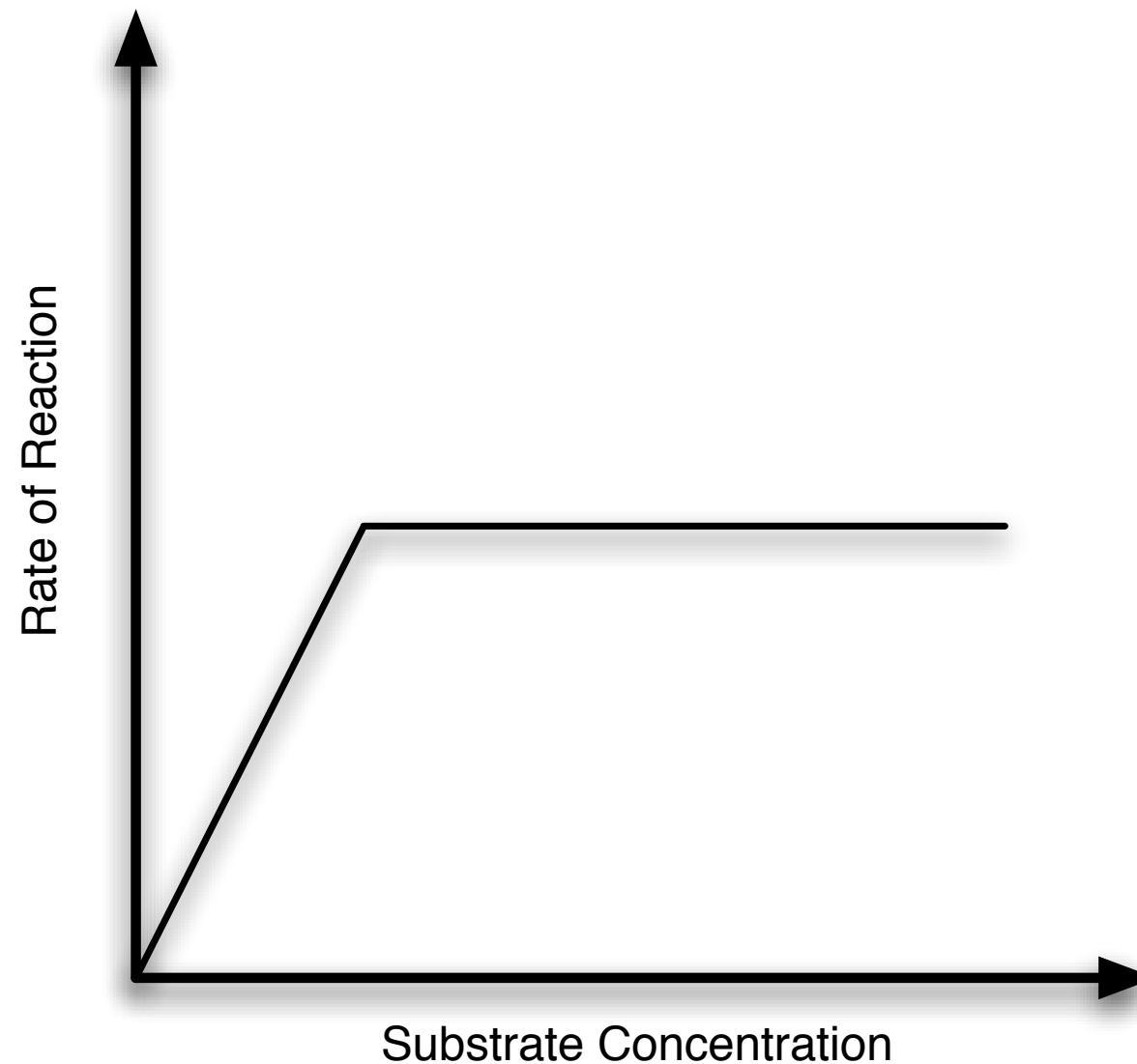
Again, as the case with temperature, every enzyme has an ideal
pH

Affect of **Enzyme Concentration** on Rate of Reaction



When the concentration increases the rate goes up...
Then it levels off

Affect of Substrate Concentration on Rate of Reaction



When the concentration increases the rate goes up...
Then it levels off