

# The Role of Teeth

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## Introduction

Surface area is the area of exposed surface that an object or particle has. For example, a large rock (in one piece) has a smaller total surface area than the total surface area of the same rock when it is broken up into smaller pieces. This is illustrated in figure 1.

When you break something up, you increase its surface area. If you crush it into powder, the surface area increases even more.

Teeth perform a vital role in breaking up food into smaller particles, hence increasing the surface area of the food. As a result of this, chemical digestion within the stomach occurs at a faster rate.

In this experiment, you are going to model the mechanics of teeth which assist the body digest its food.

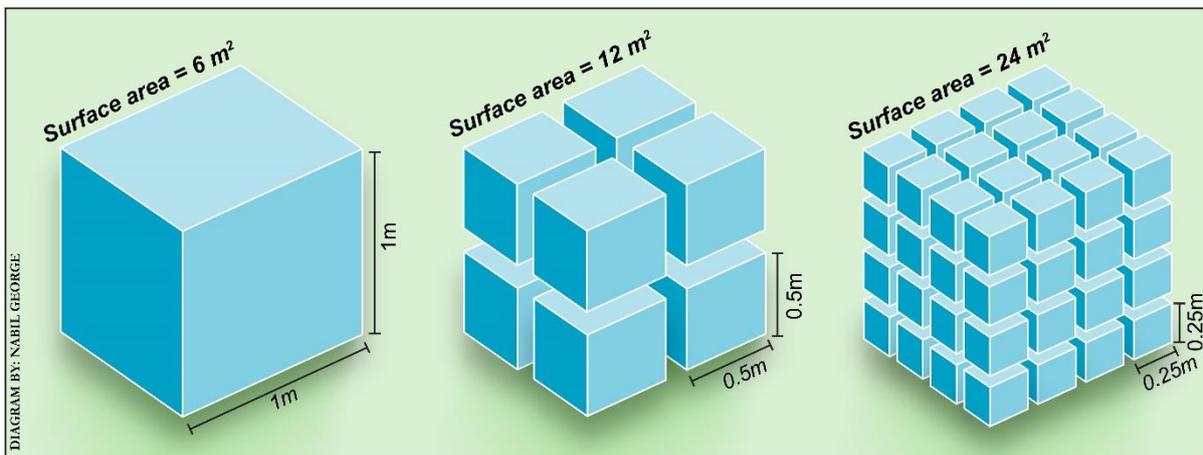


Figure 1: Effect of breaking up a cube into smaller pieces on the total surface area

## Risk analysis

- This experiment involves the use of glassware. Always act cautiously to avoid glass breakage. If accidents happen, report any breakage to your teacher.
- You will be using Alka-seltzer tablets. These tablets are quite safe. However, we recommend you wear gloves in case you are allergic to any of its components.
- Be cautious while using the mortar and pestle, as they are quite heavy and could cause injuries if dropped on your feet.
- Always wear safety goggles to protect your eyes.

## Questions

Which variables should you keep constant in this experiment to obtain fair results?

Aim: To determine what effect, if any, surface area has on reaction rate.

## Plan

You are given a plan to follow to conduct the experiment, you need to discuss the results with the team members before discussing it with the whole class and writing up your final report.

## Materials

- Mortar and pestle
- 1 x stopwatch
- 4 x Alka-seltzer tablets
- 1 x 200 ml beaker
- 1 x 50 -100 ml measuring cylinder
- Safety glasses
- Gloves

## Conduct

### Procedure

1. Add 50 ml of water to the beaker.
2. Place one Alka-seltzer tablet into the beaker. Start the stopwatch.
3. Stop the stopwatch when the tablet has completely disappeared and record the time.
4. Repeat the entire experiment with the second Alka-seltzer tablet broken into halves, then another time with the tablet broken into quarters.
5. Crush the tablet into fine powder using the mortar and pestle.
6. Repeat the entire experiment again with the crushed tablet.

## Analysis

Tabulate your results as follows:

Size of tablet	Time taken to dissolve (min.)
Whole	
Half	
Quarter	
Ground	

## Discussion-Problem solving and reasoning

Which tablet took the most time to dissolve?

Which tablet took the least time to dissolve?

Is there a consistent pattern between the size of the tablet and the time needed for it to dissolve in water?

If the results are not consistent, what do you think went wrong with the experiment?

Explain the relationship between the size of the tablet, the surface area, the time taken for the tablet to dissolve and explain how this is related to the role of teeth in digestion.

## Conclusion

Summarize your findings, mentioning whether your aim was met and if the results support your initial hypothesis.