

Outcome 1 Comparison Table

NAT 3		NAT 4		NAT 5	
Candidates are required to apply skills of scientific enquiry to carry out an experiment that draws on knowledge and understanding of key areas of a NAT3 Unit.	Candidates are provided with a Candidate Guide to assist them to produce the required evidence for assessment in the form of a scientific report.	Candidates have to apply skills of scientific inquiry to carry out an experiment that draws on knowledge and understanding of key areas of a NAT 4 Unit.	Candidates are provided with Assessment Information for Candidates to assist them to produce the required evidence for assessment in the form of a scientific report.	Candidates are required to apply skills of scientific inquiry to carry out an experiment that draws on knowledge and understanding of key areas of a NAT 5 Unit.	Candidates are provided with a Candidate Guide to assist them to produce the required evidence for assessment in the form of a scientific report.
	No planning required - procedure is given to candidates	1.1 Planning an experiment	The plan should include: a clear statement of the aim variable to be kept constant what will be measured /observed the equipment/materials a clear and detailed description of how the experiment should be carried out ,including the safety considerations; <i>The plan for the experiment must be clear enough for another person to follow and must be at an appropriate level.</i>	1.1 Planning an experiment	The plan should include: a clear statement of the aim a dependent and an independent variable key variables to be kept constant measurements /observations to be made the equipment/materials a clear and detailed description of how the experiment should be carried out ,including the safety considerations; <i>The plan for the experiment must be clear enough for another person to follow and must be at an appropriate level.</i>
1.1 Following given procedures safely	The candidate should be seen to follow procedures correctly, including safety considerations, as appropriate. <i>In the case of assessment by observation, evidence should include assessor comments that show clearly the basis on which assessment judgements have been made.</i> <i>An observation checklist could be used to record that procedures have been followed correctly and safely</i>	1.2 Following procedures safely	The candidate should be seen to follow procedures correctly, including safety considerations, as appropriate. <i>In the case of assessment by observation, evidence should include assessor comments that show clearly the basis on which assessment judgements have been made.</i> <i>An observation checklist could be used to record that procedures have been followed correctly and safely.</i>	1.2 Following procedures safely	The candidate should be seen to follow procedures correctly, including safety considerations, as appropriate. <i>In the case of assessment by observation, evidence should include assessor comments that show clearly the basis on which assessment judgements have been made.</i> <i>An observation checklist could be used to record that procedures have been followed correctly and safely.</i>
1.2 Making and recording observations /measurements correctly	Observations/measurements taken should be recorded correctly. Assessors should give support with tables/headings/units, as appropriate.	1.3 Making and recording observations/measurements correctly	Observations/measurements taken should be recorded correctly <i>The raw data should be collated in a relevant form, eg a table etc.</i>	1.3 Making and recording observations/measurements correctly	Observations/measurements taken should be recorded correctly, Measurements should be repeated and averages calculated, where appropriate. <i>The raw data should be collated in a relevant form eg a table, etc.</i>

1.3 Presenting results in an appropriate format	Candidates should present results in a given format using at least one format: table, line graph, chart, key, diagram, flow chart or summary or other appropriate format. <i>Assessors should give support with format and headings/units as appropriate.</i>	1.4 Presenting results in an appropriate format	Candidates should present results in an appropriate format using at least one format from: table, line graph, chart, key, diagram, flow chart or summary or other appropriate format. <i>Candidates should use SI units and standard abbreviations, as appropriate.</i> <i>If used, graphs should be plotted on squared graph paper.</i>	1.4 Presenting results in an appropriate format	Candidates should present results in an appropriate format using at least one format from: table, line graph, chart, key, diagram, flow chart or summary or other appropriate format. <i>Candidates should use SI units and standard abbreviations where appropriate.</i> <i>If used, graphs should be plotted on squared graph paper.</i>
1.4 Drawing valid conclusions	Conclusions should relate to the aim of the experiment. If results are inconclusive but candidates refer to evidence and the aim of the experiment to say that no conclusion can be drawn then this would be valid and sufficient response.	1.5 Drawing valid conclusions	Conclusions should refer to the aim of the experiment. If results are inconclusive but candidates refer to evidence and the aim of the experiment to say that no conclusion can be drawn then this would be a valid and sufficient response	1.5 Drawing valid conclusions	Conclusions should refer to the aim of the experiment. If results are inconclusive but candidates refer to evidence and the aim of the experiment to say that no conclusion can be drawn then this would be valid and sufficient response.
1.5 Evaluating experimental procedures	Candidates should include a suggested improvement to the experiment, if appropriate	1.6 Evaluating experimental procedures	Evaluation should provide at least one possible improvement for the experiment.	1.6 Evaluating experimental procedures	Evaluation should be supported by justification(s) and provide at least one possible improvement for the experiment. <i>The response should be appropriate for the experiment.</i> <i>'Supported by reasons' means that there needs to be justification or reasoning included in the evaluation.</i>
Suggestions for experiments within Unit 1 context	Factors affecting the rate of reaction Solubility of different substances Classification of chemicals as acid/alkaline/neutral Effect of dilution on pH Signs of chemical reaction	Suggestions for experiments within Unit 1 context	Investigate the effect of temperature or concentration of acid on: the reaction with sea shells growth of cress Investigate the effect of changing the mass of solute on the highest/lowest temperature reached in a hot/cold pack. Investigate the effect of changing an alkali or acid on volume required for neutralisation	Suggestions for experiments within Unit 1 context	The electrical conductivity of ionic compounds. Calculation of average rate of reaction for carbonate/acid reaction. Using volumetric titrations to determine the concentration of various solutions.
Suggestions for experiments within Unit 2 context	Testing foods for starch and/or glucose Testing solubility of fertilisers Energy from food	Suggestions for experiments within Unit 2 context	Solubility of different Carbohydrates Testing substances with Benedict's solution	Suggestions for experiments within Unit 2 context	Alternative fuels for cars (alcohol) Investigate the effect of chain length on energy released in combustion Determining concentration of ethanoic acid in different vinegars
Suggestions for experiments within Unit 3 context	Solubility of everyday chemicals Electrical/ heat conductivity of metals Reactions of different metals with acid Analysis of water samples	Suggestions for experiments within Unit 3 context	Investigate the effect of changing the metals in a cell on the voltage produced. Investigate the factors which affect the rate of corrosion. Analysis of water samples, eg pH, flame tests.	Suggestions for experiments within Unit 3 context	The factors affecting the voltage in electrochemical cells Volumetric analysis of water samples, chloride test, titrations

Combined Approach UASP Package 2 Suggestions for 2.2/2.3 and Outcome 1 Expt

NAT 5

Unit	Key area	Applications	Issues	Practical
Chemical Changes and Structure	Atomic structure and bonding	To investigate uses of electrolytes	Investigate the effect of using electrolytes on the environment/ society	Factors affecting the ionic conductivity of a solution
Nature's Chemistry	Energy from fuels	Use of different fuels	Investigate the environmental issues relating to using petrol as a fuel compared to biofuels	Experiment to compare energy released from alcohols using $E = cm \Delta T$
Nature's Chemistry <i>and</i> Chemistry in Society	Everyday consumer products chemical analysis	Uses of vinegar	Investigate the effect of using vinegar on the environment and society	Compare the concentration of ethanoic acid in different types of vinegar — malt/ wine/ spirit/ cider
Chemistry in Society	Metals	To investigate recent developments in battery technology	Investigate the effect of battery use on the environment/society, ie source of raw materials/disposal	To determine the factors which affect voltage

Combined Approach UASP Package 2 Suggestions for 2.2/2.3 and Outcome 1

NAT 4

Unit	Key area	Application	Issue	Practical
Chemical Changes and Structure	Rates of reaction	Investigate the use of temperature to control reactions, eg using cold storage	Investigate how temperature controlled reactions have an effect on the environment/ society	Effect of temperature on the rate of reaction
Chemical Changes and Structure	Acids and bases	Investigate acid rain formation and effect on environment/ the society	Investigate the effect of acid rain on the environment/ society, eg buildings, plants etc.	Testing the pH of given solutions
Nature's Chemistry	Hydro-carbons	Investigate the use of alkanes	Investigate the effect of using alkanes on the environment/ society	How does the light level effect the decolourisation of bromine with alkane?
Chemicals in Society	Metals	Investigate protection of metals from corrosion	Investigate the effect of corrosion on the environment/ society	Investigate the rate of corrosion (ferroxyl gel plates)