2023학년도 연세대학교 특기자전형[국제인재]
언더우드학부(생명과학공학)
면접구술시험 문제

※ **Instructions.** Read the passages below and answer the following questions.

[Passage 1] A catalyst is a substance that alters the rate of a chemical reaction by its involvement. The catalyst itself does not undergo chemical transformation throughout the course of the reaction. Activation energy is the minimum energy required for a chemical reaction to occur.

[Passage 2] An enzyme is a biological catalyst that accelerates the essential reactions in living bodies. Enzymes are composed of proteins with unique three-dimensional structures. Therefore, enzyme reactions are triggered only with substrates of complementary structures to those of the enzyme active sites.

[Passage 3] Enzyme activity is affected by temperature and pH. The temperature at which an enzyme displays peak activity is referred to as the optimum temperature. Typical optimum temperatures for the enzymes in our body range between 35 °C and 40 °C.

[Passage 4] Cellular respiration is composed of a series of chemical reactions regulated by enzymes. Glucose decomposes to carbon dioxide and water through cellular respiration in the presence of oxygen molecules, during which ATP and heat are produced. Some micro-organisms obtain ATP by fermentation, decomposing glucose to lactic acid or alcohols.

*catalyst: 촉매, rate: 속도, activation energy: 활성화 에너지, enzyme: 효소, protein: 단백질, substrate: 기질, active site: 활성 부위, optimum temperature: 최적 온도, cellular respiration: 세포 호흡, glucose: 포도당, decompose: 분해되다, oxygen molecules: 산소 분자, carbon dioxide: 이산화 탄소, micro-organism: 미생물, fermentation: 발효, lactic acid: 젖산, alcohol: 알코올

[Question 1] Describe the principle behind the acceleration of the reaction rate by enzymes. Explain why there is a dramatic decrease in the reaction rate when the temperature exceeds the optimum temperature of the enzyme. **[40 Pts]**

[Question 2] Enzyme reaction rate can be controlled by various factors. Suggest all possible methods to increase the rate of an enzyme reaction. **[30 Pts]**

[Question 3] Compare the amount of ATP produced by cellular respiration in the presence of oxygen molecules with that produced by fermentation. Explain the reason for the difference between the two processes. **[30 Pts]**