

See back cover for an English  
translation of this cover

3

91391M



913915



NEW ZEALAND QUALIFICATIONS AUTHORITY  
MANA TOHU MĀTAURANGA O AOTEAROA

SUPERVISOR'S USE ONLY

## Te Mātauranga Matū, Kaupae 3, 2014

### 91391M Te whakaatu māramatanga ki ngā āhuatanga o ngā pūhui whaiwaro

2.00 i te ahiahi Rātū 11 Whiringa-ā-rangi 2014  
Whiwhinga: Rima

Paetae	Kaiaka	Kairangi
Te whakaatu māramatanga ki ngā āhuatanga o ngā pūhui whaiwaro.	Te whakaatu māramatanga hōhonu ki ngā āhuatanga o ngā pūhui whaiwaro.	Te whakaatu māramatanga matawhānui ki ngā āhuatanga o ngā pūhui whaiwaro.

Tirohia mehemea e ōrite ana te Tau Ākonga ā-Motu (NSN) kei tō pepa whakauru ki te tau kei runga ake nei.

**Me whakautu e koe ngā pātai KATOA kei roto i te pukapuka nei.**

He taka pūmotu kua whakaritea ki te Pukaiti Rauemi L3-CHEMMR.

Ki te hiahia koe ki ētahi atu wāhi hei tuhituhi whakautu, whakamahia te (ngā) whārangi kei muri i te pukapuka nei, ka āta tohu ai i ngā tau pātai.

Tirohia mehemea kei roto nei ngā whārangi 2–25 e raupapa tika ana, ā, kāore hoki he whārangi wātea.

**HOATU TE PUKAPUKA NEI KI TE KAIWHAKAHAERE HEI TE MUTUNGA O TE WHAKAMĀTAUTAU.**

TAPEKE

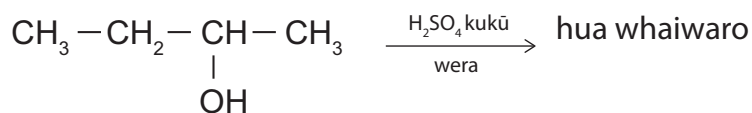
MĀ TE KAIMĀKA ANAKE

## PĀTAI TUATAHI

- (a) Whakaotihia te tūtohi i raro nei mā te tuhituhi i te ingoa nahanaha IUPAC mō ia pūhui, tāna ture tātai hanganga rānei.

Ture tātai hanganga	Ingoa nahanaha IUPAC
$\begin{array}{c} \text{Cl} \quad \text{O} \\   \quad    \\ \text{CH}_3 - \text{CH} - \text{C} - \text{CH}_3 \end{array}$	
	amiti pōwaro (propanamide)
$\begin{array}{c} \text{CH}_3 - \text{O} - \text{C} - \text{CH}_2 - \text{CH}_2 - \text{CH}_3 \\    \\ \text{O} \end{array}$	

- (b) Ina tauhohe ai te waihā-2-pūwaro ki te  $\text{H}_2\text{SO}_4$  kukū, e toru ngā momo hua whaiwaro ka puta pea, ā, he poinanaha tētahi ki tētahi.



- (i) Ki ngā pouaka i raro, tātuhia ngā poinanaha e toru ka puta i tēnei tauhohenga.

1	2	3

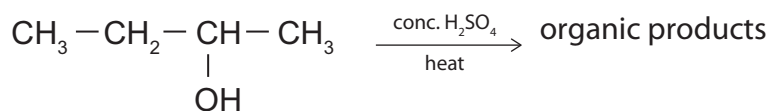
## QUESTION ONE

ASSESSOR'S  
USE ONLY

- (a) Complete the table below giving the IUPAC systematic name or the structural formula for each compound.

Structural formula	IUPAC systematic name
$\begin{array}{c} \text{Cl} \quad \text{O} \\   \quad    \\ \text{CH}_3 - \text{CH} - \text{C} - \text{CH}_3 \end{array}$	
	propanamide
$\begin{array}{c} \text{CH}_3 - \text{O} - \text{C} - \text{CH}_2 - \text{CH}_2 - \text{CH}_3 \\    \\ \text{O} \end{array}$	

- (b) When butan-2-ol undergoes a reaction with concentrated  $\text{H}_2\text{SO}_4$ , three possible organic products form, which are isomers of each other.



- (i) In the boxes below, draw the three isomers formed during this reaction.

1	2	3
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- (ii) Ko tēhea o ngā pōinanaha e toru o te wāhanga (i) te rahinga iti rawa ka puta?  
Whakamāramahia tō whakautu.

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- (ii) Which of the three isomers from part (i) will be formed in the smallest amount?  
Explain your answer.

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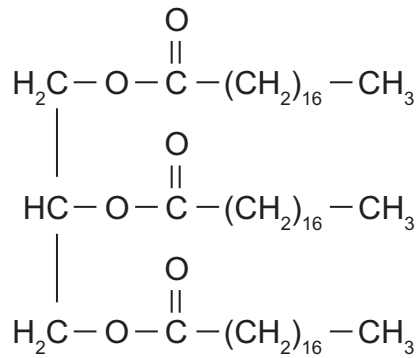
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(c) E whakaaturia ana te hākawa toru nonireka (triglyceride) ki te āhua tōtā.



(i) Porohitatia tētahi rōpū mahinga kei te hoahoa o runga ka homai i te ingoa.

Ingoa rōpū mahinga: \_\_\_\_\_

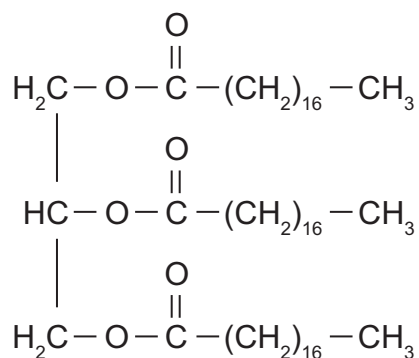
(ii) Whakatauritehia te tauhohenga o te hākawa toru nonireka i runga ina whakapāheko ā-wai mā te waikawa, mā te kawakore hoki.

I tō tuhinga me whakauru e koe:

- ngā tātuhinga o ngā hanganga tōtā o ngā hua whaiwaro
- ngā whakahohe me ngā āhuatanga e hiahiatia ana kia haere tonu te tauhohenga.

**He wāhi anō mō tō whakautu  
ki tēnei pātai kei te whārangi 8.**

- (c) The triglyceride below is shown in condensed form.



- (i) Circle a functional group on the diagram above and give its name.

Functional group name: \_\_\_\_\_

- (ii) Compare and contrast the reaction of the above triglyceride when it undergoes both acidic and basic hydrolysis.

In your answer you should include:

- drawings of condensed structures of the organic products
- any reagents and conditions required for the reaction to proceed.

**There is more space for your answer to this question on page 9.**

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**PĀTAI TUARUA**

(a) Tautohua ngā whakahohe, ngā āhuatanga e hiahia ana, me ngā kitenga e hāngai ana ki ngā momo, kia wehea ai ngā matū takirua e whai nei tētahi i tētahi.

(i) Ngā mehanga waiwai o te amini pōwaro me te amiti pōwaro.

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(ii) Hāparo-rua-pōwaro me te hāparo-tahi pōwaro.

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(iii) Waikawa pōwaro waihā-kore pūhaumāota (propanoyl chloride) me te pōhakawa pōwaro (propyl propanoate).

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(b) Kei raro nei ngā tohutohu mō te whakarite i te 2-pūhaumāota-2-mewaro-pōwaro.

Āta pānuhia ngā tohutohu ka whakautu i ngā pātai e whai ake.

1. Rurerurehia he 10 mL o te 2-mewaro-waihā-2-pōwaro ki te 30 mL waikawa pūhaumāota kukū ki roto i tētahi kōrere tātari.
2. Tukuna haerehia te apa waikawa o raro ka waiho. Tāpirihia te konutai hauwai pākawawaro pūhake ki te hua whaiwaro. Rurerurehia, me te tuku haere tonu i te kati i ētahi hēkona kia tukuna haerehia ai te pēhanga.
3. Tukuna haerehia te apa waiwai i raro ka waiho. Whakawhitia ki tētahi puoto koeko ka tāpiri i ētahi konutai pākawa pungatara waikore, ā, kia kaha tonu te kaurori.
4. Whakawhitia te hua whaiwaro ki roto i tētahi puoto tou porohita, ka kahi i te wāhanga e koropupū ana i roto i te 2°C o te pae koropupū o te 2-pūhaumāota-2-mewaro-pōwaro.

**QUESTION TWO**ASSESSOR'S  
USE ONLY

(a) Identify the reagents, conditions required, and observations linked to species, to enable the following pairs of chemicals to be distinguished from each other.

(i) Aqueous solutions of propanamine and propanamide.

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(ii) Propanone and propanal.

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(iii) Propanoyl chloride and propyl propanoate.

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(b) Instructions for the preparation of 2-chloro-2-methylpropane are given below.

Read the instructions carefully and answer the questions that follow.

- |   |
|---|
| <ol style="list-style-type: none"><li>1. Shake 10 mL of 2-methylpropan-2-ol with 30 mL of concentrated hydrochloric acid in a separating funnel for 10 minutes.</li><li>2. Run off the bottom acid layer and discard it. Add saturated sodium hydrogen carbonate to the organic product. Shake, releasing the tap every few seconds to relieve the pressure.</li><li>3. Run off the bottom aqueous layer and discard it. Transfer into a conical flask and add some anhydrous sodium sulfate, and stir thoroughly.</li><li>4. Transfer the organic product into a round-bottom flask, and collect the fraction boiling within 2°C of the boiling point of 2-chloro-2-methylpropane.</li></ol> |
|---|

- (i) Whakamāramahia he aha i tāpirihia ai te mehanga konutai hauwai pākawawaro i ngā tohutohu 2.

Whakaingoahia te haurehu ka puta i tēnei upane.

Ingoa o te haurehu ka puta: \_\_\_\_\_

Whakamāramatanga: \_\_\_\_\_

\_\_\_\_\_

- (ii) Whakamāramahia he aha i tāpirihia ai te konutai pākawa pungatara waikore i ngā tohutohu 3.

\_\_\_\_\_

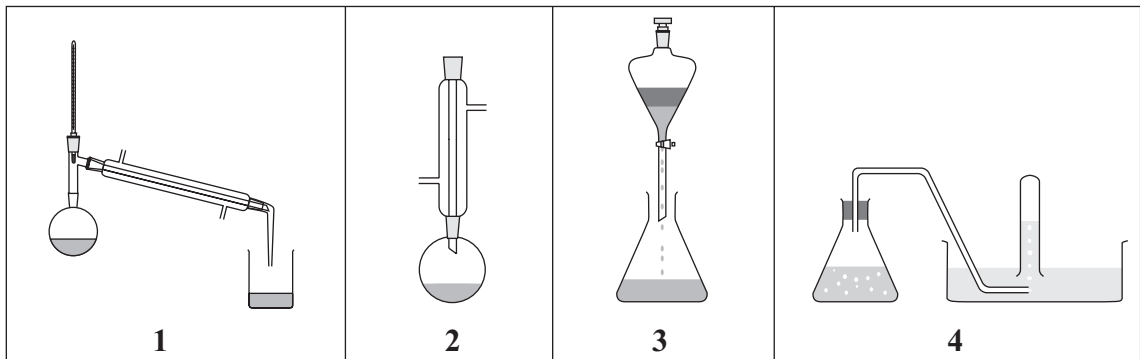
\_\_\_\_\_

- (iii) Whakaingoatia te tukanga ka whakamahi i ngā tohutohu 4 hei horoi i te hua whaiwaro.

Te tukanga ka whakamahia: \_\_\_\_\_

Tuhia te tau o ngā utauta ka whakamahia e tētahi ākonga ki te whakahaere i tēnei tukanga mai i ngā hoahoa i raro.

Tau hoahoa: \_\_\_\_\_



- (i) Explain why the solution of sodium hydrogen carbonate is added in instruction 2.

Name the gas produced in this step.

Name of gas formed: \_\_\_\_\_

Explanation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- (ii) Explain why anhydrous sodium sulfate is added in instruction 3.

\_\_\_\_\_

\_\_\_\_\_

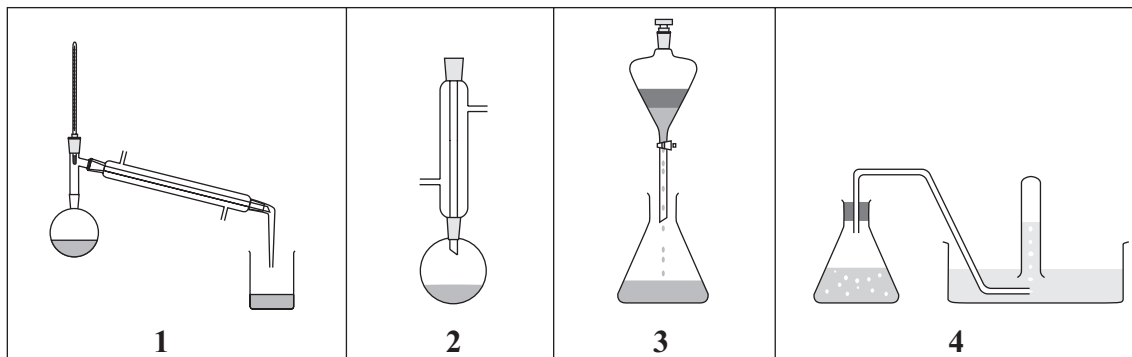
\_\_\_\_\_

- (iii) Name the process used in instruction 4 to purify the organic product.

Process used: \_\_\_\_\_

Write the number of the equipment that a student would use to perform this process from the diagrams below.

Diagram no: \_\_\_\_\_



- (iv) Matapakihia te tukanga ka whakahaerehia i roto i ngā tohutohu 4 kei te whārangi 10.

Me whakauru ki tō whakautu:

- te kaupapa o tēnei tukanga
- he whakamārama he pēhea te mahi a tēnei.

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- (iv) Discuss the process carried out in instruction 4 on page 11.

Include in your answer:

- the purpose of this process
- an explanation of how it works.

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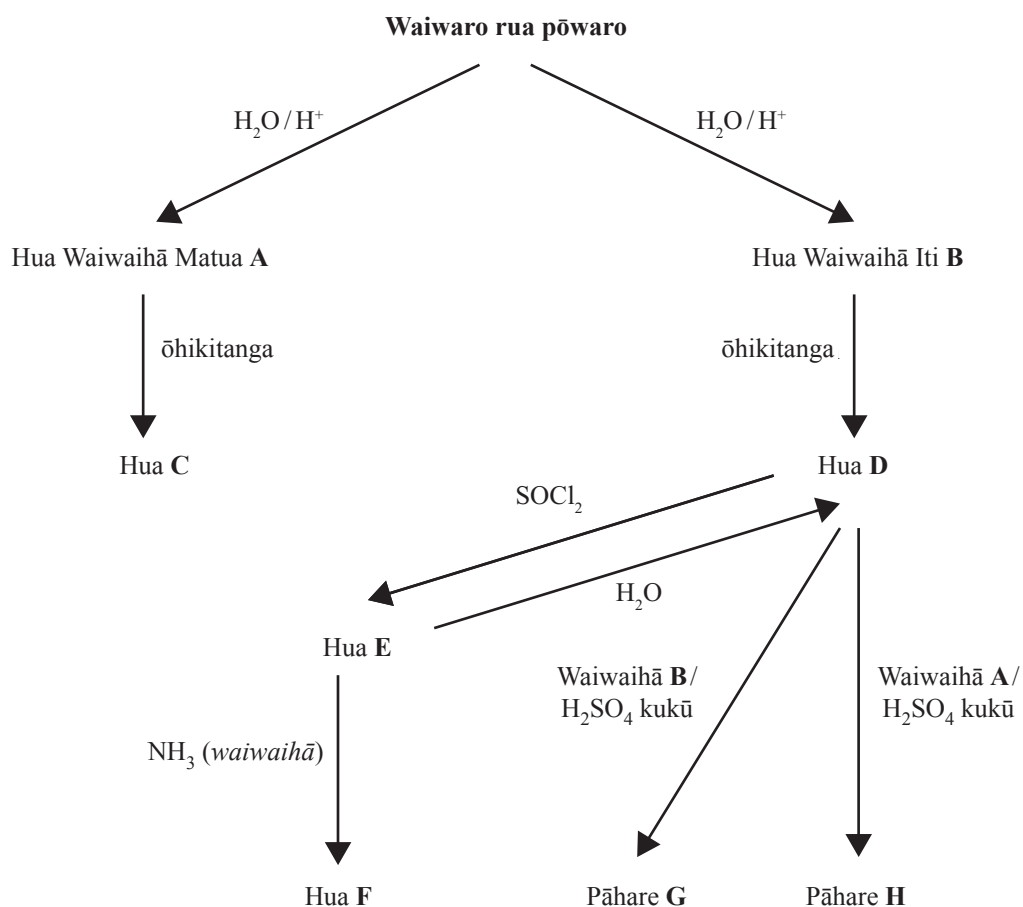
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ASSESSOR'S  
USE ONLY

## PĀTAI TUATORU

(a) Ka taea te whakahohe i te waiwaro rua pōwaro ki te wai i roto i te waikawa kia puta ai tētahi hua matua (**A**) me tētahi hua iti (**B**).

- Ka ōhikitia a **A** kia puta te hua **C**.
- Ka ōhikita a **B** kia puta te hua **D**.
- Ina whakahohea a **D** ki te  $\text{SOCl}_2$ , ka puta te hua **E**.
- Ina whakahohea a **D** ki te waiwaihā **B**, ka puta te **pāhare G**.
- Ina whakahohea a **D** ki te waiwaihā **A**, ka puta te **pāhare H**, arā, he poinanaha o **G**.
- Ina whakahohea a **E** ki te waiwaihā haukini, ka puta te hua **F**.
- Ina whakahohea a **E** ki te wai, ka puta te hua **D**.



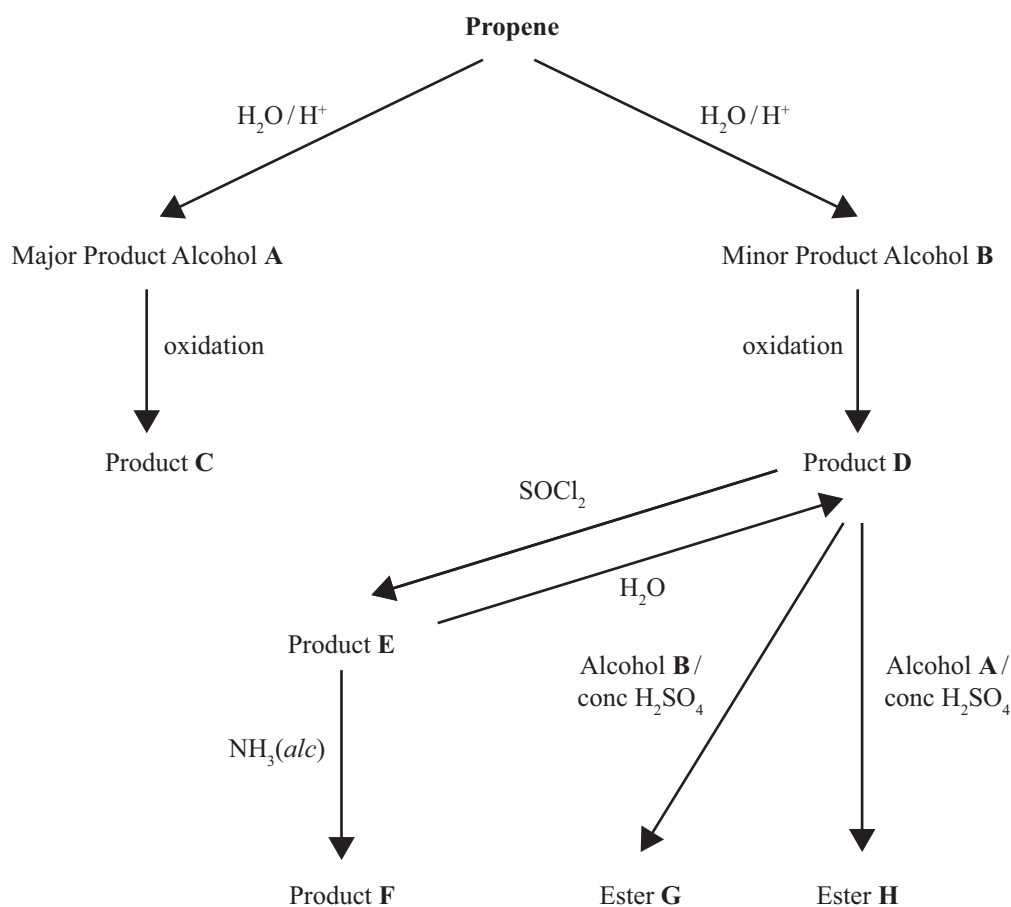


### QUESTION THREE

 ASSESSOR'S  
USE ONLY

(a) Propene can be reacted with water in the presence of acid to form a major product (**A**) and a minor product (**B**).

- **A** is oxidised to form product **C**.
- **B** is oxidised to form product **D**.
- When **D** is reacted with  $\text{SOCl}_2$ , it forms product **E**.
- When **D** is reacted with alcohol **B**, it forms an **ester G**.
- When **D** is reacted with alcohol **A**, it forms **ester H**, which is an isomer of **G**.
- When **E** is reacted with alcoholic ammonia, it forms product **F**.
- When **E** is reacted with water, it forms product **D**.



Whakaingoatia ngā pūhui **A** ki **G**, ka tātuhi i ngā ture tātai hanganga mō ngā pūhui **A** ki **H**.

	Ingoa	Ture Tātai Hanganga
<b>A</b>		
<b>B</b>		
<b>C</b>		
<b>D</b>		
<b>E</b>		
<b>F</b>		
<b>G</b>		
<b>H</b>		

Name compounds **A** to **G**, and draw structural formulae for compounds **A** to **H**.

ASSESSOR'S  
USE ONLY

	Name	Structural Formula
<b>A</b>		
<b>B</b>		
<b>C</b>		
<b>D</b>		
<b>E</b>		
<b>F</b>		
<b>G</b>		
<b>H</b>		









He puka anō mēnā ka hiahiatia.  
Tuhia te (ngā) tāu pātai mēnā e hāngai ana.

TAU PĀTAI

MĀ TE  
KAIMĀKA  
ANAKE



**Extra paper if required.**  
**Write the question number(s) if applicable.**

QUESTION  
NUMBER

ASSESSOR'S  
USE ONLY





*English translation of the wording on the front cover*

## Level 3 Chemistry, 2014

### 91391 Demonstrate understanding of the properties of organic compounds

2.00 pm Tuesday 11 November 2014

Credits: Five

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of the properties of organic compounds.	Demonstrate in-depth understanding of the properties of organic compounds.	Demonstrate comprehensive understanding of the properties of organic compounds.

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 attempt ALL the questions in this booklet.**

A periodic table is provided on the Resource Sheet L3–CHEMMR.

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 2–25 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.**

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