Lesson 14 - Investigation - Exo vs. Endo

Chemistry - Key Stage 3

Energetics

Miss Charlton

Water and Ammonium nitrate

What will be the variables of this experiment?

Sodium hydroxide and hydrochloric acid

What will be the variables for this experiment?

Complete the task

Write a method for the exothermic practical where we react sodium hydroxide and hydrochloric acid together

- A good method should contain:
- Named equipment
- Volumes/masses of all chemicals
- Step by step instructions
- What will be changed and measured
- What will be kept the same

Which table titles would be best? Why?

A

Time (minutes)	Amount of gas (cm^3)

B

Time, every 20 seconds up to 2 minutes	Volume of gas produced by the reaction

C

Volume of gas (cm^3)	Time (s)

D

Time (s)	Volume of gas (cm^3)

Complete the task

Design a table for the experiment sodium hydroxide and hydrochloric acid. We will repeat the practical 3 times

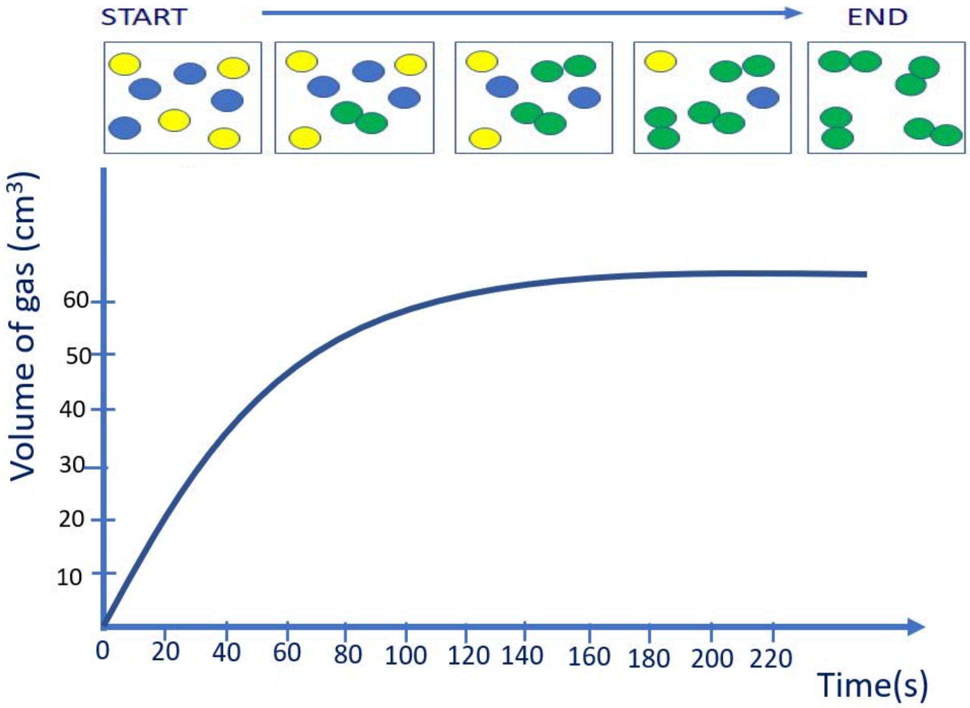
- **Independent variable in left column**
- **Full headings and units**
- **Unless told otherwise, included repeating columns and mean column**

Describe and explain the graph in terms of particles and collisions

At the beginning of the reaction...

As the number of particles begins to decrease...

Finally as there are no more collisions between reactants...



Answers

Water and Ammonium nitrate

IV: Time (s)

DV: Temperature change (°c)

CV: Material of container and cover, number of stirs, volume of water, mass of ammonium nitrate.

Sodium hydroxide and hydrochloric acid

IV: Time (s)

DV: Temperature change (°c)

CV: Material of container and cover, number of stirs, volume of sodium hydroxide, volume of hydrochloric acid

Method

1. Fill the polystyrene cup with **20cm^3** of hydrochloric acid, measured out with a measuring cylinder**.**
2. Take the start temperature of the acid using a thermometer leaving it for at least 20 seconds. Record the start temperature.
3. Add **20cm^3** of sodium hydroxide to the cup, stir twice and start the stop clock.
4. Take the temperature every 20 seconds up to 2 minutes. Record your results in a table.
5. We will be measuring the **change in temperature** at **20 second intervals** up to 2 minutes. We must keep the **polystyrene cup, the number of stirs and the volume of liquids** used the same.

Which table titles would be best? Why?

A

Time (minutes)	Amount of gas (cm^3)

B

Time, every 20 seconds up to 2 minutes	Volume of gas produced by the reaction

C

Volume of gas (cm^3)	Time (s)

D

Time (s)	Volume of gas (cm^3)

Tables

	Temperature change in (°c)			
Time (s)	1	2	3	Mean
20				
40				
60				
80				
100				
120				

Describe and explain the graph

- At the beginning of the reaction we have a high number of reacting particles colliding which makes **rate is quickest at the start, this is shown by the very steep curve.**
- As the number of reacting particles begins to **decrease the rate of reaction** also slows as there aren’t as many collisions occurring, this is shown by the **less steep part of the curve.**
- Finally as there are no more collisions between particles, **the curve begins to flatline meaning the rate doesn’t increase or decrease**, this shows us the reaction has finished as no more gas product is being made.