1	**(a)**	**(i)**	biological catalyst	[1]
		(ii)	linkage ----O---- same unit as in glucose as on question paper that is rectangles	[1]
		(iii)	chromatography	[1]
	(b)	**(i)**	--NHCO—linkage different units -NH and -CO on same monomer uni All three [2] two points [1]	[2]
		(ii)	amino acids	[1]
	(c)	)	propanol + ethanoic acid = propyl ethanoate + water reactants [1] products [1]	[2]
		(ii)	ester linkage correct rest of molecule correct	[1] [1]
		(iii)	bromine water fat 1 orange **or** yellow **or** brown to colourless fat 2 remains orange **or** yellow **or** brown Accept Potassium Manganate(VII) with corresponding colour changes	[1] [1] [1]
		(iv)	soap or sodium salts (of carboxylic acids)/sodium stearate alcohol/glycerol	[1] [1]
				[TOTAL = 15]

2 **(a)** **(i)** CH_3-CH==CH_2

[1]

(ii) **conseq** to **(i)**
correct repeat unit **[1]**
COND evidence of continuation **[1]**

(iii) monomer **[1]**
COND because it has a double bond **or** unsaturated **or** alkene **[1]**
NOT addition

(b) to remove fibres **or** remove solid
NOT precipitate, **NOT** impurities, **NOT** to obtain a filtrate **[1]**

(ii) because silver atoms have lost electrons **[1]**
OR oxidation number increased

(iii) silver chloride **[1]**

(c) name of an ester **[1]**
formula of an ester **[1]**
if they do not correspond MAX [1]
Accept name - terylene
for formula ester linkage and continuation
If a 'fat' complete structure must be correct e.g. $C_{17}H_{35}$ etc.
Mark for formula only - [1]

(ii) alcohol **or** alkanol **[1]**
NOT a named alcohol

(d) acid loses a proton **[2]**
base accepts a proton **[1]**

OR same explanation but acid loses a hydrogen ion (1)
and base gains hydrogen ion (1)

(ii) only partially ionised **or** poor hydrogen ion donor **or** poor proton donor **[1]**
NOT does not form many hydrogen ions in water **or** low concentration of hydrogen ions
NOT pH

TOTAL = 15

3 **(a** Avogadro's Number of particles
or formula mass in grams
or 6×10^{23} particles accept atoms, ions and molecules
or as many particles as there are carbon atoms in 12.00g of ^{12}Ca
ANY one **[1]**

(b) moles of Mg = 3/24 = 0.125
moles of CH_3COOH = 12/60 = 0.200
magnesium is in excess

OR 3.0g of magnesium react with 15g of acid
only 12.0 g of acid present
magnesium is in excess **[3]**

(ii) **Mark conseq to (i) but NOT to any simple integer**
moles of H_2 = 0.1 **[1]**

(iii) **Mark conseq to (ii) but NOT to any simple integer**
Volume of hydrogen = 0.1 x 24
= 2.4 dm^3 **[2]**

(c) moles of NaOH = 25/1000 x 0.4 = 0.01 **[1]**

(ii) **Mark conseq to (i) but NOT to any simple integer**
moles of acid = 0.01/2 = 0.005 **[1]**

(iii) **Mark conseq to (ii) max 10M**
concentration of acid = 0.005 x 1000/20 **[1]**
= 0.25 mol/dm^3 **[1]**

TOTAL = [10]

4 **(a) (i)** no change in concentration of reagents **or** rates equal **[1]**
Accept no change in amounts or it is as if the reaction has Stopped

(ii) back reaction is endothermic **or** the forward reaction is exothermic **[1]**
Increase in temperature favours the endothermic reaction which is the back reaction or vice versa. **[1]**
NB look for correct conclusion re thermicity and comment re position of equilibrium.

(iii) increased rate **[1]**
because molecules collide more frequently **or** concentration of molecules is increased **or** molecules are closer **[1]**
NOT they have more KE
increased yield **[1]**
high pressure favours side with few molecules **or** smaller volume **or** moves to reduce the pressure **[1]**
this is product side this can be implied **[1]**

(b) CO_2 and H_2O **[1]**
balanced **[1]**
$2CH_3OH + 3O_2 = 2CO_2 + 4H_2O$

(ii) methyl ethanoate **[1]**
water **[1]**

(iii) Methanoic (acid) accept formic acid **[1]**

TOTAL = 13