## BIOLOGY EXPERIMENTAL EXAMINATION MARKING SCHEME

Milititle Art 13

Timkitute An ist is

Table 2: Glucose concentration and time taken to decolourise

Milita Att 13

Milititle Aft XX 3

Milital And St. Co.

\*\*\*\*

\*\*\*

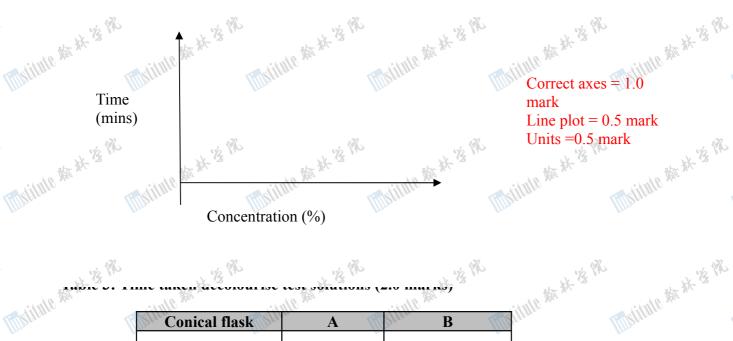
1

Toble	2: Glucose concentration	,30	,	A30	w %	₩.
Table	2. Glucose concenti atioi	ii anu timetai	cii to decolo	unse	新兴·3	- 加斯米多种
THE STATE OF THE S	Conical flask number	G1	G2	G3	G4	Astitule 1
	Glucose Concentration (%)	2.0	6.0	10.0	12.0	
· · · · · · · · · · · · · · · · · · ·	Time (mins)	11.0 - 16.0 0.5 mark	10.0 – 13.0 0.5 mark	8.0 – 11.0 0.5 mark	7.0 – 10.0 0.5 mark	****
The pitale of the state of the	Implitute And A	stitute Am	Militality of the state of the	Matitut	C SAN A	(2.0 marks)

(2.0 marks)

Milititle Art 13

## 1.1 Standard curve (Use the graph sheet provided) (2.0 marks)



	1.1110	: HILL		<u> </u>	
1	Conical flask	A	B	Milk III II	
	Time (mins)	1.5 – 3.0 1.0 mark	1.0 – 2.0 1.0 mark		
	SALES	: 1110 the 11/4 1/8 1/8	· 大水 旅	AK THE SHIPE	B. Th
	The little of th	Mile	Milling	Tilly little	

Mylithin Mark 's PR Marithte 新春 \* · 達 「然 1.2. Concentration of glucose in samples A and B estimated from the standard curve.

Samples	A	В
Concentration of	19.5%	20.5 %
glucose (%)	(1.0 mark)	(1.0 mark)

(Any correct determination from correct standard curve will score)

\*\*\*\*

- Maritante Ar Ar ig PR Assistate star of 18 (1.0 mark) 1.3. Sample with highest concentration of glucose......**B**.....
- THE THE STATE OF T 1.4. Glucose is a reducing agent because, (tick appropriate boxes below)

se	se is a reducing agent because, (tick appropriate boxes below)								
	1/2 PM	1/2 Y/L	12 PM	1/2 PM	1/2 Ph				
	Option	Reason	True	False	松 X 3				
	Hilli Mar	Oxidation number of Mn is	Xitale	With a	18 May				
	Whie I	decreased	(0.5 mark)	Tilly	P				

1. 4. 4.

				_
ii	Oxidation number of Mn in		X	
A30	MnO <sub>4</sub> became +4	A30	(0.5 mark)	A30
13 AS	7 . B 1/10	13 AS	17 B ASO	13 PM
the process of p	photosynthesis green plants use _	C gas to	synthesise	加加
e. This process of	occurs in light in the organelle cal	ledF	Hilpmin	'III
roanic substance	D is also a reacta	nt in the proces	22	

Mylitute shi xx '3

Military of the State of the Control of the Control

White the same of

**阿斯拉斯 赫 游 郑** 

**阿斯拉拉 教 教 教** 

Militally 素素 \* · 漢 學》

Maritante stat state is the

1. 地址多外

13%

Maritute ## # '\$ 182

Militate 素素 樣

Maritan An At & PR

面对加州 赫 林 '溪 |%

"水水"

		l ::	OAI	dation number	OI WIII III			<b>1</b>	1
	A32	11	Mn	O <sub>4</sub> - became +4		A30		(0.5 mark)	A32
, Y4	3 4N	14.7	3 410	17 13 AND	74	13 110		17.13 110	17 18 AV
1.5.	During	g the process	of photo	synthesis gree	n plants use _	C	gas to	synthesise	THE TAX DA
ollility and a second	glucos	e. This proce	ess occurs	s in light in the	e organelle ca	lled	Fillio.	litema	Me
Illing	An inc	organic subst	ance,	D, i	s also a reacta	ant in th	e proces	S.	
	The gl	ucose that is	manufac	tured is stored	mainly as	N	_ in the	plants.	
	The gl	ucose in the	fruits pla	ys a role in the	e dispersal of	the seed	ls. Anim	als are	
>	attract	ed by the	$Q_{\sim}$	of the fruit and	they eat it. T	he seeds	s have a	hardB	W Ch
***	which	prevents the	seed from	m beingJ_	by the	_G	in the al	imentary	1 - 1 × 13
Sing Ohns	canal o	of the animal	S. (*)	ESS Office	Pink Ohnse		Starte Starte	) · ·	10 300
THE STITUTE	Later t	the animal	P	the seeds, usua	ally away fron	n the pa	rent plan	nt. This 📆	1
	helps	reduce	M	between the	parent plant a	nd its of	fspring.		
	-		(Anv c	orrect answer	$\times$ 0.2 mark) =	= 2 mark	S		

Whiting the same of

Missitute 教教教·蒙州 \_(1.0 mark)

面对加州 赫 赫 溪 烧

水水水水

The state of the s

Maritate 教教教士等 PR

TERRITATE AND NOT AND NOTIFIED TO THE PARTY OF THE PARTY

上 松 从 浅 似

Military of the Committee of the Committ

mythite the same

1

Y/L

1

1

Y.

1

面似油根 赫 祥 '接 烧

面的抽 横 被

Maritale ## # 'E PR

Maritate ## 18 18

muliture At 13 182

\*\*\*\*

S TA TA		Way was a second		1/8					
1.6. Fruit	le D	(1.0  m)							
1.7. Reason for answer to <b>1.6</b> above (1.0 mark)									
IIII III	Options	Reason	True	False					
	i	JA does not produce insulin	X						
	ii	Fruit C has more water content than fruit		X					
, A		D, %		/					
13	iii	Fruit C has more glucose	X	上 次 多					
Olik Olivie	iv	JA does not produce glucagon	Ins.	X					

面对加州 赫 赫 紫

Marithte 新春 林·凌 然

TENTINE 教 技 袋

Milital And At 13 1982

- CHEMISTRY EXPERIMENTAL EXAMINTATION MARKING SCHEME
  2.1 From the list given, choose two substances that constitute the bottom layer obtained in step 4 from the preparation of biodiesel
  - Potassium Hydroxide (KOH) (i)
  - (ii) Water

Maritha All Are &

Milling 新菜菜家

Military \*\* \*\*

Militate Mark 15 PR

- **PKO** (iii)
- (iv) Biodiesel.

Substance	Options
One	KOH
Two	PKO

2.2. Calculate the percentage yield by mass of PKO-biodiesel from PKO based on your results.

(2.5 marks)

Milliante 教育教士等學

Volume of PKO bio-diesel =  $24.0 \text{ cm}^3$ 

Ranges of volumes for PKO-biodiesel:

18.16 cm<sup>3</sup> - 24. 56 cm<sup>3</sup> (1 mark)

 $17.02 \text{ cm}^3 - 26.70 \text{ cm}^3$  (0.5 mark)

Militian An At 18 18

Mass = Volume X density

Militate 教教教·養學

For PKO-biodiesel, mass =  $24.0 \text{ cm}^3 \times 0.89 \text{ g cm}^{-3} = 21.36 \text{ g}$  (0.5 mark)

For PKO, mass = 
$$30 \text{ cm}^3 \times 0.912 \text{ g cm}^3 = 27.36 \text{ g}$$
 (0.5 mark)  
yield for PKO-biodiesel =  $\frac{21.36 \text{ g}}{27.36 \text{ g}} \times \frac{100}{1} = 78.07$  (0.5 mark)

Militalle And At 18 18

Militation of the state of the

2.3 Why is anhydrous magnesium sulphate (MgSO<sub>4</sub>) added in step 6 in the extraction of PKO-biodiesel? Select the correct option from the table below

(0.5 mark)

. 18	13 12 IN	Option	13 170	13 190	Reason	N. B.	City City
Tak aluk	,	A	T	o improve the cond	uctivity	The sales	to to
Till Still live		В	T	o reduce the oil to h	nydrocarbons	THIS THE	Till Still live
III		C	T	o remove any remai	ining water	Win.	III
		D	Te	o increase the visco	sity of the biod	iesel	

Option chosen	The Company of the Co	(0.5 mark)	*** *** ***	45 1/2 1/2 1/2
om equations 1 a	and 2 derive the expressi	on for absolute visco	osity n (1 mark)	dillill "

Stille Mark is 18 2.4. From equations 1 and 2 derive the expression for absolute viscosity η (1 mark)

$$\frac{8lV \eta}{8klV} = \frac{\pi gh \rho r_0^4 \Delta t}{\pi gh r_0^4}$$

$$\frac{\eta}{k} = \rho \Delta t$$

(0.5 mark)

Therefore 
$$\eta = k\rho \Delta t$$

(0.25 mark)

Mylithin Am At 13 192 Record the titre value you obtained in the acid determination of PKO (1.5 marks)

٠.	record the thre value you commed in the data determination of the marksy						
	Titration Run						
	Initial Reading (cm <sup>3</sup> )						
	Final Reading (cm <sup>3</sup> )	430		030	A30		
,	Titre (cm <sup>3</sup> )	3 4	V 18	Aio	A AND		

Final titre:

myitute ##

$$21.70 \text{ cm}^3 - 29.30 \text{ cm}^3$$

(1.5 marks)

 $19.10 \text{ cm}^3 - 31.90 \text{ cm}^3$ 

(1 mark)

Value outside the above ranges

(0.5 mark)

Where V= volume in dm<sup>3</sup> / 1 of 0.01 mol dm<sup>-3</sup> (mol  $1^{-1}$ ) Potassium Hydroxide (KOH) solution consumed (titre value)

c = concentration of Potassium hydroxide (KOH) solution

m = mass (g) of PKO sample

$$Z = 56.1 \text{ g/mol}$$

(1.0 mark)Maritule \*\* \*\* \*\*

impitute of the second

$$Acid value = \frac{V \times c \times Z}{m}$$

m = density x volume = 0.912 g cm<sup>-3</sup> x 2 cm<sup>3</sup> = 1.814 g

For titre =  $21.70 \text{ cm}^3$ 

For titre = 
$$21.70 \text{ cm}^3$$
  $x = 0.01 \text{ mol cm}^3 \times 56.1 \text{ g mol}^{-1}$   $x = 6.73 \text{ mol}^{-1}$ 

For titre =  $29.30 \text{ cm}^3$ 

Acid value = 
$$\frac{29.30 \text{ cm}^3 \text{ x } 0.01 \text{ mol cm}^3 \text{ x } 56.1 \text{ g mol}^{-1}}{1.814 \text{ g}} = 9.08$$

Therefore for acid value ranging between 6.73 - 9.08

(1 mark)

For titre = 
$$19.10 \text{ cm}^3$$

Maithle was a

For titre = 19.10 cm<sup>3</sup>

$$Acid value = \frac{19.10 \text{ cm}^3 \times 0.01 \text{ mol cm}^3 \times 56.1 \text{ g mol}^{-1}}{1.814 \text{ g}} = 5.92$$

Marithu star 3

For titre = 
$$31.90 \text{ cm}^3$$

Acid value =  $\frac{31.90 \text{ cm}^3 \times 0.01 \text{ mol cm}^3 \times 56.1 \text{ g mol}^{-1}}{1.814 \text{ g}} = 9..89$ 

Therefore for acid value ranging between 5.92 - 9.89

(0.5 mark)

Militalle And St. 13

One mark for calculation working even if the measurement is incorrect

2.7. Calculate the acid concentration in mol dm<sup>-3</sup> of PKO. (K = 39.1, O = 16.0, H = 1.0).

(1*mark*)

Maritule of the state of the st

Marithus Mar # 18 180

Militate 教 林·溪 序》

Assume 1 : 1 mole ratio,

e 1 : 1 mole ratio,
$$\frac{M_{KOH} V_{KOH}}{n_{KOH}} = \frac{M_{PKO} V_{PKO}}{n_{PKO}}$$
(0.5 mark)

$$\frac{0.01 \times 25.5}{1} = \frac{M_{PKO} \times 2}{1}$$

$$M_{PKO} = \frac{0.255}{2} = 0.127 \approx 0.13 \text{ mol } dm^3$$
(0.5 mark)

One mark for calculation working even if the measurement is incorrect Also based on correct approach but incorrect titre win the marks

2.8. Record the titre value you obtained in the acid determination of PKO-biodiesel

\*\*\*\*

(1.5 marks)

1. 排水水水

T	itration Run	Mr.	Million	Illing	Million	
Initia	al Reading (cm <sup>3</sup> )					
Fina	l Reading (cm <sup>3</sup> )					
1 Ph	Titre (cm <sup>3</sup> )	46	2 %	Y.	1/2	16 Ph
K-13	ALT WAY	***	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	abe )	X- (3	1×13
al titre:	Little Street	Little Shi	of the alliter	old after	alute 8	
	$cm^3 - 3.60 cm^3$	RI III	(1.5 m (1 mar)	arks)	HILLSTON	
2.30 c	$m^3 - 3.90 \text{ cm}^3$		(1 mar	k)		

Final titre :

\*\*\*\*\*

\*\*\*

1. 4. 4. 18 18

\*\*\*\*

Milital And St. Co. Milititle Aft FF 3 Marithu Mar & 3 Mylithe star is Militally 37 75 3 Mysitute star is Value outside the above ranges (0.5 mark)Y/L 2.9. Using the formula Acid value =  $(V \times c \times Z)/m$ , calculate the Acid value of PKO-biodiesel. Where V= volume in dm<sup>3</sup> / 1 of 0.01 mol dm<sup>-3</sup> (mol 1<sup>-1</sup>) Potassium Hydroxide (KOH) solution consumed (titre value) c = concentration of Potassium hydroxide (KOH) solution m = mass(g) of PKO-biodiesel sample Z = 56.1 g/mol(1mark) Ensure you use the appropriate units and assume 1 cm<sup>3</sup> of PKO-biodiesel weighs 0.89 g malitute ## ## 3 Sc. St. Miller Mistitute 🗱 Mariture the the commission of Makitata An At is the Maritate the the light of the Maritule was string for Matinte Mark 13 180 Maritute the state of the Mariture was string for Mainte the the light of the Maritute Mark is 198 Milling 新菜菜家 面的抽象教教學 1 Marithta 教育 林·淺 序》 Misitate Mi kit is fix Marithe Mark if the Maritate Mar H. 13 PR Maritan And At 13 1982 Marianto Maria Mar Marithta 教育 林·淺 學 Marithle Mark if the Misitate Mark is the Marithus Mar # 15 192 Ministate of the state of the Maritante ste st. ig file Misitale Mark if the Ministatus And At 15 1980 Misitate Mark is the Ministate # # 18 Maritule # # 18 matitute 精神技术资格 Ministate And At 13 1980 Maritante state of the Ministate # # 18 Misitate Mark is the Misitate # # 18 \*\*\*\*\* \*\*\*\* \*\*\*\*\* \*\*\*\*\* 1. 40 14 18 18 \*\*\*\*\*

Mythite Mar 18

Y/L

1

 $m = density x volume = 0.89 g cm^{-3} x 2 cm^{3} = 1.78 g$ 

For titre =  $2.60 \text{ cm}^3$ 

Acid value = 
$$\frac{2.60 \text{ cm}^3 \text{ x } 0.01 \text{ mol cm}^3 \text{ x } 56.1 \text{ g mol}^{-1}}{1.78 \text{ g}} = 0.83$$

For titre = 3.60 cm<sup>3</sup>

$$Acid \ value = \frac{3.60 \ cm^3 \ x \ 0.01 \ mol \ cm^3 \ x \ 56.1 \ g \ mol^{-1}}{1.78 \ g} = 1.19$$
Therefore for acid value ranging between 0.83 = 1.19

Milling # # 13 PR Therefore for acid value ranging between 0.83 - 1.19

(1 mark)

myitate the state of the

Marithus Market of 180

Maritule Mark is 1980

Militation of the state of the

Militinin 横林塔原

Mylitate the 18 18

\*\*\*\*\*

For titre =  $2.30 \text{ cm}^3$ 

Acid value = 
$$\frac{2.30 \text{ cm}^3 \times 0.01 \text{ mol cm}^3 \times 56.1 \text{ g mol}^{-1}}{1.78 \text{ g}} = 0.74$$

For titre =  $3.90 \text{ cm}^3$ 

1. 40 秋 後 《

Acid value = 
$$\frac{3.90 \text{ cm}^3 \text{ x } 0.01 \text{ mol cm}^3 \text{ x } 56.1 \text{ g mol}^{-1}}{1.78 \text{ g}} = 1.25$$

Therefore for acid value ranging between 074-1.25

\*\*\*

(0.5 mark)

\*\*\*\*

One mark for calculation working even if the measurement is incorrect

1. ## # 18 18

2.10. Calculate the acid concentration in mol  $dm^{-3}$  of the PKO-Biodiesel. (K = 39.1, 16.0, H = 1.0)

Moditule # 4

$$\frac{M_{KOH}V_{KOH}}{n_{KOH}} = \frac{M_{BD}V_{BD}}{n_{BD}}$$
 (0.5 mark)

Makitate An Ar Ca

Maritute And At 13 1980

Mittelle Start 18 182

Milling the 13 PR

Muliture star of 18

Agithte ## 13 18

William And At 'S PR

$$\frac{0.01 \times 3.1}{1} = \frac{M_{BD} \times 2}{1}$$

$$M_{BD} = \frac{0.031}{2} = 0.0155 \approx 0.016 \text{ mol } dm^3$$
(0.5 mark)

- Provide the correct option from A-D for the differences in the observed acidity of PKO and PKO-biodiesel (0.5 mark)

Mistitute Start 18 18

Arithte start is 182

Stitute to the State of the Sta

- B. Magnesium sulphate was used in the extraction of PKO-Biodiesel
  C. In the extraction PKO-biodiesel it was minuted. C. In the extraction PKO-biodiesel it was mixed with potassium hydroxide (KOH) which neutralized the acidity
  - D. The extraction process increases the yield of PKO-Biodiesel

. 30	. 1/1	.97	.30	
A CAN	1/2 1/2	1/2 4/10	1/2 1/2	
Option selected	abe WA	ALT WAY	(0.5 mark)	
See Steel	And Ship	All Sylve	And Alle	24

- mytime \*\* Select the best option in the list below for the reason that Biodiesel releases less pollutants 2.12. into the atmosphere than petro-diesel when combusted. (0.5 mark)
  - A. It contains more oxygen
  - C. It contains more carbon atoms
    D. It is highly dense

Maritude Mark 13 PR

Astitute the the light of the

別加州海林港

Mithile Man At 13 182

Stitute to the State of the Sta

加加加州

	Option selected	В	Millon, L	(0.5 mark)	MINO	
D <u>.</u>	It is highly dense	titule ""	Titule "	with the	Titule Mar	
C.	It contains more carbon	atoms	AND WE	AND AND	松	
Β.	Biodiesel contains less	sulphur. 🙀 🤲	1/2 Y/S	1/2 YA	1/2 1/4	>
A.	It contains more oxygen	1	20	20	20	

Mistitute Start 13 182

Agithte Mark 13 PR

Stitute the the is the

## PHYSICS EXPERIMENTAL EXAMINTATION MARKING SCHEME Table 1: Table of values

Maritule ## \*\*

The titule And the same

Milital At 3

Distance marks on the tube (cm)	Distance travelled (cm)	The state of the s	Time (s)	物状治学
Mr. Markithe	Maritime Maritime	Medilino	t <sub>2</sub> mindi	t t
20	-	0.00	0.00	0.00
40 Kg W	3 20	<b>%</b>	- 1/2 Ph	1.36
50.11	Militale And 30 Militale And 1	Tilly titule of		2.00
60	40			2.74
70	50	N.	S Ph	3.41
80	60 Mille Mar Me	atitute #	N N	4.12
90	70	Illing	Illing	4.78
100	80		- 41	5.44
110	90	11	冰	6.14

3.5.1 Plot the graph of distance travelled against time. Molitule Market 18 182

Whithite Mark '3

Ministate Market 18 182

Misitate # # 18

Militale ## \*

1. 按张·洛·洛·

Marinta And Art 3

(Use the graph sheet provided)

(3.2 marks) (1.6 marks)

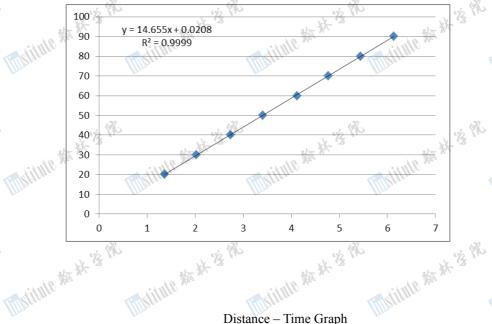
面的排作

Maritale 新 林 沒 內

Maritule # 14 18

Marithia Market 13 1982

Mylithe star '3



Distance – Time Graph

3.5.2 Determine the slope of the graph in question 3.5.1

W. W. W. W.

(1.2 marks)

Slope =  $14.66 \text{ cms}^{-1} = 0.1466 \text{ ms}^{-1}$ 

Maritule 3/4 34 3

Mysitude And Are 3

This itute the the is the

Militale Man # 13 182

Marithle Market is the

本学资格

Term(force) label	Type of force (choose from Table 3)			
A	III			
<b>B</b>	IV W			
C	L 次 3			

Mylithe All XX 3

Millinin 教教教·婆 然 3.5.4 Rearrange equation (1) to make  $\eta_{\ell}$  the subject of the equation. Call this equation (2).

(1.2 marks)

Maritule And Nr. 3

$$\eta_{\ell} = \frac{2}{9\mathbf{v}_o} r^2 g \left( \rho_s - \rho_{\ell} \right)$$

3.5.5 Given that  $v_0$  is the slope determined in question (1.5.2) and that  $g = 9.8 \text{ ms}^{-2}$ ,  $\rho_{\ell} = 900 \text{ kgm}^{-3}$ ,  $\rho_{\rm s}$ = 7800 kgm<sup>-3</sup>, calculate  $\eta_{\ell}$  for the castor oil.

(2.3 marks)

$$\eta_{\ell} = \frac{2 \times 9.8 \times (2.38 \times 10^{-3})^2 \times (7800 - 900)}{9 \times 0.1466} = 0.5806 \text{ kgm}^{-1} \text{s}^{-1}$$

Militate And At 18 18 3.5.6 The factors in Table 4 may affect the value of the coefficient of viscosity measured at different locations on the earth's surface by this method. Tick ( $\sqrt{\ }$ ) as appropriate

(1.0 mark)

W	W. C.	16.75		14 T	
Allto May	titule May	Title No.	Alltite -	True	False
Altitude	West of the second	MILLON	MILLERY		LIIIV.
Latitude					
Relative humid	ity				
Ambient tempe	rature	2	. 42	V	SZ.

3.5.7 Precautions which may be taken in order to obtain a precise result are given in Table 5. Tick  $(\sqrt{})$  as appropriate. (1.0 mark)

Table 5

Tubic c			
	True	False	
Minimize parallax error	1 /2	W.	1/2 Ph
Avoid the balls touching the walls of the glass cylinder	***		400 700
Changing the starting point of timing to 50 cm	7/4-	V	IITE A.
Dropping the ball from a height above the liquid		Alling	

