

# Answers Week 8.

## Questions

1. List the factors that affect the rate of reaction in a heterogeneous system.

nature of reactants  
concentration of reactants  
surface area of reactants  
temperature of reactants.  
catalyst

2. Explain the following observations:

- a. If a lump of iron is placed in a flame it simply gets hot. If powdered iron is sprinkled into the same flame it burns and iron oxides are formed.

powdered iron has a greater surface area than a lump of iron  
 $\therefore$  more collisions per second  
 $\therefore$  greater rate of reaction.

- b. The reaction  $\text{Ag}^+ + \text{Cl}^- \rightarrow \text{AgCl}$  is faster than the reaction  $\text{C}_2\text{H}_6 + \text{Br}_2 \rightarrow \text{C}_2\text{H}_5\text{Br} + \text{HBr}$

$\text{Ag}^+ + \text{Cl}^-$  reaction involves no breaking of strong covalent bonds  
 $\therefore$  lower energy required and faster reaction rate compared to  $\text{C}_2\text{H}_6 + \text{Br}_2$  reaction.

3. To make some carbon dioxide a chemist puts some large pieces of marble in a 0.10 M solution of hydrochloric acid. The rate of production of carbon dioxide is too slow. List 4 ways in which the chemist could alter the conditions so that the carbon dioxide is produced more rapidly and briefly explain each using the Collision Theory.

Method 1

Increase concentration of HCl

Explanation

More reacting particles available  $\therefore$  more collisions occur with some proportion successful  $\therefore$  increase in reaction rate

Method 2

Increase surface area of marble by crushing.

Explanation

Greater surface area means more collisions per unit of time. Some proportion successful  $\therefore$  increase in reaction rate

Method 3

Increase temperature of reactants.

Explanation

More particles with sufficient energy  $\therefore$  more collisions that are more energetic  $\therefore$  increase in reaction rate

Method 4

Use a catalyst.

Explanation

A catalyst provides a lower energy pathway  $\therefore$  less energy required for collision to be successful  $\therefore$  increase in reaction rate.