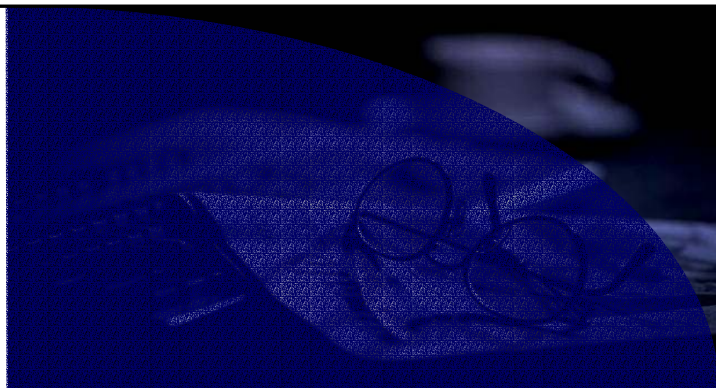


GCSE Science Coursework



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GCSE Science coursework...Year 10 Coursework:

GCSE Coursework...Year 10: Single and double science: 2006.

Notes:

All Double Award and Single Award students will complete similar coursework in Year 10.

A full investigation, 'Which brand of indigestion tablets are best' (Chemistry [SC03]), should be completed prior to the end of term three, year 10.

An Analysing/Evaluation exercise, 'What affects reactivity of metals' (Chemistry [SC03]), should also be completed giving pupils additional mark choice for Analysis and evaluation. Research show that these are the marks which are least well done during a full POAE investigation.

Teachers notes

Year 10 Coursework...“Which brand of indigestion tablets are best?”

Your technician will supply five different indigestion tablets e.g Boots, Tesco, Bisodol, Rennie's etc.

[They could be labelled Magic Mixture, Cur-a-pain, Burp-no-more, Spacial Anti acid Remedy, Tesbury's Anti-Acid Cure to make it more pupil friendly].

It would be appropriate for pupils to be given “information from the manufacturer” – on % content of calcium carbonate of the different “products”. This will allow for graphs to be drawn with lines of best fit and for predictions to be made.

Please warn pupils that tablets are not to be eaten by any pupil !

Pupils will need to carry out some preliminary work to ensure the correct quantities are being used without wastage of the tablets. Advice on maximum quantities should be given to pupils before they start. Pupils should know that the hydrochloric acid in their stomachs is ~pH2. The acid provided will be 0.1M – so pupils may wish to use pH meters to discover the pH. Warnings should be given about safety when using acid.

Pupils should also be given opportunity to chose their own....perhaps 2 to 3 so they can score P6B

Pupils should have researched information on acids, alkalis and neutralisation to remind them of appropriate indicators and pH. etc. Pupils should be able to work out that the rate of reaction between the acid and ‘indigestion remedy’ can be measured by time.

Results from Test Investigation -

“Which indigestion tablet works the best”

Apparatus

- 1: 3 drops methyl orange per 50cm³ 0.1M HCl
- 2: Pestle, mortar, measuring cylinder, spatula, mass balance, paper, stopwatch, beakers (100 cm³), samples of indigestion tablets.

Brand	Calcium Carbonate (mg)	Mass of tablet (g)	Price per tablet	Average time taken to change colour (seconds)
Boots	500	1.2	3.45	More than 3 mins
Rennie	680	1.3	4.53	21
Bisodol	522	1.5	5.67	26
Settlers	500	1.2	4.86	28
Superdrug	500	1.2	2.24	?

- 3: Crush tablet in pestle/mortar
- 4: Add 3 drops methyl orange indicator to 50 cm³ 0.1M HCl in beaker. Solution is pink
- 5: Add crushed power to acid and start timer and stir
- 6: Stop timer when solution is yellow.

Problems

- 1: Some powder left in mortar after crushing
- 2: Difficulty in adding powder to acid and starting stopwatch at the same time – solved - used paper to pour powder into beaker
- 3: Inconsistency in 'crushing'
- 4: Most powders did not dissolve into acid
- 5: Stirring inconsistent
- 6: Difficulty in knowing when end yellow colour was reached

Pupil Sheet

Year 10 Coursework

“Which brand of indigestion tablets are best ?”

This is a chemistry topic – based on acids, alkalis and neutralisation.

Research your notes, textbooks or the internet for information about neutralisation of acids, and indigestion remedies.

FACTS YOU NEED TO KNOW:

- Acid is neutralised by adding an alkali to it
- Indigestion tablets are alkaline and work by neutralising excess stomach acid
- The quickest acting indigestion tablet would probably contain the most alkali.
- When alkalis are added to an acid in the presence of an indicator a colour change will occur when the solution reaches neutral.

You will be supplied with 5 different ‘brands’ of indigestion powders, you can also chose to investigate 2 or 3 of your own choice. Plan an experiment to find the best indigestion table from the range of “brands” supplied.

Do some preliminary work on one of the ‘brands’ to ensure that you are happy with your plan. Don’t forget to write about the preliminary work that you do.

Use the coursework prompt sheets.

Your stomach contains acid to help enzymes digest or breakdown proteins as well as destroy any bacteria in the food that we eat. When we suffer digestion it is because the stomach produces too much acid. This build up of acid starts to irritate us and we know it as ‘indigestion.’ A potential remedy is to take indigestion tablets that contain the active ingredient calcium carbonate. These tablets neutralise excess acid and help us recover form indigestion.

Research your notes, textbooks or the internet for information about indigestion, stomach acid or neutralisation.

FACTS YOU NEED TO KNOW:

The technician will supply five different indigestion tablets e.g Boots, Tesco, Bisodol, Rennie etc.

You are also given “information from the manufacturer” – on % content of calcium carbonate of the different “products” and their mass in grams

This will allow for graphs to be drawn with lines of best fit and for predictions to be made.

Brand	Calcium Carbonate (mg)	Mass of tablet (g)	Price per tablet
Boots	400	1.2	3.54
Rennie	680	1.3	4.53
Bisodol	522	1.5	5.67

Settlers	500	1.2	4.86
Superdrug	500	1.2	2.24

Planning:

Your task is to investigate how effective each acid indigestion tablet is at neutralising stomach acid. You will do this by determining how effective each tablet is at neutralising 50cm³ of 0.1molar HCl acid.

You will be provided with all the equipment and an indicator that changes colour when the pH become 7 or neutral.

Do some preliminary work on one tablet and how quickly the neutralisation occurs. Don't forget to write about the preliminary work that you do.

You will need to carefully plan your experiment and repeat at least three times for each tablet. You also need to make a list of all equipment that you use including all measuring equipment and a full method that anyone could follow.

You also need to consider in you planning the following:

Planning:

PLANNING	
P2A	Outline a simple procedure.
P4A	Plan to collect evidence which will be valid.
P4B	Plane the use of suitable equipment or sources of evidence.
P6A	Use scientific knowledge and understanding to plan and communicate a procedure, to identify key factors to vary, control or take into account, and to make a prediction where appropriate.
P6B	Decide a suitable extent and range of evidence to be collected.
P8A	Use detailed scientific knowledge and understanding to plant and communicate an appropriate strategy, taking into account the need to produce precise and reliable evidence, and to justify a prediction, when one has been made.
P8B	Use relevant information from preliminary work, where appropriate, to inform the plan.

Obtaining:

You need to place all your results data and averages in a well presented results table making sure all the correct units are there.

Your also need to consider the following:

OBTAINING	
O2A	Collect some evidence using a simple and safe procedure.
O4A	Collect appropriate evidence which is adequate for the activity.
O4B	Record the evidence
O6A	Collect sufficient systematic and accurate evidence and repeat or check where appropriate

O6B	Record clearly and accurately the evidence collected.
O8A	Use a procedure with precision and skill to obtain and record an appropriate range of reliable evidence.

Analysis:

You need to draw graphs with labelled axis and units and title. You also need to draw in any lines of best fit. In your analysis you need to consider what has happened and any trends and patterns in the data.

You also need to consider the following:

ANAYSIS	
A2A	State simply what is shown by the evidence
A4A	Use simple diagram, charts or graphs as a basis for explaining the evidence.
A4B	Identify trends and patterns in the evidence.
A6A	Construct and use suitable diagrams, charts, graphs (with lines of best fit, where appropriate), or use numerical methods to process evidence for a conclusion.
A6B	Draw a conclusion consistent with the evidence and explain it using scientific knowledge and understanding.
A8A	Use detailed scientific knowledge and understanding to explain a valid conclusion drawn from processed evidence.
A8B	Explain the extent to which to which the conclusion supports the prediction, if one has been made.

Evaluating:

Remember it helps you to evaluate your experiment if you write down all the problems which occur whilst you are doing your experiment: e.g: Some powder left in mortar after crushing or Difficulty in adding powder to acid and starting stopwatch at the same time.

You also need to consider the following:

EVALUATION	
E2A	Make a relevant comment about the procedure used or the evidence obtained.
E4A	Comment on the quality of the evidence, identifying any anomalies.
E4B	Comment on the suitability of the procedure and where appropriate, suggest changes to improve it.
E6A	Consider critically the reliability of the evidence an whether it is sufficient to support the conclusion, accounting for any anomalies
E6B	Describe, in detail, further work to provide additional relevant evidence

Remember – all GCSE Coursework must be your own.

You need to complete all coursework and hand in to your teacher. Without coursework you cannot pass your science. You will also not be entered for your final exams. We do not waste money on exams entries for pupils with no coursework.

You will also get your coursework back to improve it only once: These corrections have to be made within 10 days.

Pupil sheet: Year 10 coursework A & E (single or double science)

Analysis and Evaluation only...“What affects reactivity of Metals”

Introduction:

A pupil planned an investigation to place the following metals in the reactivity series:

Calcium. Iron. Magnesium. Zinc.

The following predictions were made by the pupil;

- 1: All the metals will react with 2M Hydrochloric Acid: Formula HCl
- 2: The reactions will be Exothermic or produce energy in the form of heat.
- 3: The metal which will be most reactive will give out the greatest amount of heat.

Overview of the method:

2 grams of each metal: was placed in 20 ml of 2M acid in a polystyrene cup and the temperature changes in degrees Celsius was measured and recorded from the start of the reaction. For each of the metals the temperature was recorded every 30 seconds for a total of 510 seconds. All the experiments for each metal were repeated three times and the average values are given below. All experiments were exactly the same except the metal type.

Time:	Metal 1: Temp °C	Metal 2 Temp °C	Metal 3 Temp °C	Metal 4 Temp °C
Seconds	Iron	Magnesium	Zinc	Calcium
0	22	23	22	23
30	23	58	24	87
60	23	77	24	96
90	23	82	25	94
120	23	81	25	90
150	23	78	25	87
180	23	76	25	82
210	23	73	25	78
240	23	80	25	76
270	23	68	26	73
300	23	67	26	71
330	23	65	26	68
360	23	63	27	67
390	23	63	26	65
420	23	62	27	63
450	23	60	27	62
480	23	58	27	58
510	23	56	28	57

Data is the average for 3 experiments for each metal.

Analysis

- Draw and plot a graph of the results including the correct units for the X and Y axis and a title. Put all 4 sets of results on the same piece of graph paper.
- Draw on lines of best fit for each set of results.
- Explain what the results tell you and identify any trends and patterns in the observations or measurements.
- Place the 4 metals in order of their reactivity from the results and go into scientific detail into why the metals have different reactivities.
- Include in your explanation equations and diagrams to help explain the order of reactivity for the metals. You will need to go into some detail for this part.
- Draw a valid conclusion consistent with the results that you have been given and also use scientific ideas and understanding of the reactivity of metals.
- Explain how the results support or contradict the original prediction. . Were a suitable number and range of observations made during the investigation.

Evaluation:

- You need to make a comment on the procedure or method used or the results obtained. For example were enough repeats done or metals investigated.
- Comment on the overall accuracy of the results and point out any errors or points that are above or below lines of best fit.
- Suggest some improvements to the method or investigation. Say how these might improve the reliability of the results.
- Say whether you think that the results are sufficient to support the original hypothesis or your conclusion, how certain are you.
- Propose improvements to the experiment to provide additional results and how would you extend this investigation.

Top Tip

As you address each point just tick it off and make sure you answer each point fully using full sentences or diagrams where appropriate.

Full Mark scheme for A & E:

ANAYSIS	
A2A	State simply what is shown by the evidence

A4A	Use simple diagram, charts or graphs as a basis for explaining the evidence.
A4B	Identify trends and patterns in the evidence.
A6A	Construct and use suitable diagrams, charts, graphs (with lines of best fit, where appropriate), or use numerical methods to process evidence for a conclusion.
A6B	Draw a conclusion consistent with the evidence and explain it using scientific knowledge and understanding.
A8A	Use detailed scientific knowledge and understanding to explain a valid conclusion drawn from processed evidence.
A8B	Explain the extent to which to which the conclusion supports the prediction, if one has been made.

Evaluating:

EVALUATION	
E2A	Make a relevant comment about the procedure used or the evidence obtained.
E4A	Comment on the quality of the evidence, identifying any anomalies.
E4B	Comment on the suitability of the procedure and where appropriate, suggest changes to improve it.
E6A	Consider critically the reliability of the evidence an whether it is sufficient to support the conclusion, accounting for any anomalies
E6B	Describe, in detail, further work to provide additional relevant evidence

Remember – all GCSE Coursework must be your own.

You need to complete all coursework and hand in to your teacher. Without coursework you cannot pass your science. You will also not be entered for your final exams. We do not waste money on exams entries for pupils with no coursework.