

February 2022: Kaplan MCAT stumpers put pre-meds to the test

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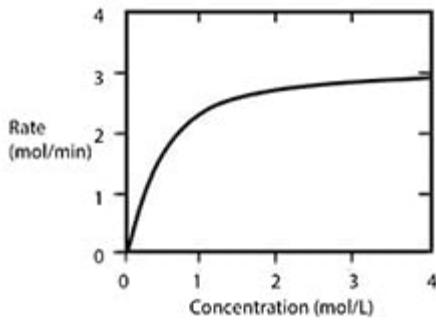
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If you're preparing for the Medical College Admission Test (MCAT), you will want to consult the experts. These selections from Kaplan's MCAT Question of the Day series can help you sharpen your skills as you prepare to begin your potential journey into medical training.

The questions below come from three of the four MCAT sections—biological and biochemical foundations of living systems; chemical and physical foundations of biological systems; and psychological, social, and biological foundations of behavior. A fourth section, critical analysis and reasoning skills (commonly referred to as CARS), is based largely on inference. Medicine can be a career that is both challenging and highly rewarding but figuring out a medical school's prerequisites and navigating the application process can be a challenge unto itself. For students preparing for medical school, the [AMA pre-med glossary guide](#) has the answers to frequently asked questions.

Section: Biological and biochemical foundations of living systems

Question: The kinetics of normal enzyme X is shown below. A defect is inherited in an autosomal recessive fashion and greatly reduces, but does not eliminate, enzyme function X. If the same series of enzyme assays used to create the graph are applied to defective X, which of the following pairs of kinetic data is least likely to be obtained?



- A. $K_m = 1 \text{ mol/L}$, $V_{\max} = 3 \text{ mol/min}$
- B. $K_m = 0.1 \text{ mol/L}$, $V_{\max} = 1 \text{ mol/min}$
- C. $K_m = 0.1 \text{ mol/L}$, $V_{\max} = 3 \text{ mol/min}$
- D. $K_m = 6 \text{ mol/L}$, $V_{\max} = 1 \text{ mol/min}$

The correct answer is C.

Kaplan explains why: The graph shows the kinetics of the normal enzyme X. We can deduce that the K_m is about 0.5 and the V_{max} is about 3.5. In addition, the dysfunctional enzyme has lower activity. In order for activity to be lowered on an overall scale, either affinity must be decreased (that is, K_m will be higher), or the reaction must proceed at a lower rate (that is, V_{max} will be lower), or both must be true. **Choice C** reflects an increased affinity (lower K_m) and increased activity (higher V_{max}). This enzyme would be more active than the wild-type, and thus cannot be the diseased form. Therefore, **choice C** is correct.

Section: Chemical and physical foundations of biological systems

Question: What would be the most likely effect on a reaction after the introduction of an enzyme specific to that reaction?

- A. The enzyme would decrease the theoretical yield.
- B. The effect of the enzyme depends on the ΔG of the reaction.
- C. The enzyme would increase the theoretical yield.
- D. The enzyme would not affect the theoretical yield.

The correct answer is D.

Kaplan explains why: Theoretical yield is calculated by knowing the stoichiometry of a given reaction. Enzymes only change the rate of a reaction, not its overall favorability or stoichiometry, so an enzyme would not have an effect on the theoretical yield, matching **choice D**.

Section: Psychological, social and biological foundations of behavior

Question: Structural functionalist sociologists believe that some deviance in society may be useful for society because deviance establishes and clarifies moral guidelines. Which of the following learning paradigms supports this idea, and why?

- A.** Observational learning. Witnessing deviance and the resultant punishment allows individuals to shape their own behavior accordingly.
- B.** Classical conditioning. The unconditioned stimulus of deviance is met with the unconditioned response of punishment to condition obedience.
- C.** Operant conditioning. Deviant individuals who are punished tend to return to society more likely to perform that behavior again.
- D.** Habituation. Society habituates to moral guidelines as they are more repeatedly and more strictly enforced.

The correct answer is A.

Kaplan explains why: The idea that deviance establishes and clarifies moral guidelines suggests that deviance is being observed by the society at large and the members of society are shaping their behavior and moral guidelines in accordance with what they are observing, which aligns with **choice A**, observational learning.

For each of **choices B, C and D**, the explanation in each answer choice mischaracterizes its associated psychological phenomenon. For example, **choice B**, classical conditioning, relies on associating an instinctive response to a stimulus that is not normally tied to instinct. Deviance, and social punishments of deviance, are both social constructs and are certainly not instinctual. Therefore, classical conditioning would not apply.

By contrast, operant conditioning, **choice C**, might be a reasonable explanation, except this answer choice claims that a behavior would increase following punishment. Finally, **choice D**, habituation, refers to a decrease in some behavior following repeated exposure to a stimulus. Moral guidelines are not a stimulus, and furthermore behaviors in accord with moral guidelines should increase in frequency over time, not decrease.