

Reaction Flash Cards

Instructions:

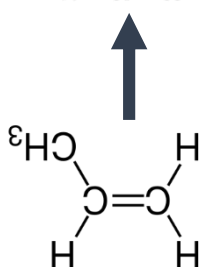
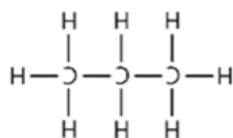
Cut individually and fold/glue.

Can be either laminated or folded around cardboard.

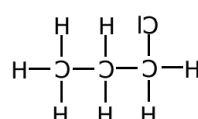
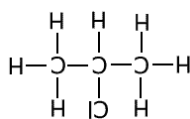
Ideas for Use:

1. Group reactants (or products) into functional groups
2. Arrange cards into reaction types – check back. Reaction types are colour coded below.
3. Test in pairs for reagent/ conditions of reaction
4. Test for naming compounds using functional IUPAC conventions
5. Use cards like dominos to construct large reaction scheme.
6. Create different starting compound and draw/name products created with same reaction.

Substitution reactions are characterized by replacement of an atom or group (Y) by another atom or group (Z). Aside from these groups, the number of bonds does not change.	
Polymerisation reactions join monomers together to form a polymer. Condensation polymerisation removes a small molecule (such as a H from one monomer and OH from another) and joins the two ends of the monomers together	
Oxidation reactions involve a loss of electrons from the organic molecule or a gain of oxygen. An oxidant such as dichromate or permanganate is used.	
Condensation (or dehydration) reactions are a type of elimination reaction where a small molecule is removed) – in esterification OH and H is removed from alcohol and carboxylic acid and they are joined to form an ester	
Addition reactions increase the number of bonds to the Carbon chain by bonding additional atoms, usually at the expense of one or more double bonds.	
Hydrolysis reactions involve water as a reactant to 'split' a larger molecule into smaller molecules and the water becomes part of the reaction product.	
Elimination reactions decrease the number of single bonds by removing atoms and new double bonds are often formed.	
Reduction reactions involve a gain of electrons from the organic molecule or a loss of oxygen. A reductant such as LiAlH_4 is used.	

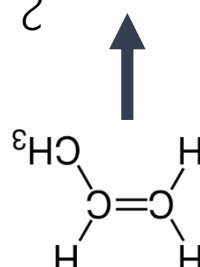


Reaction type	addition
Reagent/ Conditions	H ₂ (Ni/Pt) with Heat
Starting compound	propene
Final compound	propane

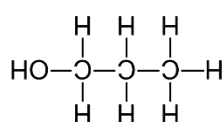
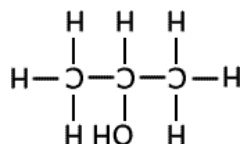


2

1

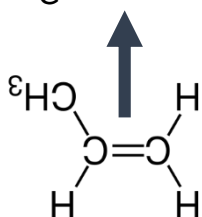


Reaction type	addition
Reagent/ Conditions	HCl (in CCl ₄)
Starting compound	propene
Final compound	1. Minor: 1-chloropropane 2. Major: 2-chloropropane

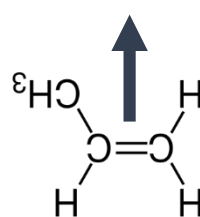
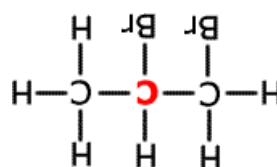


2

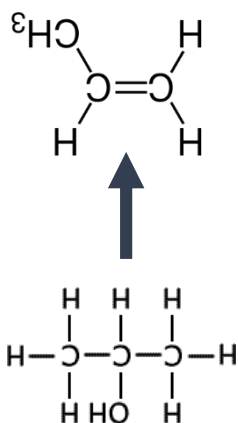
1



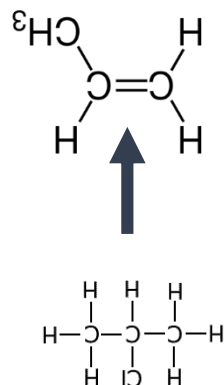
Reaction type	addition
Reagent/ Conditions	H ₂ O/H ⁺ heat
Starting compound	propene
Final compound	1. Minor: propan-1-ol 2. Major: propan-2-ol



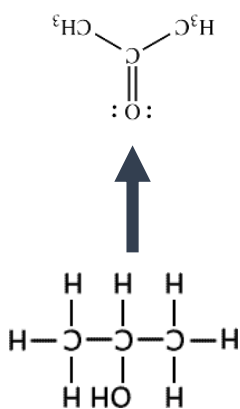
Reaction type	addition (double)
Reagent/ Conditions	Br ₂
Starting compound	propene
Final compound	1,2-dibromopropane



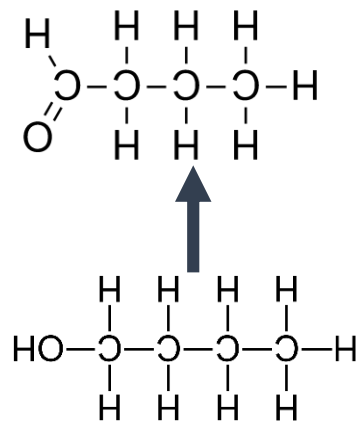
Reaction type	elimination
Reagent/ Conditions	Conc. H_2SO_4 with Heat
Starting compound	Propan-2-ol
Final compound	propene



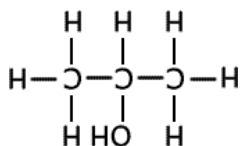
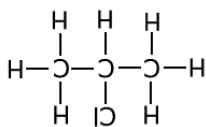
Reaction type	elimination
Reagent/ Conditions	Alcoholic KOH reflux
Starting compound	2-chloropropane
Final compound	propene



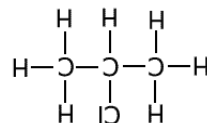
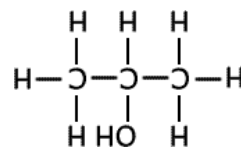
Reaction type	oxidation
Reagent/ Conditions	$\text{Cr}_2\text{O}_7^{2-}/\text{H}^+$ reflux
Starting compound	Propan-2-ol
Final compound	propanone



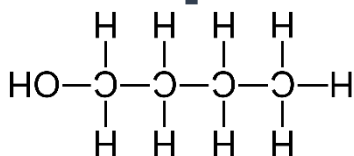
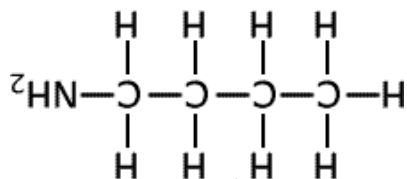
Reaction type	oxidation
Reagent/ Conditions	$\text{Cr}_2\text{O}_7^{2-}/\text{H}^+$ cold
Starting compound	butan-1-ol
Final compound	butanal



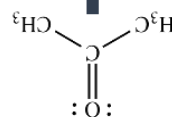
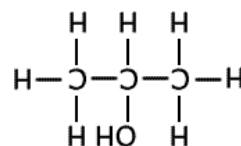
Reaction type	substitution
Reagent/ Conditions	SOCl_2 reflux
Starting compound	Propan-2-ol
Final compound	2-chloropropane



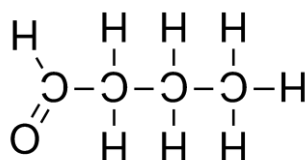
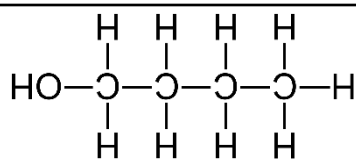
Reaction type	substitution
Reagent/ Conditions	KOH (aq) reflux
Starting compound	2-chloropropane
Final compound	Propan-2-ol



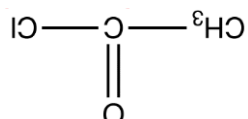
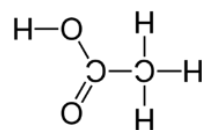
Reaction type	substitution
Reagent/ Conditions	NH_3 warm
Starting compound	Butan-1-ol
Final compound	1-aminobutane



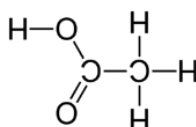
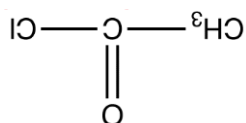
Reaction type	reduction
Reagent/ Conditions	NaBH_4
Starting compound	propane
Final compound	Propan-2-ol



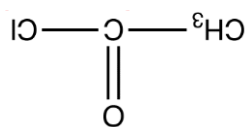
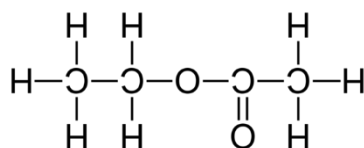
Reaction type	reduction
Reagent/ Conditions	NaBH_4
Starting compound	butanal
Final compound	butan-1-ol



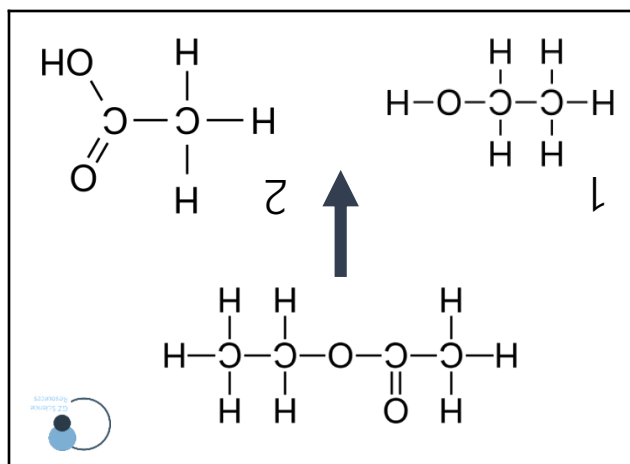
Reaction type	substitution
Reagent/ Conditions	H_2O
Starting compound	ethanoyl chloride
Final compound	ethanoic acid



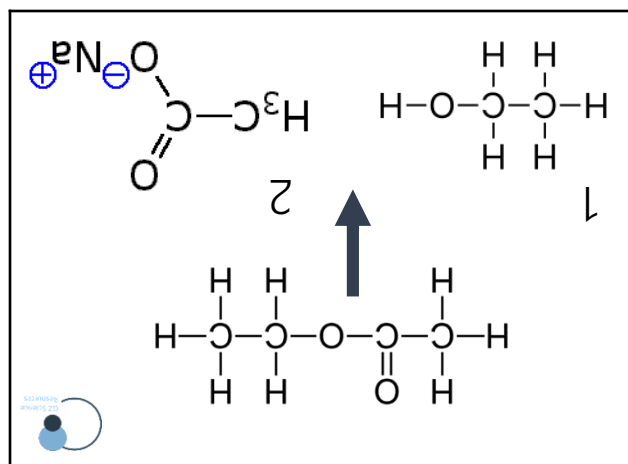
Reaction type	substitution
Reagent/ Conditions	SOCl_2
Starting compound	ethanoic acid
Final compound	ethanoyl chloride



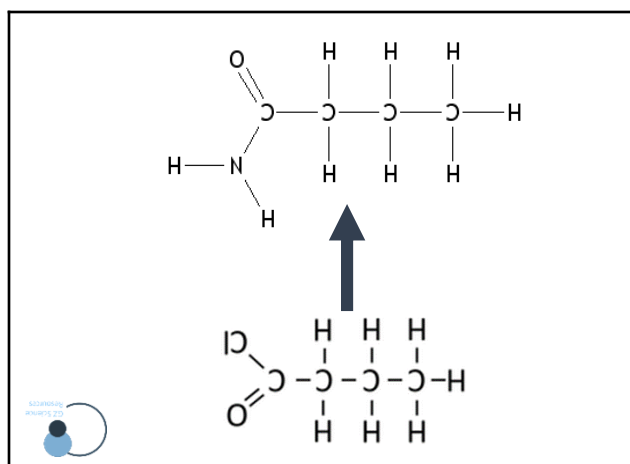
Reaction type	condensation (esterification)
Reagent/ Conditions	ethanol
Starting compound	Ethanoyl chloride
Final compound	Ethyl ethanoate



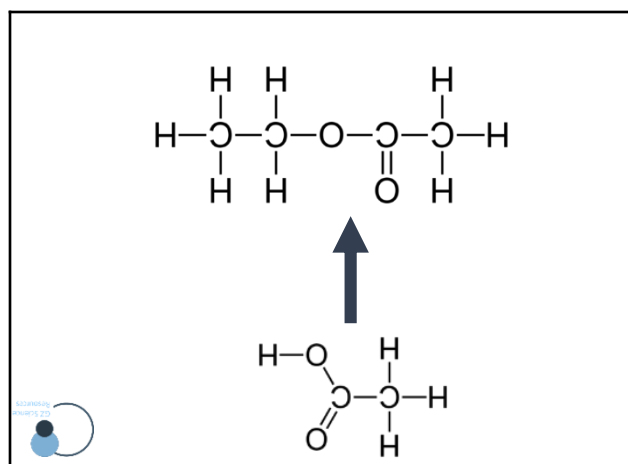
Reaction type	acid hydrolysis
Reagent/ Conditions	H ₂ O/H ⁺
Starting compound	Ethyl ethanoate
Final compound	1. Ethanol 2. Ethanoic acid



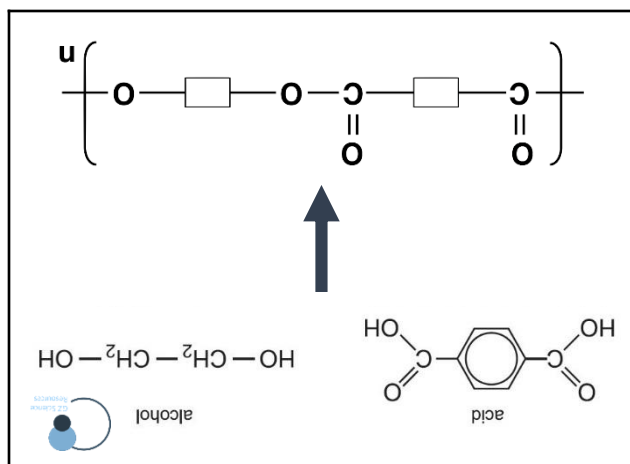
Reaction type	base hydrolysis
Reagent/ Conditions	NaOH
Starting compound	Ethyl ethanoate
Final compound	1. Ethanol 2. Sodium ethanoate



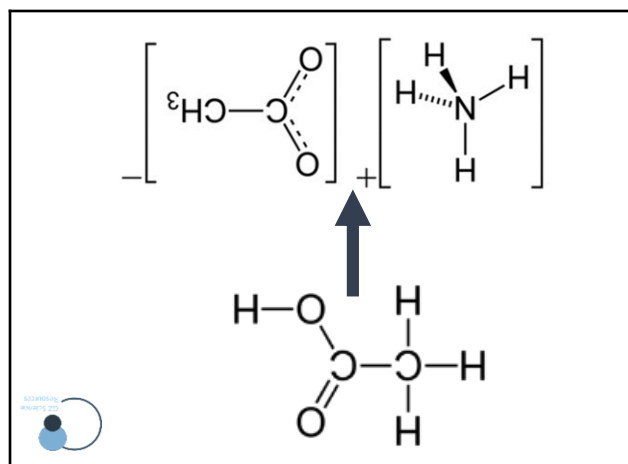
Reaction type	substitution
Reagent/ Conditions	Alcoholic NH ₃
Starting compound	Butyl chloride
Final compound	butanamide



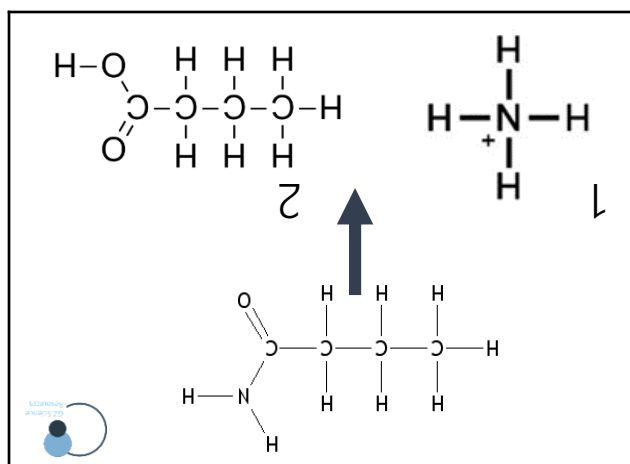
Reaction type	condensation (esterification)
Reagent/ Conditions	ethanol
Starting compound	Ethanoic acid
Final compound	Ethyl ethanoate



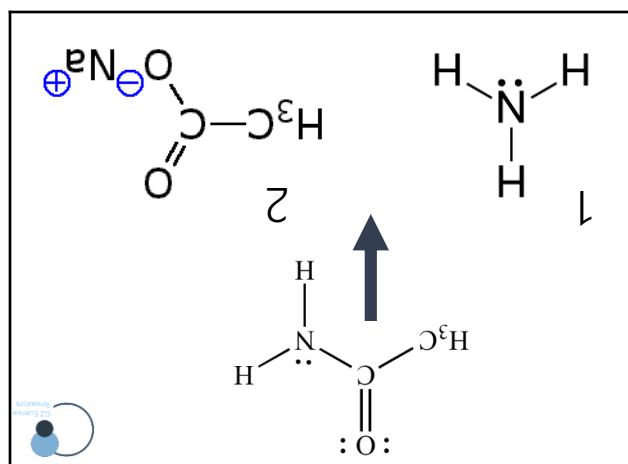
Reaction type	Condensation Polymerisation
Reagent/ Conditions	_____
Starting compound	1. diol 2. di carboxylic acid
Final compound	polyester



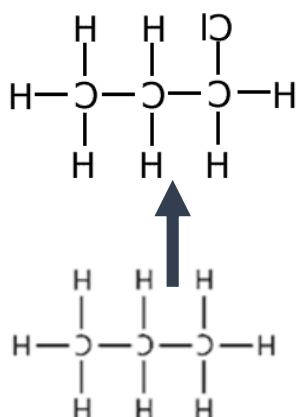
Reaction type	acid-base reaction
Reagent/ Conditions	NH ₃
Starting compound	Ethanoic acid
Final compound	Ammonium ethanoate



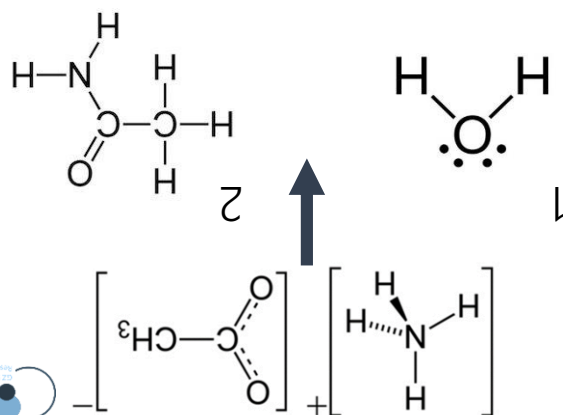
Reaction type	acid hydrolysis
Reagent/ Conditions	H ₂ O/H ⁺
Starting compound	butanamide
Final compound	1. Ammonium ion 2. Butanoic acid



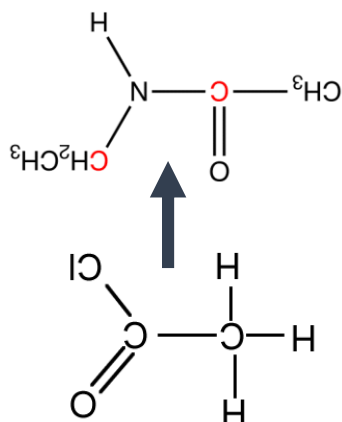
Reaction type	base hydrolysis
Reagent/ Conditions	NaOH
Starting compound	ethanamide
Final compound	1. ammonia 2. Sodium ethanoate



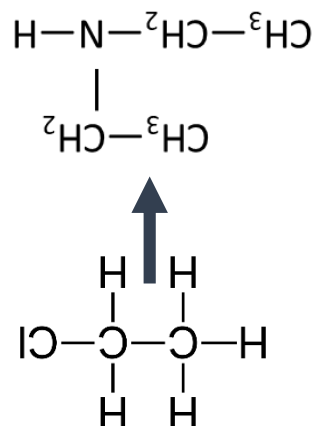
Reaction type	substitution
Reagent/ Conditions	Br_2, Cl_2 + UV light
Starting compound	propane
Final compound	1-chloropropane



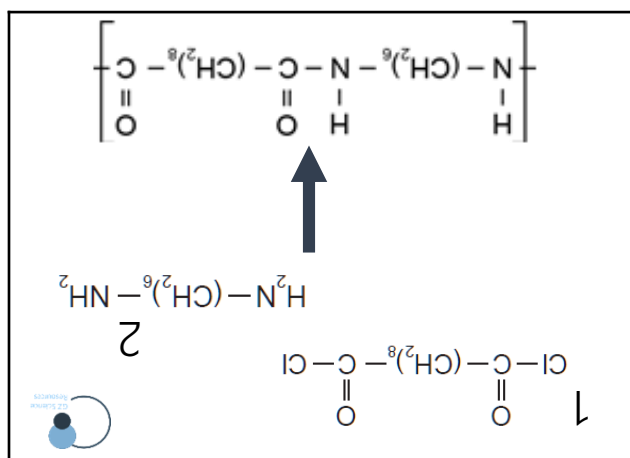
Reaction type	substitution
Reagent/ Conditions	heat
Starting compound	ammonium ethanoate
Final compound	1. water 2. ethanamide



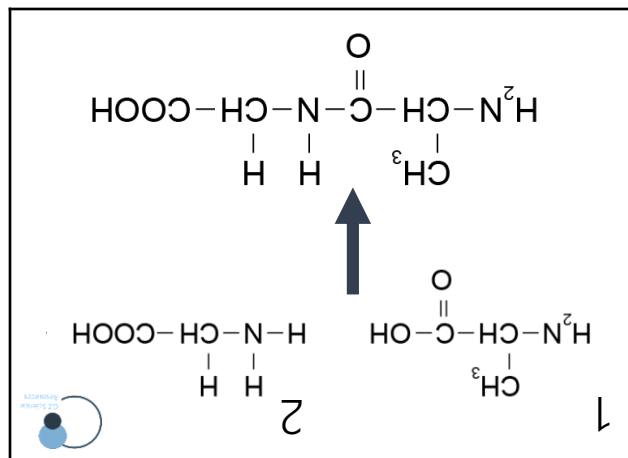
Reaction type	substitution
Reagent/ Conditions	Alcoholic: 1-aminoethane
Starting compound	ethanoyl chloride
Final compound	N-ethyl ethanamide



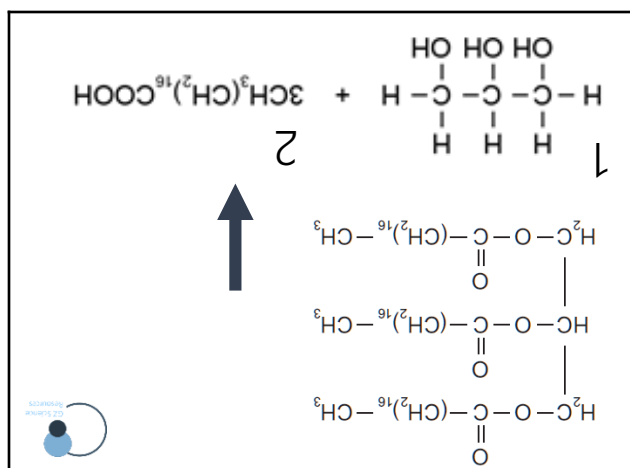
Reaction type	substitution
Reagent/ Conditions	1-aminoethane
Starting compound	1-chloroethane
Final compound	N-ethyl ethanamine



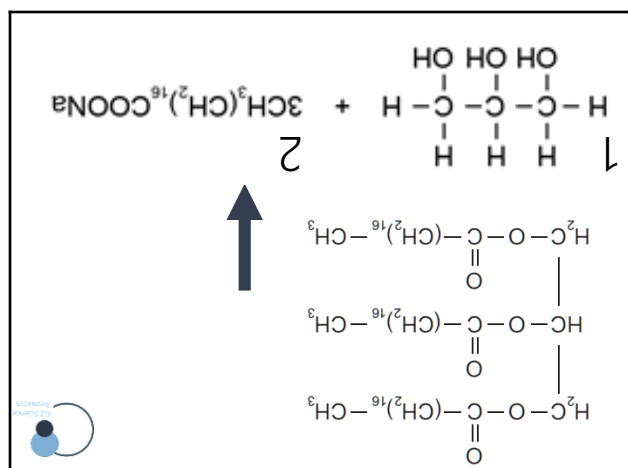
Reaction type	condensation polymerisation
Reagent/ Conditions	_____
Starting compound	1. di acid chloride 2. di amine
Final compound	polyamide



Reaction type	condensation polymerisation
Reagent/ Conditions	_____
Starting compound	1. Amino acid 1 2. Amino acid 2
Final compound	Dipeptide (don't need to name)



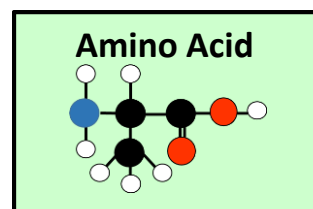
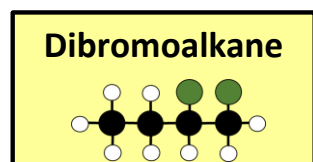
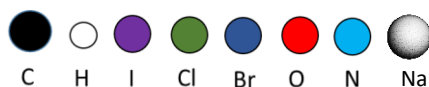
Reaction type	acid hydrolysis
Reagent/ Conditions	Dilute acid
Starting compound	Triglyceride (do not have to name)
Final compound	1. Triol 2. Carboxylic acid x 3



Reaction type	base hydrolysis
Reagent/ Conditions	NaOH
Starting compound	Triglyceride (do not have to name)
Final compound	1. Triol 2. Carboxylate salt x 3

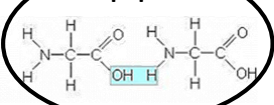
C3.5 Reaction Scheme

Reaction Type	arrow colour
substitution	green
condensation polymerisation	orange
oxidation	blue
condensation	purple
elimination	grey
hydrolysis	red
addition	red
acid-base	orange
reduction	yellow

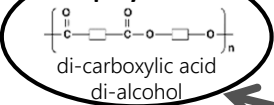


Polymerisation
Condensation

dipeptide

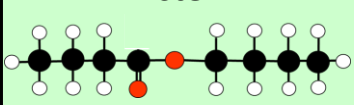


polyester

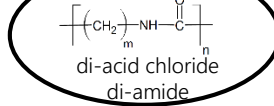


Conc. H_2SO_4

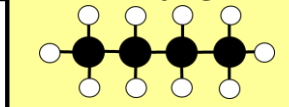
Ester



polyamide

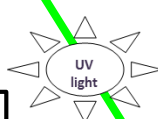


Alkane



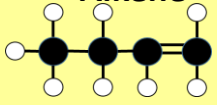
Do not need to name 2° and 3° for L3

Slow



H_2
(Pt) Heat

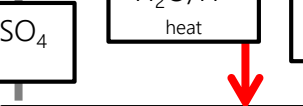
Alkene



Br_2
 Cl_2

fast
 HCl

Alcohol

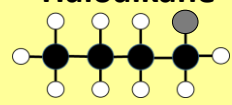


Conc. H_2SO_4
heat

$\text{H}_2\text{O}/\text{H}^+$
heat

Alc. KOH
reflux

Haloalkane



Turn red litmus to blue

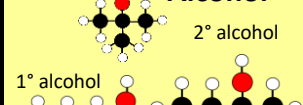
NH_3
warm

Amine
warm

KOH(aq)
reflux

$\text{PCl}_3, \text{SOCl}_2$
reflux

3° alcohol
2° alcohol
1° alcohol

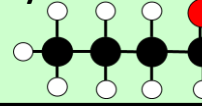


$\text{Cr}_2\text{O}_7^{2-}/\text{H}^+$
heat

NO reaction to
Tollens, Oxidants
Benedict's

NaBH_4

Aldehyde



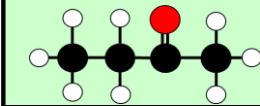
Positive reaction to
Tollens
Oxidants
Benedict's

NaBH_4

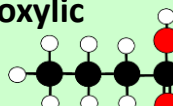
$\text{Cr}_2\text{O}_7^{2-}/\text{H}^+$
cold

$\text{Cr}_2\text{O}_7^{2-}/\text{H}^+$
reflux

Ketone



Carboxylic Acid



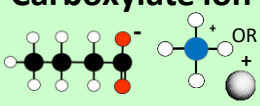
$\text{H}_2\text{O}/\text{H}^+$

H_2O

$\text{Cr}_2\text{O}_7^{2-}/\text{H}^+$
reflux

$\text{MnO}_4^-/\text{H}^+$
can also be used as an oxidant

Carboxylate ion

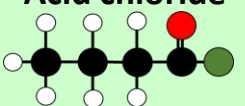


Plus alcohol

heat

NaOH

Acid chloride



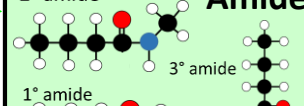
ethanol

Violent reaction to water

NH_3 or amine
In ethanol

$\text{NH}_3(\text{alc})$

Amide



H_3O^+

NH_4^+

NH_3