Appendix D

PST 7's written excerpt related to temperature effect on reaction rate in Experiment 13

Beginning question (class): How does temperature affect the rate of reaction in a chemical reaction?; How does concentration affect the rate of reaction in a chemical reaction?; How does catalyst affect the rate of reaction in a chemical reaction? and How does contact surface affect the rate of reaction in a chemical reaction?
Claims: 1) In a chemical reaction, the reaction rate increases as the temperature increases 2) In a chemical reaction, the reaction rate increases as contact surface increases 3) In a chemical reaction, catalyst increases the reaction rate 4) In a chemical reaction, the reaction rate increases as the concentration increases.

Evidence: In my first claim, I said, "In a chemical reaction, the reaction rate increases as the temperature increases." Because if the temperature increases, kinetic energy increases. In other words, since the movement speed of the particles increases, the collision rate of the particles increases. So the reaction takes place faster. As

an example, I give my experiment.

(Sıcaklık: Temperature; Zaman: time)

When we look at this graph, the temperature is inversely proportional to time. In other words, as the temperature increases, the time in the chronometer has decreased. If we calculate the reaction rates according to this graph. We calculate from the formula $\Delta[\ ]/\Delta t$

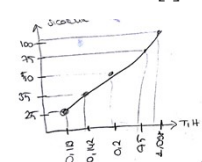In 25°C→ $\Delta[\ ]/\Delta t = 1/84 = 0.119$ M/s
In 35°C→ $\Delta[\ ]/\Delta t = 1/7 = 0.142$ M/s
In 50°C→ $\Delta[\ ]/\Delta t = 1/5 = 0.2$ M/s
In 75°C→ $\Delta[\ ]/\Delta t = 1/2 = 0.5$ M/s
In 100°C→ $\Delta[\ ]/\Delta t = 1/0.91 = 1.098$ M/s

According to these calculations, we found the reaction rates and when we draw a graph according to these calculations, we prove our claim.

(Sıcaklık: Temperature; T.H: short form of Tepkime Hızı which means Reaction Rate)

When we look at the graph, we see that the temperature and reaction rate are directly proportional. The reaction rate of the substance increased as the temperature increased. In other words, as I said in the 1st claim, the temperature increases the rate of reaction. Based on the information given above and the observations and data in the experiment, I have proved the accuracy of my claim.


Reading and Reflection: When the temperature is increased, the kinetic energies of the atoms, molecules and ions that react and their speed increase accordingly. The number of particles with increasing velocity colliding with each other increases. In addition, the reaction rate increases when the number of particles exceeding the minimum energy barrier required for the reaction increases (General Chemistry Book 2).

We use the formula of $\Delta[\ ]/\Delta t$ accordingly,

Temperature is directly proportional to the reaction rate. In the first research question we investigated the effect of temperature on reaction rate. In my first claim, I said that as the temperature increases in a chemical reaction, the reaction rate increases. Based on the information above and the observations and data in the experiment, I proved that the reaction rate increased in the calculations I made. My thoughts before and after the experiment partially changed because I said temperature increases the reaction rate. However, I only used time-temperature graph to provide evidence to my claim. Then I realized in our class discussion that I also need to use calculations to generate temperate-reaction rate graph to support my claim because we investigated the effect of temperature on reaction rate and temperature-time graph is not enough to support my claim. The information above and data supported my claim because when temperature increases the

kinetic energies of atom, molecules and ions increases. This leads to increase of effective collision and reaction between atoms, molecules or ions. Consequently, reaction rate increases. To prove this, I calculated the reaction rate of temperatures of 25 and 50 C degrees and found that reaction rate of temperature of 25 C is 0.119M/s and reaction rate of 50C is 1.098 M/s. Based on these calculations, I generated a temperature-reaction rate graph. It also showed that as temperature increases reaction rate increases. With the above information and data, I proved my claim and thoughts.
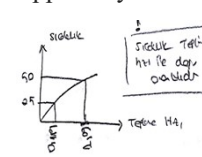
Analytic framework score: Question:15;Claim:15; Evidence:15; Reflection:10; **Holistic Framework score**:15