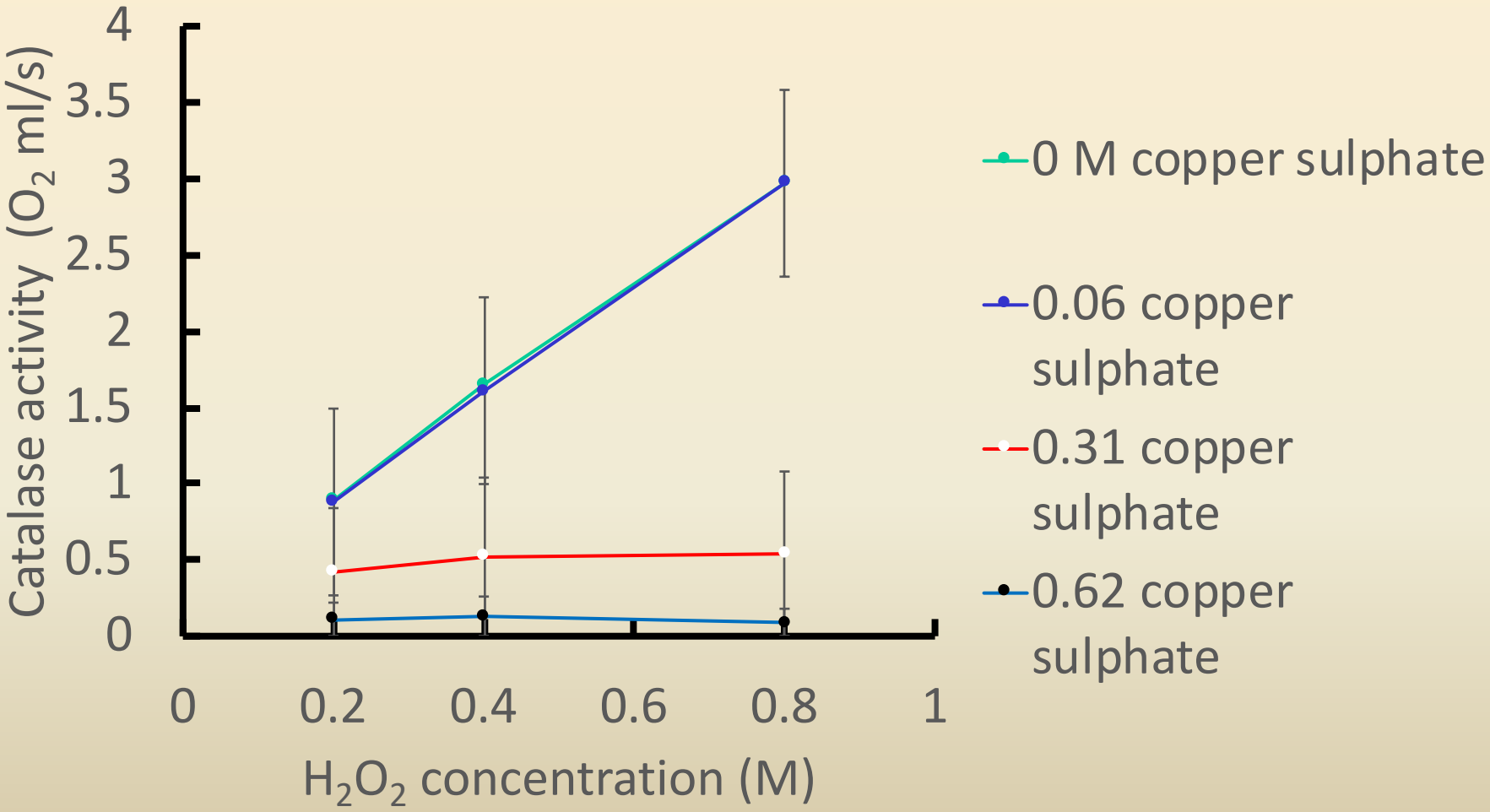
Effect of inhibitors on enzymatic reactions

- The following reaction is catalyzed by the enzyme catalase: $2H_2O_2 \rightarrow 2H_2O + O_2$
- In a series of experiments examining the effect of inhibitors on catalase activity you obtain the following results (assuming [catalase] remains constant).

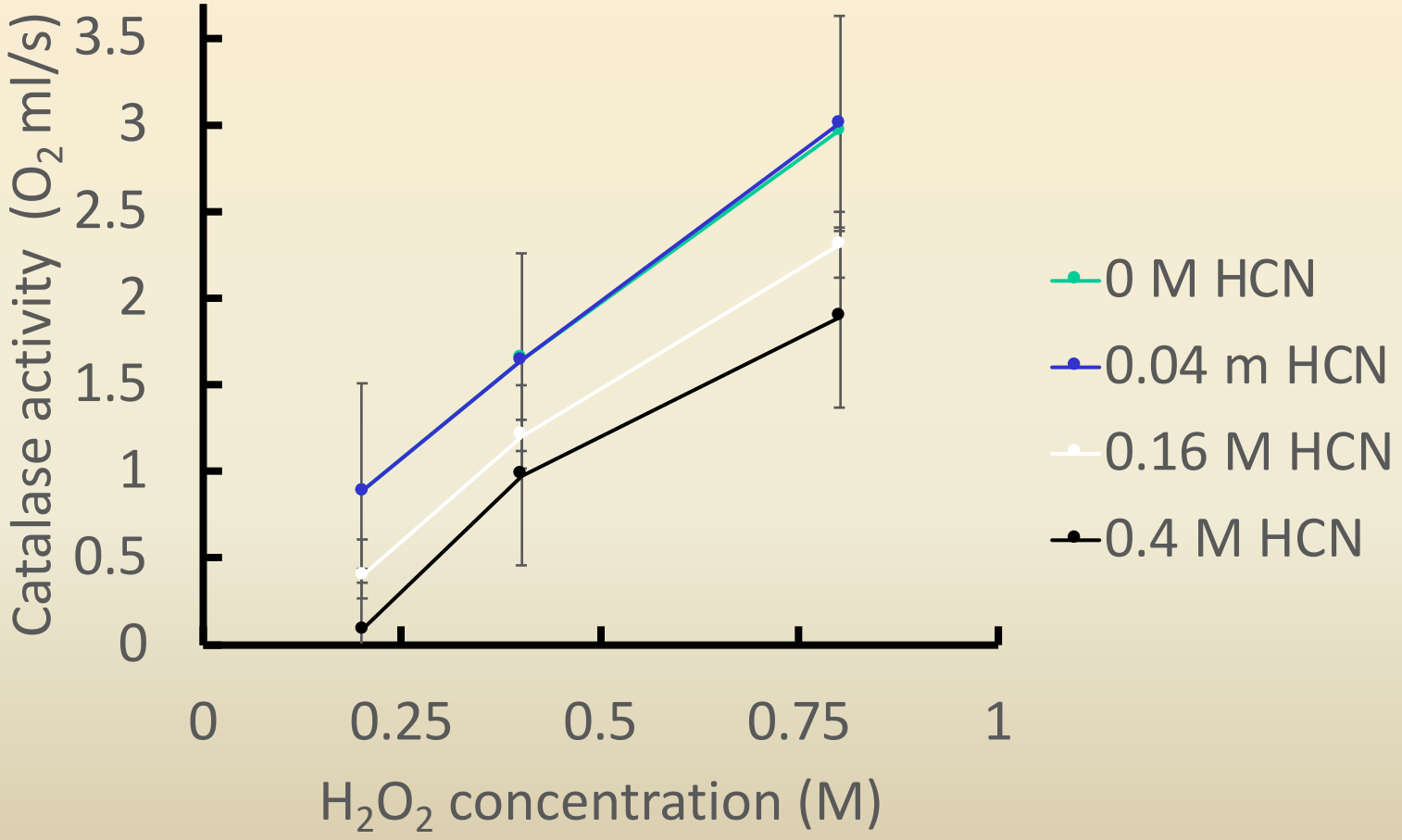
Draw 2 graphs that show, in the most appropriate way (use Smart Board and submit 2 graphs per group to your instructor), the effect of these 2 types of inhibitors on catalase activity. Label your graphs appropriately.

[INHIBITOR] (M)	CATALASE ACTIVITY (mean±sd O_2 ml/s)		
	Substrate (H_2O_2) concentrations		
	0.20 M	0.40 M	0.80 M
No inhibitor	0.89±0.07	1.65±0.13	2.97±0.28
Copper sulphate 0.06	0.88±0.07	1.61±0.11	2.97±0.27
0.31	0.42±0.03	0.52±0.03	0.54±0.04
0.62	0.11±0.01	0.13±0.02	0.09±0.01
Cyanide (hydrogen cyanide) 0.04	0.89±0.08	1.64±0.13	3.01±0.28
0.16	0.400±0.04	1.21±0.09	2.31±0.19
0.40	0.09±0.01	0.98±0.08	1.89±0.20

Inhibitory effect of copper sulphate on the activity of liver catalase



Inhibitory effect of hydrogen cyanidee on the activity of liver catalase

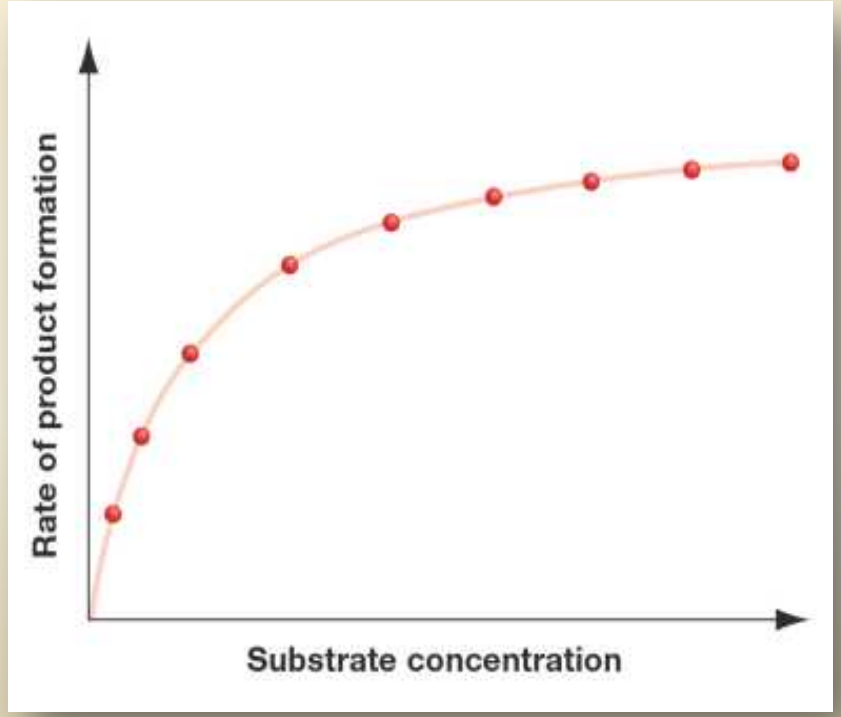


What type of enzyme inhibition is supported by the results for copper sulphate and Cyanide?

A. Copper sulphate: non-competitive; cyanide: non-competitive
B. Copper sulphate: non-competitive; cyanide: competitive
C. Copper sulphate: competitive; cyanide: competitive
D. Copper sulphate: competitive; cyanide: non-competitive
E. None of the above

In the following diagram of the kinetics of a chemical reaction, why does the graph level off at high substrate concentrations?

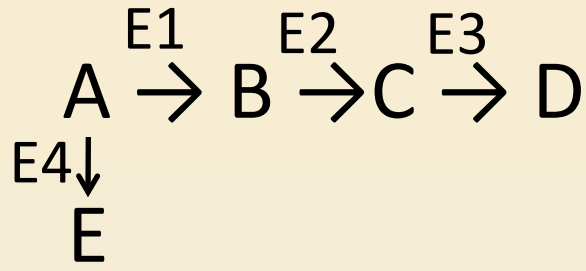
A. The enzyme has been consumed.
B. There is no more substrate.
C. The reaction has run to completion.
D. The active sites of the enzyme are saturated.



If an enzyme solution is saturated with substrate, the most effective way to obtain an even faster yield of products is to:

A. Add more of the enzyme
B. Heat the reaction to 90°C
C. Add more substrate
D. Add an allosteric inhibitor
E. Both A and C

In the following enzymatic pathway, product D is produced in excess. Where should the pathway be shut down in order to regulate the production of D? And what type of regulation is most likely to occur in this pathway?



A. Enzyme 1; competitive regulation
B. Enzyme 4; allosteric regulation
C. Enzyme 1; allosteric regulation
D. Enzyme 4; competitive regulation

Zinc, an essential trace element for most organisms, is present in the active site of the enzyme carboxypeptidase. The zinc most likely functions as a(n)

A. noncompetitive inhibitor of the enzyme.
B. cofactor necessary for enzyme activity.
C. competitive inhibitor of the enzyme.
D. coenzyme derived from a vitamin.
E. allosteric activator of the enzyme.

In the mid-1990s, researchers discovered an enzyme in HIV called protease. Once the enzyme's structure was known, researchers began looking for drugs that would fit into the active site and block it. If this strategy for stopping HIV infections were successful, it would be an example of what phenomenon?

A. allosteric regulation
B. vaccination
C. competitive inhibition
D. Non-competitive inhibition
E. poisoning
F. allosteric activator of the enzyme.

The addition of the competitive inhibitor mevinolin slows the reaction HMG-CoA → mevalonate, which is catalyzed by HMG-CoA reductase. The effects of mevinolin would be best overcome and the rate of the reaction increased by:

A. Adding more mevalonate
B. Adding more HMG-CoA
C. Lowering the temperature of the reaction
D. Adding a prosthetic group
E. Both B and D