

SPEED AND ENERGY OF REACTIONS

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Some chemical reactions occur slowly. Others happen very quickly. All chemical reactions involve energy changes. When fireworks explode, a chemical reaction takes place. Chemists can control factors that can make reactions speed up or slow down. In a reaction model, the particles of the reacting substances collide with each other. Collisions allow energy to be transferred from particle to particle. This energy is used in breaking and forming bonds. If collisions take place more often, the reaction will occur faster. Factors that increase the numbers of collisions will speed up the reaction. Concentration is the number of particles present in a given volume of space. In general, the greater the concentration, the faster a reaction will occur [1].

Hard boiling an egg is a chemical reaction. It might take 10 minutes to hard cook an egg using water that is hot but not boiling. But it might take as little as 3 minutes to hard cook the egg if boiling water is used.

Most reactions go faster when the temperature is raised. As the temperature increases, the particles of substances move about more rapidly. Particles that move faster collide more often.

Some chemical reactions take place very slowly. For example, the exhaust gases from an automobile engine contain poisonous carbon monoxide (CO) and unburned gasoline. These substances will react and change into carbon dioxide (CO₂) and water. But the reaction is normally very slow. In some cases, a catalytic converter helps the reaction along. It contains small beads of a substance that causes the change to be very rapid. A substance that speeds up a

chemical reaction is called a catalyst. The latter itself is not changed during a reaction. It can be used over and over.

Scientists are trying to understand how catalysts speed up a reaction. It is believed that catalysts make it easier for collisions to occur.

Some catalysts play an important role in food processing. The production of margarine involves the use of a catalyst. Margarine is made by adding hydrogen to liquid oils, such as soybean oil. The hydrogen and the oil react and yield solid margarine. This chemical change takes place in the presence of a catalyst, finely divided nickel.

Have you ever warmed your hands at a fire? The burning wood supplies the heat you need to warm yourself. Burning is an example of an exothermic reaction. The heat and light produced in a fireworks display result from an exothermic reaction.

Many chemical reactions absorb heat. Baking powder contains chemical compounds that react in dough to make it rise. But the chemical reaction does not take place until you put the dough into a hot oven. Then the dough absorbs heat, and tiny bubbles of carbon dioxide gas form. The gas causes the dough to rise. This is an endothermic reaction [2].

References

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