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NZQA
NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 2 Science, 2007

90766 Describe the chemical properties and effects of fertilisers

Credits: Four
2.00 pm Wednesday 28 November 2007

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should answer ALL the questions in this booklet.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–8 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

For Assessor's use only	**Achievement Criteria**	
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Describe the properties and effects of fertilisers. ☐	Explain the effects of fertilisers in terms of their properties. ☐	Discuss the effects of fertilisers in terms of their properties. ☐
Overall Level of Performance ☐		

You are advised to spend 40 minutes answering the questions in this booklet.

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SUPERPHOSPHATE

(a) Describe the key characteristic of superphosphate that makes it an inorganic fertiliser.

(b) Superphosphate has a rating of 0:20:0.

Explain what this rating of 0:20:0 means.

Rock phosphate has the chemical formula of $Ca_3(PO_4)_2$ and superphosphate has the chemical formula of $Ca(H_2PO_4)_2$.

(c) Give the ion charge of the **phosphate ion** in rock phosphate.

(d) Give the ion charge of the **di-hydrogen phosphate ion** in superphosphate.

(e) Explain the differences in the charges of the two ions in (c) and (d) above.

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(f) Name the TWO nutrients supplied to the soil by the fertiliser superphosphate.

Nutrient 1 _____ Nutrient 2 _____

(g) Using the information provided on the previous page, which fertiliser, rock phosphate or superphosphate, has the greatest percentage of phosphorus included. Show all your workings.

(Ca = 40 H = 1 P = 31 O = 16)

Rock phosphate _____

_____

_____

_____ %

Superphosphate _____

_____

_____

_____ %

(h) Many farmers in New Zealand use superphosphate in preference to rock phosphate.

Explain why superphosphate is used rather than rock phosphate.

_____

_____

_____

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(i) Plants use phosphorus from the soil to make plant DNA in the nucleus of their cells.

Discuss how phosphorus gets from the soil into the cell of the plant to be made into DNA.

A farmer orders some superphosphate with added molybdenum. The molybdenum is added in very small amounts. It is important for the growth of clover plants.

(j) What name is given to an element needed by plants in very small amounts?

(k) Explain why clover plants need molybdenum.

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Superphosphate was applied to a paddock and when the soil was tested it had a pH of 6.

(l) Describe what a pH of 6 means.

(m) Explain how the pH of the soil could be changed so that it was neutral (pH 7).

(n) Discuss how soil pH affects the uptake of nutrients by plants. Relate your answer to soil chemistry. (Key chemistry should include solubility, and effects of high and low pH on nutrient uptake.)

Farmers protect their waterways with a riparian strip as drainage from their properties goes into the waterway. The local environmental council takes phosphate readings across the paddocks, the riparian strip and the waterway. These are shown below.

Location	**Phosphate readings (ppm)**
Paddock	30
Riparian strip close to paddock	18
Riparian strip close to the waterway	4
Waterway	1.5

(o) Explain the differences in the readings from the paddock to the waterway.

(p) What name is given to fertiliser pollution of waterways?

(q) Explain TWO **other ways** a farmer could minimise fertiliser pollution in our waterways.

Extra paper for continuation of answers if required.
Clearly number the question.

Assessor's use only

Question number	