NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Level 2, 2003

Science: Describe naturally occurring organic mixtures and the production of derived consumer products (90315)

National Statistics

Assessment Report

Assessment Schedule

Science: Describe naturally occurring organic mixtures and the production of derived consumer products (90315)

National Statistics

Number of Results	Percentage achieved			
	Not Achieved	Achieved	Merit	Excellence
947	86.1%	13.1%	0.7%	0.1%

Assessment Report

General Comments

Every candidate for a National Certificate of Educational Achievement examination paper is expected to:

- read the question and do what the question asks
- allow adequate time to complete answers
- be accurate: check and/or proofread
- use appropriate technical terms
- bring the correct equipment
- write and/or draw clearly
- use pen if work is to be eligible for reconsideration.

The title of this achievement standard specifies the outcome as a description of naturally occurring organic mixtures as well as a description of the production of derived consumer products. Candidates need to achieve both sections of this standard. Although the first section was completed well, most candidates were unable to describe the steps in production of consumer products. To gain Achievement with Merit, candidates are required to link composition with use. There was little evidence of this linking.

Candidates have a good knowledge of organic compounds and structures, but are not as knowledgeable in providing structural formulae. The explanatory notes are quite clear about what is required in this respect.

Candidates were often unaware of the key steps in commercial wine and beer making. These processes are specified in the explanatory notes. In describing the wine-making process, candidates were not aware of the role of cool temperatures in achieving maximum alcohol production, often referring to the need to warm the yeast.

Candidates need to be more accurate with their use of language related to the concepts they are describing. Candidates often used the terms ‘power’ or ‘run’ rather than fuel, or described LPG/CNG being used as ‘petrol’ for cars.

Assessment Schedule

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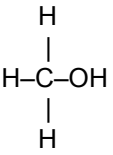
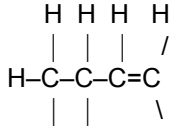
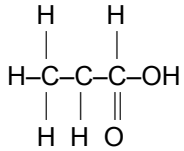
Evidence Statement

/ = or **: = both parts required**

Question	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence
	Describe organic compounds, and the composition and uses of naturally occurring organic mixtures.	Link the composition of naturally occurring organic mixtures and the derived consumer products to their uses.	Explain the usefulness of naturally occurring organic mixtures and the derived consumer products in terms of their properties.
	Holistic statement. The student can describe organic compounds and the composition and use of TWO organic mixtures from beer, natural gas and petroleum.	Holistic statement. The student can link the organic mixtures of beer, natural gas and petroleum to their uses.	Holistic statement. The student can explain the process of petroleum refinery related to petrol production.
ONE (a)			
(b)	Hexane		
(c)	 / correct double bond (or c–c=c–c isomer)		
(d)	Pentanol/pentan-1-ol		
(e)			

Question	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence
TWO (a)	**Part A: Beer** Sugar (or glucose), hops, water, yeast, malt (or barley/grain) (2 required).		
(b)	Fermentation/warmth/absence of oxygen/mixture mixed/wort ingredients boiled.	Mixture mixed : fermented in absence of oxygen: warmth : wort ingredients boiled. Link 2 of above.	Link explained in terms of properties (eg explains why no oxygen during fermentation).
(c)	ethanol/CH_3CH_2OH H H | | H–C–C–OH | | H H		
(d)	Alcohol dissolves flavouring substances.	Alcohol dissolves flavouring substance : alcohol then dissolves in water (must be linked ideas).	
(e)	**Part B: Natural gas** 2 of: carbon dioxide, methane, ethane, propane, butane, sulfur compounds.		
(f)	CNG – fuel for vehicles, LPG – household (eg cooking, heating) gas/fuel/bottled gas/fuel – not vehicles on its own. Gas/fuel must be mentioned. **1 correct use required**		
(g)(i)	**Part C: Petroleum** Natural gas/petrol (or naphtha)/avgas/diesel/fuel oil/lubricant oil/bitumen (asphalt)/kerosene/petroleum jelly (or oil)/paraffin waxes (not 'oil' alone; not 'tar' not both 91 petrol and 96 petrol; aviation fuel, etc accepted). (3 required names or valid uses)	Natural gas/petrol/avgas/diesel/ fuel oil/lubricant oil/ bitumen/ kerosene/petroleum jelly (or oil) For Uses 'fuel' must be used (or 'combustion') NOT 'run' or 'power'. Incorrect name, eg tar with correct use acceptable. (3 required + 3 valid uses)	

(g)(ii)		A correct property named (for a correct name in (g)(i)) (Physical properties Gas/liquid/solid Chemical properties Chain length Burn as fuels) and linked to a relevant use (ie a relevant use is mentioned).	Explanation as to why the property is important to the use given.
(h)	Fractional distillation/ cracking/reformed named OR described.	Fractional distillation/cracking / reforming correctly explained AND named; ie boiling points correctly mentioned or catalyst/heat/pressure/ hydrogenation for cracking.	Fractional distillation : cracking both explained in terms of petrol production.

Question	Evidence contributing to Achievement	Evidence contributing to Achievement with Merit	Evidence contributing to Achievement with Excellence
	Describe key steps in the production of consumer products from naturally occurring organic mixtures.	Link the key steps in the consumer production process to the properties of the naturally occurring organic mixtures involved.	Explain the purpose of individual steps in the consumer production process.
	Holistic statement. The student can describe the key steps in the production of wine.	Holistic statement. The student can link the key steps in the production of wine.	Holistic statement. The student can explain the purpose of individual steps in the production of wine.
THREE (a)	Step 1 Measure sugar levels/pH/ acidity. NOT sweetness.		
(b)	Step 2 Break skins/remove foreign material/get juice/break cell walls (1 required).	Break skins for juice to enable fermentation. Foreign material – unable to be fermented/contains no sugar/affects taste, etc. 2 of Achieved linked to purpose in wine-making process.	
(c)	Kill wild yeasts/sterilise/prevent oxidation/prevent microbial action/preservative/prevents discolouration to stop oxidation/spoils taste ('keep oxygen/air out' not accepted).	Grape juice contains wild yeasts: SO_2 kills natural yeasts/ microbes or similar link.	Affects final product/not give desired flavour.

(d)	Step 3 $C_6H_{12}O_6 \rightarrow C_2H_5OH + CO_2$ Not balanced	$C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$ Balanced	
(e)	Juice inoculated with chosen yeast/temperature controlled/ ferments under CO_2/no O_2 present/stainless steel or wood fermentation vats/sterile conditions or utensils, containers. 2 required	Juice inoculated with chosen yeast: desired flavours/products Or temperature controlled: lower temperature the higher the alcohol Or ferments under CO_2 : anaerobic respiration Or stainless steel or wood fermentation vats: non-reactive/ flavour enhancement. 2 required	All 4 conditions provided linked to purpose.
(f)	Step 4 Yeast/Bacteria	Yeast : to stop fermentation/ bacteria : stop converting to ethanoic acid/(acetic acid).	
(g)	To stop oxidation/spoils taste ('keep oxygen/air out' not accepted).	(Stop oxidation/stop production of ethanoic acid) : spoils taste.	

Judgement Statement

Judgement statements (formerly referred to as sufficiency statements) help candidates understand how their overall results for each standard were arrived at.

Question	Achievement	Achievement with Merit	Achievement with Excellence
One	Sufficiency: 3 out of 5 correct		
Two	Sufficiency: 5 out of 9 correct	Sufficiency: 3 out of 5 correct	Sufficiency: 1 out of 3 correct
Three	Sufficiency: 4 out of 7 correct	Sufficiency: 3 out of 6 correct	Sufficiency: 1 out of 2 correct