PEARSON EDEXCEL GCSE COMBINED SCIENCE (HIGHER) · 1SC0

CHEMISTRY



MARK SCHEME

TOPIC 0: FORMULAE, EQUATIONS AND HAZARDS (PAPER 2, PACK 1)

SCORE	PERCENTAGE
/113	%

STEMUP

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Mark Scheme

Q1.

Question Number	Answer	Additional guidance	Mark
	$2Al + 6H^+ \rightarrow 2Al^{3+} + 3H_2$ (2)	Al and H_2 (1) balancing of correct species (1) allow multiples	**(2)** AO 2 1

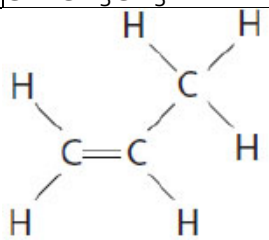
Q2.

Question number	Answer	Mark
	2 Na + $\mathbf{F_2}$ → **2** NaF (2) F_2 (1) 2 (1)	**(2)**

Q3.

Question number	Answer	Additional guidance	Mark
	• calculates energy needed to break bonds (1) • calculates energy released in forming bonds (1) • calculates energy change (1) • evaluation of final answer with negative sign (1)	Example of calculation Bonds broken = 436 + 243 = 679 ($kJ\ mol^{-1}$) Bonds formed = 2 × 432 = 864 ($kJ\ mol^{-1}$) Energy change = 679 – 864 = −185 ($kJ\ mol^{-1}$) Award full marks for correct numerical answer without working	**(4)**

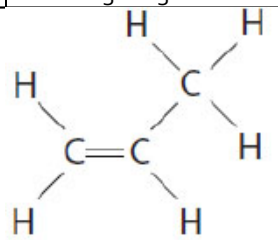
Q4.

	Answer	Acceptable answers	Mark
(a)	C – CH_3CH_3		
(b)		carbon skeleton correct including double bond (1) rest of molecule correct (1) allow CH_3	(2)
(c)	$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ • reactant formulae (1) • product formulae (1) • balancing of correct formulae (1)	accept multiples reject incorrect use of cases and non-subscripts	(3)

		Indicative Content	
QWC	***(d)**	advantages • renewable / sustainable • more plants can be grown • crops use up carbon dioxide and produce oxyg growing /photosynthesising • carbon neutral because the carbon produced c combustion is used when growing the plants • does not use up crude oil/non-renewable resou disadvantages • crops grown for bio-fuels use up land • land could otherwise be used to provide home farmland available for growing food crops • lots of crops required to provide a small amou	

		bio-methane • bad season reduces availability • carbon emissions due to transport and produc qualified	
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description e.g. using bio-methane conserves fossil fuels and uses up carbon dioxide when plants are grown • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description e.g. growing plants to produce biomethane is sustainable and conserves fossil fuels but uses up lots of farm land which could be used to grow plants for food • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• detailed description e.g growing plants remove carbon dioxide from the air during photosynthesis and conserves fossil fuels but lots of crops are required to make biomethane and this uses up farm land which could otherwise be used to grow crops for food • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Q5.

	Answer	**Acceptable answers**	**Mark**
(a)	C – CH_3CH_3		
(b)		carbon skeleton correct including double bond (1) rest of molecule correct (1) allow CH_3	(2)
(c)	$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$ • reactant formulae (1) • product formulae (1) • balancing of correct formulae (1)	accept multiples reject incorrect use of cases and non-subscripts	(3)

		Indicative Content	
QWC	***(d)**	advantages • renewable / sustainable • more plants can be grown • crops use up carbon dioxide and produce oxyg	

		growing /photosynthesising • carbon neutral because the carbon produced c combustion is used when growing the plants • does not use up crude oil/non-renewable resou disadvantages • crops grown for bio-fuels use up land • land could otherwise be used to provide home farmland available for growing food crops • lots of crops required to provide a small amou bio-methane • bad season reduces availability • carbon emissions due to transport and produc qualified	
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description e.g. using bio-methane conserves fossil fuels and uses up carbon dioxide when plants are grown • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description e.g. growing plants to produce biomethane is sustainable and conserves fossil fuels but uses up lots of farm land which could be used to grow plants for food • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• detailed description e.g growing plants remove carbon dioxide from the air during photosynthesis and conserves fossil fuels but lots of crops are required to make biomethane and this uses up farm land which could otherwise be used to grow crops for food • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Q6.

Question number	Answer	Mark
(i)	(liquid changes from colourless to) yellow / orange/ brown / red	**(1)**

Question number	Answer	Mark
(ii)	$Cl_2 + 2I^- \rightarrow 2Cl^- + I_2$ LHS (1) RHS (1) balancing of correct species (1)	**(3)**

Question number	Answer	Mark
(iii)	An explanation that combines identification - understanding (1 mark) and reasoning/justification - understanding (1 mark): • when chlorine and iodine react, their atoms gain an electron (1) • electron attracted into chlorine atom more strongly than into an iodine atom (1) • because chlorine atom is smaller / outer electrons in chlorine atom closer to the nucleus / more shielding between nucleus of iodine atom and outer electrons (1)	(2)

Question number	Answer	Additional guidance	Mark
(iv)	An explanation that combines identification - understanding (1 mark) and reasoning/justification - understanding (1 mark): • iodide ion loses an electron (1) • oxidation is loss of electrons / iodine is oxidised (1) • chlorine atom gains an electron (1) • reduction is gain of electrons / chlorine is reduced (1)	if no reference made to gain or loss of electrons, allow (1) for redox reaction involves both oxidation and reduction	(4)

Q7.

Question number	Answer	Additional guidance	Mark
	$CaCO_3 + 2HCl \rightarrow CaCl_2 + CO_2 + H_2O$ • LHS (1) • RHS (1)	Allow products in any order	(2)

Q8.

Question number	Answer	Mark
	$2C_{10}H_{22} + \mathbf{31}O_2 \rightarrow \mathbf{20}CO_2 + \mathbf{22}H_2O$ • LHS (1) • RHS both numbers correct (1)	(2)

Q9.

Question number	Answer	Additional guidance	Mark
(i)	$Cl_2(g) + H_2O(l) \rightleftharpoons HCl(aq) + HClO(aq)$ (3)	all three formulae (only) on correct sides of equation with no incorrect balancing (2) two formulae correct regardless of any other error (1) all three state symbols (1) Do not allow incorrect symbols or non subscripts eg CL^2	(3) AO2

Question number	Answer	Additional guidance	Mark
(ii)	H^+	if any other ions included 0 marks	(1) AO1

Question number	Answer	Additional guidance	Mark
(iii)	neutralisation	allow exothermic reject endothermic	(1) AO1

Q10.

Question number	Answer	Additional guidance	Mark
(i)	Left : H_2SO_4 (1) Right : $CuSO_4$ (1)	reject superscript numbers reject superscript numbers incorrect balancing max 1	(2)

Question number	Answer	Mark
(ii)	63.5 + 12 + 3x16 (1) = 123.5 (1)	(2)

Q11.

Question number	Answer	Additional guidance	Mark
	C_2H_4	Allow H_4C_2	**(1) AO2**

Q12.

Question number	Answer	Additional guidance	Mark
	$N_2 + 2O_2 \rightarrow 2NO_2$ (2) or NO_2 (1)	other incorrect balancing max 1	**(2) AO2**

Q13.

Question number	Answer	Additional guidance	Mark
	2K (s) + F_2(g) → 2KF (s) **2 K (1)** **2 KF (1)** **s, s (1)**	ignore words	**(3)**

Q14.

Question number	Answer	Mark
	diagram of • delivery tube with bung in flask connected to (1) • gas syringe / gas syringe labelled (1) or • delivery tube with bung in flask leading into water trough (below upturned measuring cylinder) (1) • upturned measuring cylinder containing water / measuring cylinder labelled (1) allow • connected delivery tube from flask to upturned test tube in water trough (1)	**(2)** **AO1**

Q15.

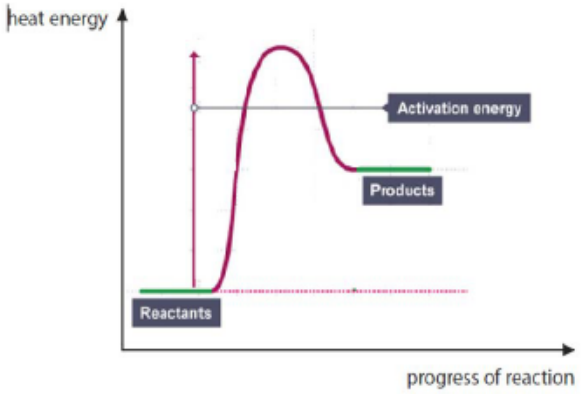
Question number	Answer	Additional guidance	Mark
	$Al^{3+} + PO_4^{3-} \rightarrow AlPO_4$ (2) Al^{3+} (1) $AlPO_4$ (1)	allow any neutral aluminium phosphate formula based on their aluminium ion. allow $Al^{3+}PO_4^{3-}$	**(2)** **AO2**

Q16.

Question number	Indicative content	Mark
	$2CaCO_3 + Mg^{2+} \rightarrow CaMg(CO_3)_2 + Ca^{2+}$ 2 **(1)** Mg^{2+} **(1)**	**(2)**

Q17.

Question Number	Answer	Mark
(i)	fuel oil	(1) AO 3 2a

Question Number	Answer	Additional guidance	Mark
(ii)	• reactant(s) and product(s) labelled in their correct positions (1)	example of diagram  	(3) AO 1 1
	• activation energy labelled (1)	ignore arrow heads	
	• energy of reactants lower than energy of products (1)	allow unlabelled diagram of an endothermic reaction showing the basic outline shape if exothermic reaction profile shown, allow (1) for reactants and products in correct position and (1) for correct labelling of activation energy	

Question Number	Answer	Additional guidance	Mark
(iii)	C_6H_{14}		(1) AO 2 1

Q18.

Question number	Answer	Additional guidance	Mark
	An answer that combines the following points of understanding to provide a logical description: • (hydrogen produced as a gas so) there would be {effervescence/fizzing/ bubbles} (1) • and (calcium hydroxide produced as a solid so) the water would go {cloudy/a white precipitate would form} (1)	Allow: calcium moves (around) (1) calcium decreases in size/disappears/dissolves (1)	(2)

Q19.

Question number	Answer	Additional guidance	Mark
	$\frac{2.24}{56.0} = 0.04$ and $\frac{0.96}{16.0} = 0.06$ (1) 1 : 1.5 / 2 : 3 (1) Fe_2O_3 (1) $4Fe + 3O_2 \rightarrow 2\mathbf{Fe_2O_3}$ (1)	allow ECF for MP2 and MP3 only. allow $\frac{2.24}{56.0} = 0.04$ and $\frac{0.96}{32.0} = 0.03$ (1) 1.33 : 1 / 4 : 3 (1) Fe_2O_3 (1) $4Fe + 3O_2 \rightarrow 2\mathbf{Fe_2O_3}$ (1) NOTE: equation alone gains no marks.	**(4)**

Q20.

Question Number	Answer	Acceptable answers	Mark
(a)	improves resistance to corrosion	ignore rusting	**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)	An explanation to include • anode dissolves / half equation given / atoms lose electrons /copper becomes ions/copper (atoms) oxidised (1) • copper ions moving from anode to cathode (1) • copper plated on cathode / half equation given / ions gain electrons/copper ions reduced/copper ions form atoms (1) • {difference/0.2g} is impurities (1) • would expect same decrease in mass (as increase) (1)	ignore references to mass increase of cathode and mass decrease of anode ignore 'impure copper (ions)' for the second marking point allow difference is metal around it eaten away/ impurities/sludge fallen to bottom of container /under anode (1) (there needs to be a reference to the difference in electrode masses for this point)	**(3)**

Question Number	Answer	Acceptable answers	Mark
(c)	$2O^{2-} \rightarrow O_2 + 4e^{(-)}$ (2) OR $O^{2-} \rightarrow O + 2e^{(-)}$ (1) $2O \rightarrow O_2$ (1)	Unbalanced equation (1)	**(2)**

Question Number		Indicative Content	Mark
QWC	*** (d)**	A description including some of the following points • sodium chloride is melted and ions are free to move at cathode • {sodium / positive} ions move to cathode • (sodium) metal forms at cathode • sodium ions gain electrons ... • to form atoms • this is reduction • $Na^+ + e^- \rightarrow Na$ at anode • {chloride / negative} ions move to anode • (chlorine) gas forms at anode • chloride ions lose electrons ... • to form atoms • this is oxidation • two chlorine atoms combine to form a chlorine molecule / share electrons • $Cl^- \rightarrow Cl + e^-$ / $2Cl^- \rightarrow Cl_2 + 2e^-$ • $2\,Cl \rightarrow Cl_2$	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description e.g. gives at least one relevant description or explanation • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description e.g. for anode or cathode gives at least three descriptions or relevant explanations • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description e.g. for both anode and cathode gives a total of at least five descriptions or relevant explanations • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Q21.

Question Number	Answer	Acceptable answers	Mark
(a)	improves resistance to corrosion	ignore rusting	**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)	An explanation to include • anode dissolves / half equation given / atoms lose electrons /copper becomes ions/copper (atoms) oxidised (1) • copper ions moving from anode to cathode (1) • copper plated on cathode / half equation given / ions gain electrons/copper ions reduced/copper ions form atoms (1) • {difference/0.2g} is impurities (1) • would expect same decrease in mass (as increase) (1)	ignore references to mass increase of cathode and mass decrease of anode ignore 'impure copper (ions)' for the second marking point allow difference is metal around it eaten away/ impurities/sludge fallen to bottom of container /under anode (1) (there needs to be a reference to the difference in electrode masses for this point)	**(3)**

Question Number	Answer	Acceptable answers	Mark
(c)	$2O^{2-} \rightarrow O_2 + 4e^{(-)}$ (2) OR $O^{2-} \rightarrow O + 2e^{(-)}$ (1) $2O \rightarrow O_2$ (1)	Unbalanced equation (1)	**(2)**

Question Number		Indicative Content	Mark
QWC	*** (d)**	A description including some of the following points • sodium chloride is melted and ions are free to move at cathode • {sodium / positive} ions move to cathode • (sodium) metal forms at cathode • sodium ions gain electrons ... • to form atoms • this is reduction • $Na^+ + e^- \rightarrow Na$ at anode • {chloride / negative} ions move to anode • (chlorine) gas forms at anode • chloride ions lose electrons ... • to form atoms • this is oxidation • two chlorine atoms combine to form a chlorine molecule / share electrons • $Cl^- \rightarrow Cl + e^-$ / $2Cl^- \rightarrow Cl_2 + 2e^-$ • $2\,Cl \rightarrow Cl_2$	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited description e.g. gives at least one relevant description or explanation • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple description e.g. for anode or cathode gives at least three descriptions or relevant explanations • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• a detailed description e.g. for both anode and cathode gives a total of at least five descriptions or relevant explanations • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Q22.

Question Number	Answer	Acceptable answers	Mark
(a)(i)	NaCl	Must be capital N, C; small a, l	**(1)**

Question Number	Answer	acceptable answers	Mark
(a)(ii)	as a coolant/ removes **heat** energy	(good) conductor of heat Ignore what would happen if no coolant eg 'meltdown' etc.	**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(i)	reduction Exact spelling required.		**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(ii)	**A** ions can only move freely in molten lead bromide		**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)(iii)	(lead bromide →) lead (1) + bromi**n**e (1)	reject bromide or any formulae ignore state symbols	**(2)**

Question Number	Answer	Acceptable answers	Mark
(c)(i)	**A** and **B** both required for mark.		**(1)**

Question Number	Answer	Acceptable answers	Mark
(c)(ii)	• **A** permanent hardness because scum/ no lather (even after boiling) (1) • **B** temporary hardness because lather /no scum (only) after boiling (1) • **C** soft because lather / no scum (before boiling) / does not conduct /no ions (1)	If no or some/all incorrect explanations, then allow: 3 correctly classified with 2 correct explanations = 3 marks 3 correctly classified with 1 correct explanation = 2 marks 3 correctly classified with 0 correct explanations = 1 Allow statements such as 'only in test 3' to mean 'after boiling'	**(3)**

Q23.

Question Number	Answer	Additional guidance	Mark
	$2Al + 3Cl_2 \rightarrow 2AlCl_3$ (3) LHS (1) RHS (1) balancing of correct formulae (1)	penalise the use of 'CL' or 'AL' once only ignore state symbols allow multiples ignore use of capital L for MP3	**(3)** AO 2 1

Q24.

Question Number	Answer	Additional guidance	Mark
	$2Na(s) + 2H_2O(l) \rightarrow 2NaOH(aq) + H_2(g)$ 2 Na (1) 2 NaOH (1) s, l, aq, g (1)	 allow S, L, AQ, G ignore words	**(3)** AO 2 1

Q25.

Question Number	Answer	Acceptable answers	Mark
(i)	A description including two of the following • dissolve the sugar/aqueous solution (1) • **warm**/ 25-40°C (1) • in absence of air / no oxygen/ anaerobic / attach airlock (1) • pH neutral / slightly acidic /4-7 • **sterile** conditions ignore any mention of pressure	ignore incorrect answers ignore heat / hot allow any temperature or range within 25-40 allowed ignore clean etc ignore 'optimum' {temp/pressure/pH}	**(2)**

Question Number	Answer	Acceptable answers	Mark
(ii)	**B** fractional distillation		**(1)**

Question Number	Answer	Acceptable answers	Mark
(iii)	$C_6H_{12}O_6 \rightarrow 2\ C_2H_5OH + 2\ CO_2$ (2) correct formulae (<u>with no others</u>) (1) balancing <u>the three</u> formulae (1) ignore state symbols	allow C_2H_6O/ CH_3CH_2OH for C_2H_5OH reject CO2 / CO^2 allow multiples	**(2)**

Q26.

Question Number	Answer	Acceptable answers	Mark
(i)	A description including two of the following • dissolve the sugar/aqueous solution (1) • **warm**/ 25-40°C (1) • in absence of air / no oxygen/ anaerobic / attach airlock (1) • pH neutral / slightly acidic /4-7 • **sterile** conditions ignore any mention of pressure	ignore incorrect answers ignore heat / hot allow any temperature or range within 25-40 allowed ignore clean etc ignore 'optimum' {temp/pressure/pH}	**(2)**

Question Number	Answer	Acceptable answers	Mark
(ii)	**B** fractional distillation		**(1)**

Question Number	Answer	Acceptable answers	Mark
(iii)	$C_6H_{12}O_6 \rightarrow 2\ C_2H_5OH + 2\ CO_2$ (2) correct formulae (<u>with no others</u>) (1) balancing <u>the three</u> formulae (1) ignore state symbols	allow C_2H_6O/ CH_3CH_2OH for C_2H_5OH reject CO2 / CO^2 allow multiples	**(2)**

Q27.

	Answer	Acceptable answers	Mark
(a)	$C_2H_4 + H_2o \rightarrow C_2H_5OH$ C_2H_4 as **reactant** (1) rest of equation correct conditional on C_2H_4 as a reactant (1)	do not allow H2O / H^2O / lower case h/HOH allow C_2H_6O for ethanol ignore state symbols	**(2)**
(b)	A description including any two from • dissolve sugar in water/sugar solution (1) • (add) yeast (1) • warm / any temperature or range within 15 to 40°C (1) • anaerobic /	allow glucose solution ignore carbohydrate allow room temperature ignore heat unless specified temperature ignore optimum temperature	**(2)**

	{no/little}{air/oxygen} can enter the apparatus (1)	do not allow just 'sealed container' ignore fractional distillation	
(c)	An explanation linking Marking point 1 – sugar- one from • sugar obtained from {plants /crops/specific crop} (1) • (plenty of) land available to grow {plants /crops/specific crop} (for fermentation)(1) Marking point 2 - ethene • ethene obtained from {crude oil / fractional distillation /cracking} (1) Marking point 3 – cost/energy – one from • cannot afford to buy crude oil (1) • crude oil is too expensive (1) • more expensive to {use/buy/produce} ethene (1) • cheaper to use fermentation (1)	ignore answers that just repeat the information in the question ignore vague answers such as carbon neutral/environmentally friendly for marking point 1 **OR**2, allow plants renewable/{crude oil/ethene} non-renewable (1) allow {little/no} {heat/energy} required for fermentation (1) allow {high temperature /high pressure} required for hydration of ethene (1)	**(3)**
(d)	An explanation including any two from • formulae differ by CH_2 • same general formula • all have {OH/hydroxyl group}	general formula is C_nH_{2n}+1OH (2) allow increase by {CH_2/1 carbon **and**2 hydrogens} do not allow incorrect general formula allow have similar **chemical** {reactions /properties}/same functional group/OH from an incorrect general formula ignore 'hydroxide'/all end in (an)ol /all alcohols ignore physical properties maximum (1) if hydroxide ions /carboxyl group	**(2)**

Q28.

	Answer	Acceptable answers	Mark
(a)	$C_2H_4 + H_2o \rightarrow C_2H_5OH$ C_2H_4 as **reactant** (1) rest of equation correct conditional on C_2H_4 as a reactant (1)	do not allow H2O / H^2O / lower case h/HOH allow C_2H_6O for ethanol ignore state symbols	**(2)**
(b)	A description including any two from • dissolve sugar in water/sugar solution (1) • (add) yeast (1) • warm / any temperature or range within 15 to 40°C (1) • anaerobic / {no/little}{air/oxygen} can enter the apparatus (1)	 allow glucose solution ignore carbohydrate allow room temperature ignore heat unless specified temperature ignore optimum temperature do not allow just 'sealed container' ignore fractional distillation	**(2)**
(c)	An explanation linking Marking point 1 – sugar- one from • sugar obtained from {plants /crops/specific crop} (1) • (plenty of) land available to grow {plants /crops/specific crop} (for fermentation)(1) Marking point 2 - ethene • ethene obtained from {crude oil / fractional distillation /cracking} (1) Marking point 3 – cost/energy – one from • cannot afford to buy crude oil (1) • crude oil is too expensive (1) • more expensive to {use/buy/produce} ethene (1) • cheaper to use fermentation (1)	ignore answers that just repeat the information in the question ignore vague answers such as carbon neutral/environmentally friendly for marking point 1 **OR**2, allow plants renewable/{crude oil/ethene} non-renewable (1) allow {little/no} {heat/energy} required for fermentation (1) allow {high temperature /high pressure} required for hydration of ethene (1)	**(3)**
(d)	An explanation including any two from • formulae differ by CH_2 • same general formula • all have {OH/hydroxyl group}	general formula is C_nH_{2n}+1OH (2) allow increase by {CH_2/1 carbon **and**2 hydrogens} do not allow incorrect general formula allow have similar **chemical**	**(2)**

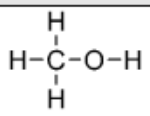
		{reactions /properties}/same functional group/OH from an incorrect general formula ignore 'hydroxide'/all end in (an)ol /all alcohols ignore physical properties maximum (1) if hydroxide ions /carboxyl group	

Q29.

Question Number	Answer	Acceptable answers	Mark
(a)	**B** add yeast, temperature of 35°C		**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)	C_2H_4 (1) + H_2O (1) → C_2H_5OH award one mark max if incorrectly balanced	allow correct molecular formula C_2H_6O allow H_4C_2 correct multiples ignore state symbols	**(2)**

Question Number	Answer	Acceptable answers	Mark
(c)(i)	A description linking any two from • same **general** formula (1) • same functional group (1) • (consecutive) compounds differ by CH_2 (1) • gradual variation in physical properties (1) • {similar / same} chemical {properties / reactions} (1)	 allow $C_nH_{2n+1}OH$ (2) allow C_nH_{2n} or any correct general formula (2) ignore same properties/physical properties allow a correct trend, e.g. bp increases with number of carbon atoms (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
(c)(ii)		allow –OH allow correct dot and cross diagram	**(1)**

Question Number	Answer	Acceptable answers	Mark
(d)(i)	oxidation		**(1)**

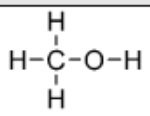
Question Number	Answer	Acceptable answers	Mark
(d)(ii)	A description including any two from • effervescence/fizzing/bubbling (1) • solid disappears (1) • colourless solution (1)	 ignore incorrectly named gases ignore gas given off/evolved allow magnesium floats on surface of acid allow solid dissolves (1) ignore solution <u>turns</u> colourless ignore clear	**(2)**

Q30.

Question Number	Answer	Acceptable answers	Mark
(a)	**B** add yeast, temperature of 35°C		**(1)**

Question Number	Answer	Acceptable answers	Mark
(b)	C_2H_4 (1) + H_2O (1) → C_2H_5OH award one mark max if incorrectly balanced	allow correct molecular formula C_2H_6O allow H_4C_2 correct multiples ignore state symbols	**(2)**

Question Number	Answer	Acceptable answers	Mark
(c)(i)	A description linking any two from • same **general** formula (1) • same functional group (1) • (consecutive) compounds differ by CH_2 (1) • gradual variation in physical properties (1) • {similar / same} chemical {properties / reactions} (1)	 allow $C_nH_{2n+1}OH$ (2) allow C_nH_{2n} or any correct general formula (2) ignore same properties/physical properties allow a correct trend, e.g. bp increases with number of carbon atoms (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
(c)(ii)		allow –OH allow correct dot and cross diagram	**(1)**

Question Number	Answer	Acceptable answers	Mark
(d)(i)	oxidation		**(1)**

Question Number	Answer	Acceptable answers	Mark
(d)(ii)	A description including any two from • effervescence/fizzing/bubbling (1) • solid disappears (1) • colourless solution (1)	 ignore incorrectly named gases ignore gas given off/evolved allow magnesium floats on surface of acid allow solid dissolves (1) ignore solution <u>turns</u> colourless ignore clear	**(2)**