

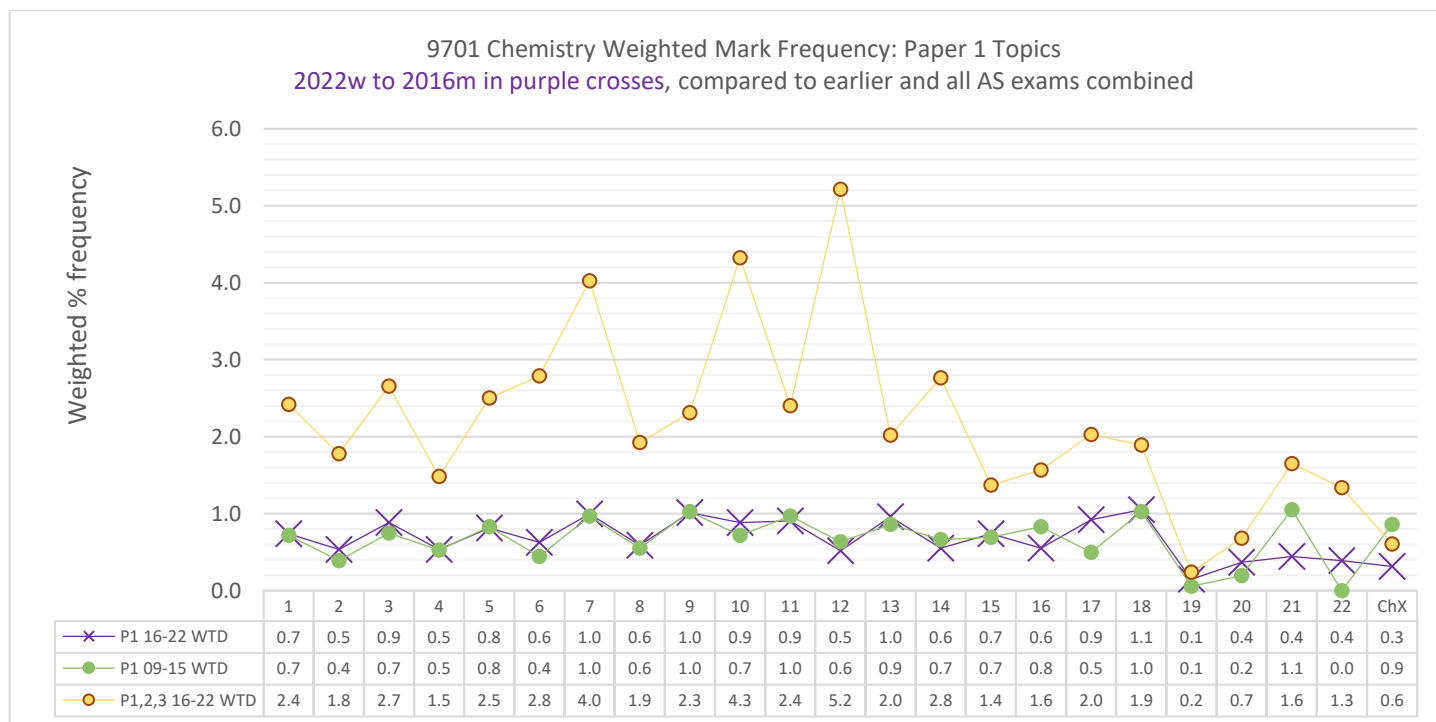
ALyl Chem 19 EQ P1 22w to 09s Paper 1 Nitrogen compounds 10marks

As you start and work through this worksheet you can tick off your progress to show yourself how much you have done, and what you need to do next. The first task is just to read the first question and should take you less than one minutes to complete.

Paper 1 Topic 19

Checklist Tick each task off as you go along

RANK:	P1 Noob	P1 Novice	P1 Bronze	P1 Silver	P1 Gold	P1 ¹ Winner	P1 Hero	P1 Legend
	1 Q started	1 Q done	10% of marks	25% of marks	40% of marks	50% of marks	75% of marks	100% of marks
Topic (marks)	10	1	1	3	4	5	8	10
Time @75s/mark (minutes)	13	1	1	3	5	6	9	13



What the most thoughtful students will get out of their extensive studying will be a capacity to do meaningful brain-based work even under stressful conditions, which is a part of the self-mastery skillset that will continue to deliver value for the whole of their lives. Outstanding grades will also happen, but the most important goal from skillful action in study is being better at any important task, even if circumstances do not feel ideal.

As you are moving through your studies you can learn more about yourself by trying out new ways to manage yourself, and analysing how effective those new techniques were. In this reflective process not only will you get better at working positively and productively to deliver ambitious and successful outcomes, but you will be working towards one aspect of life's highest pursuit, summarised and inscribed on the Temple of Apollo at Delphi: "know thyself".

- To complete these questions, as important as your answer, is checking your answer against the mark scheme.
- For each page or group of 10 questions, convert your mark score into a percentage. This will allow you to see (and feel) your progress as you get more experience and understanding with each topic.
- Multiple choice questions, done carefully where you explain and show yourself your thinking using written notes as you move through each question, can be more useful than just Paper 2 for students aiming for a C or B grade. Paper 2 should be the larger focus for students aiming for A and A* grades, however.
- If you find you get a higher percentage answering short answer questions than multiple choice questions that often means you are NOT using the marking scheme correctly; your correct answer might not be fully complete for all the marks you are awarding. The marks easiest to miss rely on providing the largest amount of detail.

¹ **DO NOT** work on these higher levels of completion in your A2 year unless you have also achieved at least a "Silver" (25%) in the same topic in **Paper 2**, which is **MOST** of your **AS grade**, and Paper 3 which is a smaller part of your year but still important.



19 Nitrogen compounds

19.1 Primary amines

Learning outcomes

Candidates should be able to:

- recall the reactions by which amines can be produced:
 - reaction of a halogenoalkane with NH_3 in ethanol heated under pressureClassification of amines will not be tested at AS Level.

19.2 Nitriles and hydroxynitriles

Learning outcomes

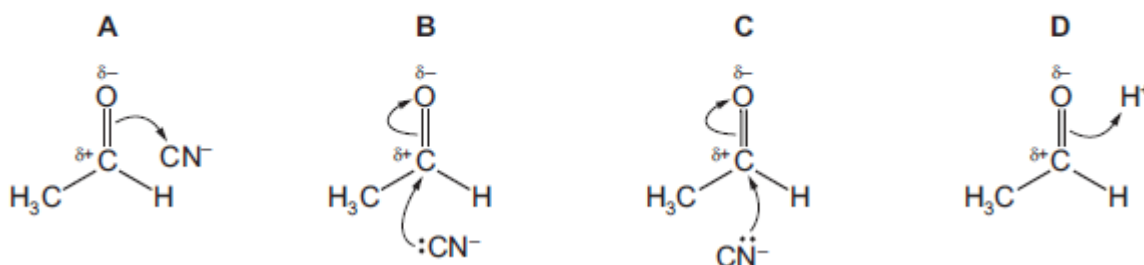
Candidates should be able to:

- recall the reactions by which nitriles can be produced:
 - reaction of a halogenoalkane with KCN in ethanol and heat
- recall the reactions by which hydroxynitriles can be produced:
 - the reaction of aldehydes and ketones with HCN, KCN as catalyst, and heat
- describe the hydrolysis of nitriles with dilute acid or dilute alkali followed by acidification to produce a carboxylic acid

Q# 1222/ AS Chemistry/2022/w/TZ 1/Paper 1/Q# 34//www.SmashingScience.org :o)

34 Ethanal reacts with hydrogen cyanide in the presence of KCN to produce a hydroxynitrile.

What is the first step in the mechanism of this reaction?



Q# 1223/ AS Chemistry/2021/w/TZ 1/Paper 1/Q# 26//www.SmashingScience.org :o)

26 $\text{CH}_3\text{CH}_2\text{COCH}_2\text{CH}_3$ reacts with hydrogen cyanide to form an organic product called a cyanohydrin.

Which statement is correct?

- The cyanohydrin product has one chiral centre.
- The cyanohydrin product is formed by electrophilic addition.
- The cyanohydrin product is formed via an intermediate which contains a C–OH group.
- The formation of the cyanohydrin product requires the use of cyanide ions as a catalyst.



The responses **A** to **D** should be selected on the basis of

A	B	C	D
1, 2 and 3 are correct	1 and 2 only are correct	2 and 3 only are correct	1 only is correct

36 In which different forms does nitrogen exist in compounds?

- 1 bonded by a triple covalent bond
- 2 as part of a cation
- 3 in an oxidation state of +5

Q# 1225/ AS Chemistry/2018/m/TZ 2/Paper 1/Q# 19//www.SmashingScience.org :o)

19 One molecule of ammonia reacts with one molecule of ethyl methanoate, $\text{HCO}_2\text{C}_2\text{H}_5$, to produce one molecule of methanamide, HCONH_2 , and only one other molecule, X.

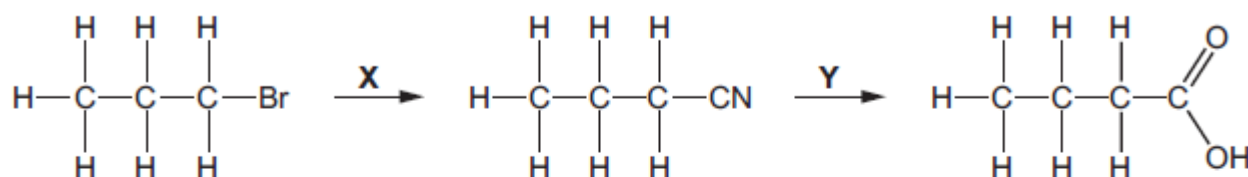
One molecule of methanamide decomposes on heating strongly to produce one molecule of ammonia and only one other molecule, Y.

What could be the identities of X and Y?

	X	Y
A	ethanoic acid	carbon monoxide
B	ethanoic acid	hydrogen cyanide
C	ethanol	carbon monoxide
D	ethanol	hydrogen cyanide

Q# 1226/ AS Chemistry/2017/s/TZ 1/Paper 1/Q# 26//www.SmashingScience.org :o)

26 X and Y are the reagents required to convert 1-bromopropane into butanoic acid.



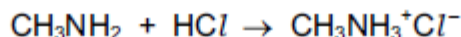
What are the correct identities of X and Y?

	X	Y
A	NH_3	HCl(aq)
B	$\text{KCN in C}_2\text{H}_5\text{OH}$	NaOH(aq)
C	$\text{KCN in C}_2\text{H}_5\text{OH}$	HCl(aq)
D	HCN	NaOH(aq)



19 Methylamine, CH_3NH_2 , has very similar chemical properties to ammonia, NH_3 .

Methylamine reacts with hydrogen chloride to form a white crystalline salt, methylammonium chloride.



A sample of methylammonium chloride is heated with aqueous sodium hydroxide.

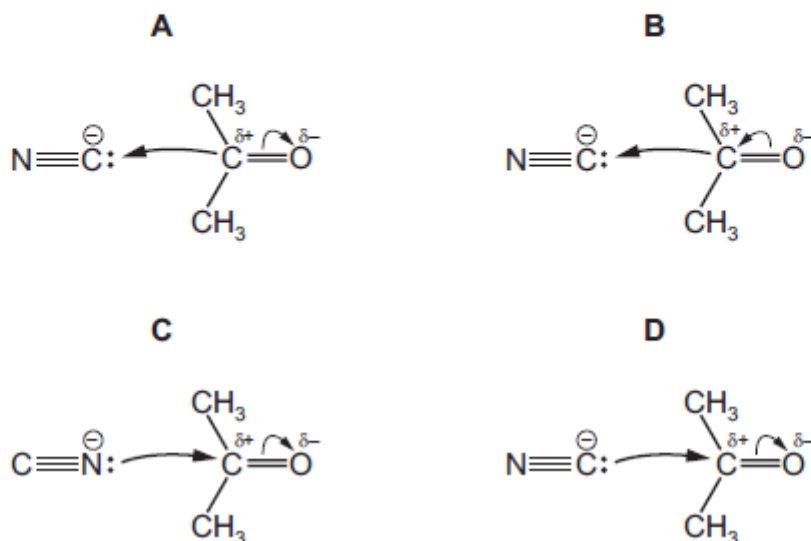
What are the products?

- A ammonia, sodium chloride and water
- B ammonia, sodium hydrogencarbonate and sodium chloride
- C methylamine, hydrogen chloride and water
- D methylamine, sodium chloride and water

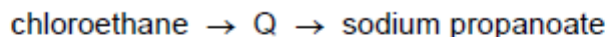
26 Propanone reacts with an aqueous mixture of HCN and NaCN by a nucleophilic addition mechanism.

The first stage of the mechanism involves attack by cyanide ions.

Which diagram correctly represents this?



24 Chloroethane can be used to make sodium propanoate.

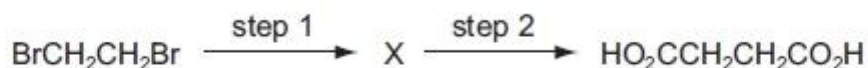


The intermediate, Q, is hydrolysed with boiling aqueous sodium hydroxide to give sodium propanoate.

Which reagent would produce the intermediate, Q, from chloroethane?

- A concentrated ammonia solution
- B dilute sulfuric acid
- C hydrogen cyanide in water
- D potassium cyanide in ethanol

21 Butanedioic acid occurs in amber, algae, lichens, sugar cane and beets. It may be synthesised in two steps from 1,2-dibromoethane.



Which reagents could be used for this synthesis?

	step 1	step 2
A	HCN(g)	HCl(aq)
B	HCO ₂ Na(aq)	HCl(aq)
C	KCN(aq / alcoholic)	H ₂ SO ₄ (aq)
D	NaOH(aq)	K ₂ Cr ₂ O ₇ / H ₂ SO ₄ (aq)

The responses **A** to **D** should be selected on the basis of

A	B	C	D
1, 2 and 3 are correct	1 and 2 only are correct	2 and 3 only are correct	1 only is correct

39 How can the rate of reaction between ethanal and aqueous hydrogen cyanide be increased?

- 1 by irradiation with ultraviolet light
- 2 by a rise in temperature
- 3 by the addition of a small quantity of aqueous sodium cyanide



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34 | **B**

Q# 1223/ AS Chemistry/2021/w/TZ 1/Paper 1/Q# 26//www.SmashingScience.org :o)

26 | **D**

Q# 1224/ AS Chemistry/2018/m/TZ 2/Paper 1/Q# 36//www.SmashingScience.org :o)

36 | **A**

Q# 1225/ AS Chemistry/2018/m/TZ 2/Paper 1/Q# 19//www.SmashingScience.org :o)

19 | **C**

Q# 1226/ AS Chemistry/2017/s/TZ 1/Paper 1/Q# 26//www.SmashingScience.org :o)

26 | **C**

Q# 1227/ AS Chemistry/2017/m/TZ 2/Paper 1/Q# 19//www.SmashingScience.org :o)

19 | **D**

Q# 1228/ AS Chemistry/2016/w/TZ 1/Paper 1/Q# 26//www.SmashingScience.org :o)

26 | **D**

Q# 1229/ AS Chemistry/2016/w/TZ 1/Paper 1/Q# 24//www.SmashingScience.org :o)

24 | **D**

Q# 1230/ AS Chemistry/2011/s/TZ 1/Paper 1/Q# 21//www.SmashingScience.org :o)

21 | **C**

Q# 1231/ AS Chemistry/2009/s/TZ 1/Paper 1/Q# 39//www.SmashingScience.org :o)

39 | **C**

