# Reaction rates

Why wait for my vitamin C tablet to dissolve – how can I save time?

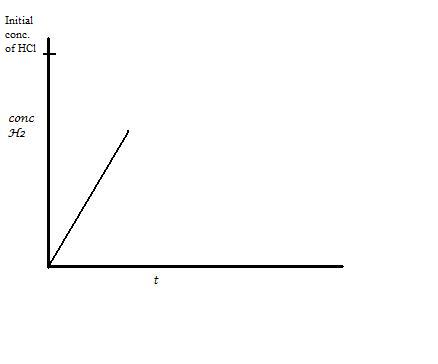
# SAILS inquiry and assessment unit overview

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| --- | --- |
| Name | Reaction rates |
| Key content/concepts | * Rates of reaction * Acid and carbonate reactions * Factors influencing rates of reaction (temperature, concentration, surface area) * Properties of gases |
| Level | * Lower second level * Upper second level |
| Inquiry skills assessed | * Planning investigations * Forming coherent arguments * Working collaboratively |
| Assessment of scientific reasoning and scientific literacy | * Scientific reasoning (data entry, drawing conclusions; trouble-shooting; identifying variables) * Scientific literacy (presenting scientific data; critiquing experimental design) |
| Assessment methods | * Teacher observation * Classroom dialogue * Peer-assessment * Self-assessment * Worksheets * Student devised materials (graphs, group work placemats, investigation plans, reports) * Presentations * Other assessment items (homework exercise) |

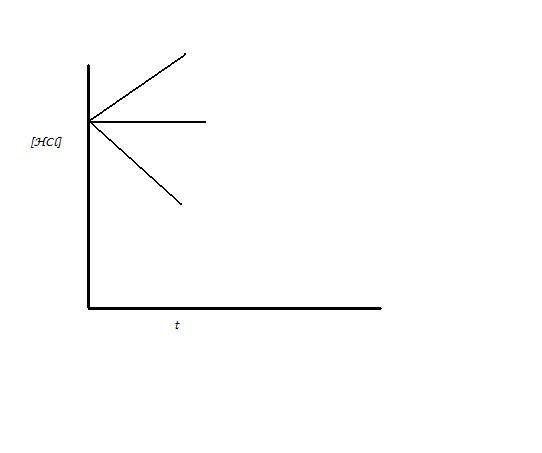
**Question 1:**

(i) In the reaction of HCl with Mg to form H2 (reaction HCl + Mg 🡪 MgCl2 + H2), the change in concentration of H2 is shown on Graph A (Figure 6a). From the point shown, draw in how the HCl concentration would change over the same time. (Alternative question (i) Select which line in Graph B (Figure 6b) shows how the HCl concentration changes over the same time.)

(a)(b)



**Graph A**



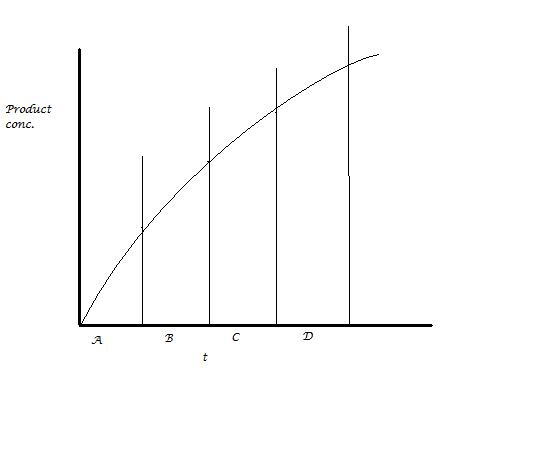
**Graph B**

Figure 6: Graphs A and B, for Question 1

ii) If the reaction continued until all the Mg was used up, extend Graph A to show how the H2 concentration would change.

**Question 2:**

In a particular reaction, the concentration of product is graphed against the time of reaction, as shown in Graph C (Figure 7). During which time interval (A-D) is the rate of reaction the fastest? The slowest?

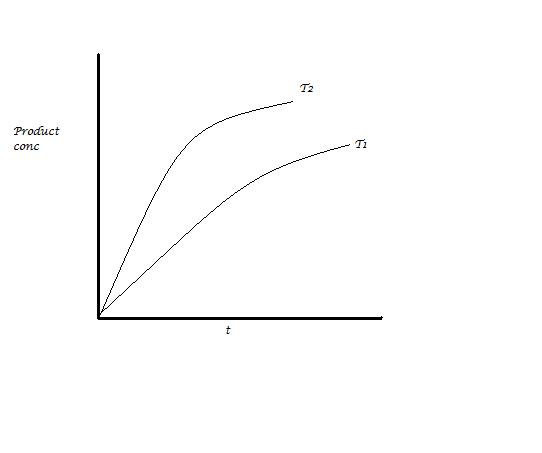


**Graph C**

Figure 7: Graph C, for Question 2

**Question 3:**

For the reaction shown in Graph D (Figure 8), at which temperature (T1 or T2) is rate of reaction the highest/slowest? Explain your answer.



**Graph D**

Figure 8: Graph D, for Question 3

**Question 4:**

Marble chips react with acid to produce CO2 gas. Marble is available as a board, large lumps and as ground powder. Suggest, with explanation, which forms of marble should be used to generate CO2 most quickly.

**Question 5:**

Vinegar is often used to clean surfaces at home. If you have a marble (CaCO3) worktop, would you use vinegar – explain why/why not.

**Question 6:**

Using a provided set of data showing the amount of CO2 produced against time:

* Represent the data on a graph
* Determine the overall rate of the reaction

Is the reaction occurring at the same rate over the whole time?