

## Concept Test Question on LeChatelier's Principle

Concept Test designed to test application of LeChatelier's Principle to a biological situation.

Oxygen bound to hemoglobin (Hb) in red blood cells is delivered to tissues by the following endothermic process:  $\text{HbO}_2 + \text{H}^+ \rightleftharpoons \text{HbH}^+ + \text{O}_2$ . Assuming that there is a constant partial pressure for oxygen, according to LeChatelier's Principle which of the following occurs when body temperature decreases during hypothermia?

1. The amount of oxygen delivered will increase.
2. The amount of oxygen delivered will decrease.
3. The amount of oxygen delivered will not change.
4. No oxygen will be delivered.

*Correct answer:* 2. The amount of oxygen delivered will decrease. LeChatelier's Principle predicts a shift to the left, which means that less  $\text{O}_2$  will be released, more  $\text{O}_2$  will be bound to the hemoglobin.

*Comment to Instructor:* This question shows how chemical principles apply to biological and medical situations. The question can be extended to the effect of increased lactic acid formation during exercise, and the effects of acidosis and alkalosis.