

AS 90930 Carry out a practical chemistry investigation, with direction

Credits 4 (Internal) Literacy Activity: Answers

Achievement	Achievement with Merit	Achievement with Excellence
Carry out a practical chemistry investigation, with direction.	Carry out an in-depth practical chemistry investigation, with direction.	Carry out a comprehensive practical chemistry investigation, with direction.

Below is a list of the things you will need to be able to understand if you are to gain the best results you can on this standard. You probably won't need to know every single thing but they have all been included anyway. The technical words specific to this standard have been highlighted.

- Carry out a practical chemistry investigation, with direction.
- Can write the aim of the investigation (given on task sheet)
- Can write a plan (from general method & experience gained in trials) with a step-by-step procedure
- Can create a range of at least FOUR different values of
 - Temperature (e.g. using water baths)
 - Concentration (e.g. by making dilutions)
 - Surface area (e.g. by cutting up the material in some way)
- Can identify the independent variable
- Can identify the dependent variable
- Can identify variables to control to keep the same (to make it a fair test)
- Can prepare a results table with appropriate units
- Knows what is meant by accuracy
 - how it can be increased
 - can justify choices made to increase accuracy
- Knows what is meant by reliability
 - how it can be increased by repeat trials – usually original experiment AND 2 repeats
 - by spotting obviously anomalous results / outliers
- Can convert minutes to seconds if needed
- Can average data from repeat trials
- Can see a trend or lack of a trend in numerical data
- Can plot an appropriate graph (optional) to better see a trend or lack of a trend in numerical data
 - Evenly spaced labelled axes
 - Line of best fit or smooth curve if appropriate (Not “join the dots”)
 - Can identify obviously anomalous results / outliers
- Can write a conclusion
 - Conclusion matches processed data
 - Conclusion links to the aim of the investigation
 - Conclusion is related the prediction / hypothesis made
 - Conclusion is justified by reference to actual processed data
- Can relate the investigation findings to applicable chemistry ideas

Literacy terms and their definitions:

Term	Definition
Practical chemistry investigation	A science investigation is an activity covering the complete process from planning through to reporting and involves collecting primary data.
With direction	This means that your teacher will guide you in choosing an investigation to carry out and will give you general instructions in writing about the investigation. You will choose from a range of equipment and/or chemicals that your teacher will provide for you.
Aim of an investigation	A formal statement of the purpose of the investigation.
Prediction / hypothesis	In a scientific investigation you need to say what you think will happen in your experiment using your scientific knowledge before you do the experiment. This is called a prediction. Hypotheses are written in the following format: <i>"That....."</i> e.g. <i>that salinity of water will increase the rate of</i>
Trials	Rough experiments carried out to identify suitable quantities, equipment or techniques
Plan	A written experimental procedure
Method	An accurate written description of the materials and experimental procedure used in the investigation (usually written in third person).
Step-by-step procedure	A detailed method is achieved if your method includes sufficient detail and clarity of instruction for others to carry out the experiment and achieve consistent outcomes.
Range (e.g. temperature) of different values	A range is a number of possible values for the independent variable – an appropriate range is half the possible range or over e.g. A range of suitable temperatures for water is 20°C, 40°C, 60°C, 80°C.
Independent variable	The independent variable is one factor that you change and record its change when carrying out the investigation.
Dependent variable	The dependent variable is the factor that you measure as it changes in response to changing the independent variable.
Variables to control	The control variables are all other factors that are kept constant each time you repeat the investigation.
Fair test	Fair testing finds relationships between variables. A single variable is changed while keeping other variables the same. Any differences are said to be the result of the changed variable.
Primary data	The first data that is collected in an investigation. For example, in a practical investigation on changes in heat of an object, the primary data that is collected will be temperature and time.
Results table	Result tables and graphs should allow the reader to look at one graph or table and make comparisons.
Appropriate units	Units that belong to the quantity e.g. metres belong to length, seconds belong to time. Appropriate units usually involve S.I. Units (Systeme Internationale units)

Accuracy	Accuracy indicates the closeness of measurements to each other – if you repeated an experiment 3 times would you the same result 3 times?
Justify choices	Explain with reason(s)
Reliability	If someone else carried out your investigation would they would get the same results and come to the same conclusions? Unreliable conclusions are worthless, other than telling you that your investigation should be modified and improved. Your experimental results might be considered reliable if your trial and repeats were all “quite close”.
Anomalous results / outliers	A result that does not match other results for the same experiment.
Convert	You can't average minutes and seconds unless you first convert all times to seconds.
Average	Add up data and \div by the number of pieces of data
Trend	A trend is a easily observed pattern e.g.
Appropriate graph	A graph with correct title, labelling and plotting where a line has been drawn with a ruler or a curve of best fit has been drawn as a smooth curve (not join the dots to make an animal)
Processed data	Processed data involves calculated data, for example, average a set of numbers or graph the data.
Conclusion	This is a conclusion relating the findings of your investigation back to the aim and hypothesis for your experiment.
Applicable chemistry ideas	You will need to be able to explain the effect of changing temperature, surface area or concentration on terms of collisions between particles , i.e. simple collision theory. E.g. more collisions per second