

1. The decrease of the temperature to -20°C (the temperature in the freezer) reduces the velocity of the molecules and the rate of growth of microorganisms. Therefore, food will decompose much more slowly.
2. Curve 3. This curve demonstrates the highest mean kinetic energy of the particles. Given that kinetic energy increases proportionally to temperature, this curve represents the highest reaction temperature.
3.
 - a) There would be no effect on the overall reaction rate, since the rate-determining step is step 2. The graph would show the first peak lower down, since the activation energy of this step would decrease.
 - b) The overall reaction rate would increase. The graph would show the second peak lower down, since the activation energy of this step would decrease.
 - c) There would be an effect if the inhibitor increased the activation energy higher than in step 2, which would lead to a decrease in the overall reaction rate. The graph would show the first peak higher up, since the activation energy of this step would increase.
 - d) There would necessarily be a decrease in the overall reaction rate. The graph would show the second peak higher up, since the activation energy of this step would increase.
4. No, the addition of a catalyst in a reaction decreases the activation energy, but does not play a role in the final concentration of the products.
5.
 - a) Reaction 2. The substances in the three reactions are all in the same phase, but reaction 2 has fewer intermolecular bonds to break than the other reactions. Therefore, it will be the fastest.
 - b) Reaction 3. It has the most bonds to break.
6. The dotted line would move to the right because there would be fewer particles that would have the necessary kinetic energy for the reaction to occur. An inhibitor increases the activation energy of a reaction.