

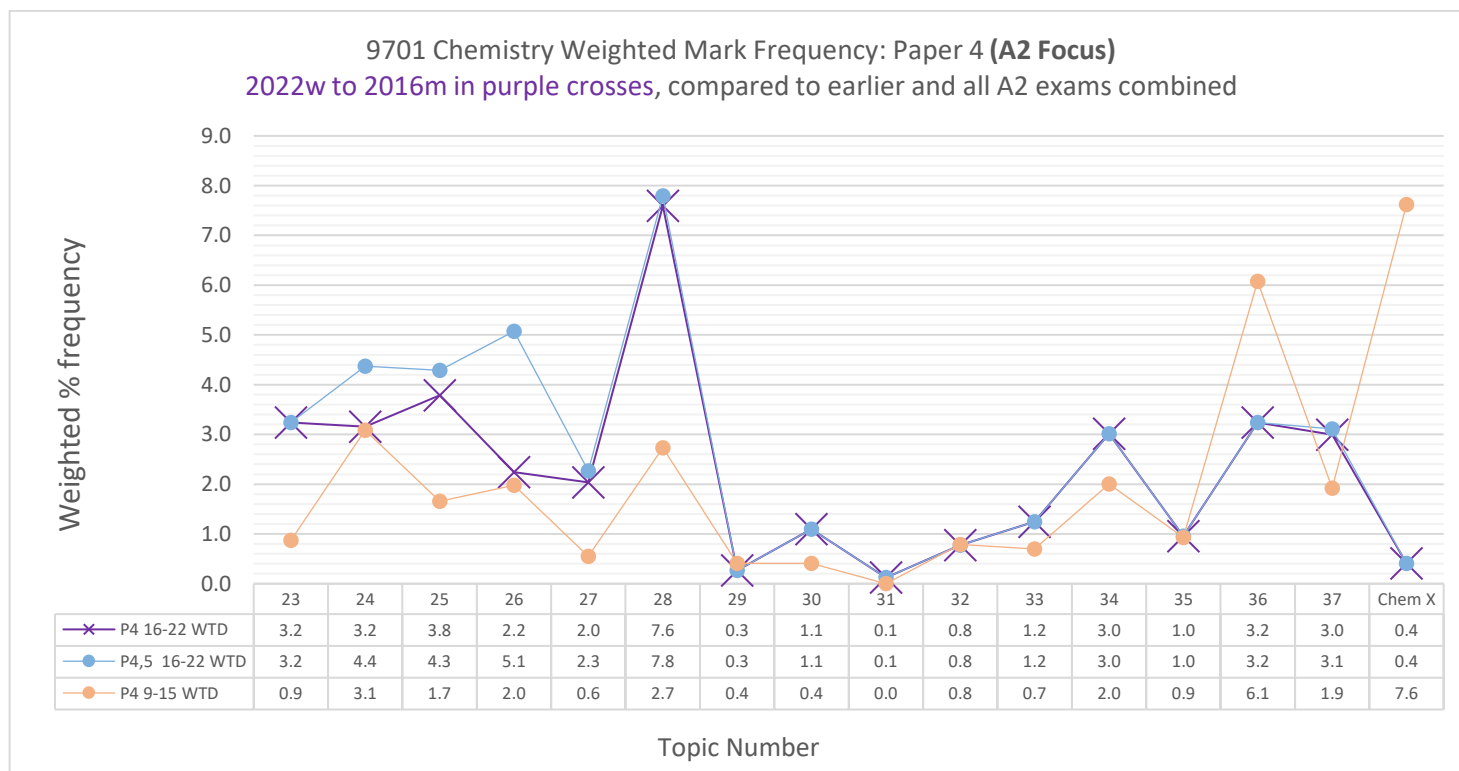
ALyl Chem 31 EQ 22m to 09w Paper 4 Halogen compounds 6marks

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 3 minutes to complete.

Paper 4 Topic Checklist

Tick each task off as you go along

	RANK:	P4 Noob	P4 Novice	P4 Bronze	P4 Silver	P4 Gold	P4 ¹ Winner	P4 Hero	P4 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 31 (marks)	6		3	1	2	2	3	5	6
Time - 72 seconds per mark (minutes)	7		4	1	2	3	4	5	7



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 outcome from skillful action in study is being better at any important tasks even if circumstances are do not feel ideal.

Learning how to manage oneself so we can more reliably get ambitious and successful outcomes out of our challenges in a productive and positive way is one aspect of life's most valuable pursuit summarised and inscribed on the Temple of Apollo at Delphi: "know thyself".

1. To complete these questions, as important as your answer, is checking your answer against the mark scheme.
2. For each question, or page, 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.
3. If you find you get a higher percentage answering short answer questions than multiple choice questions that often means you are using the marking scheme correctly; your correct answer might not be fully complete. The marks easiest to miss rely on providing more details fully described.

¹ DO NOT work on these higher levels of completion unless you have also achieved at least a "Silver" (25%) in the same topic in Paper 5, if it exists.



31 Halogen compounds

31.1 Halogen compounds

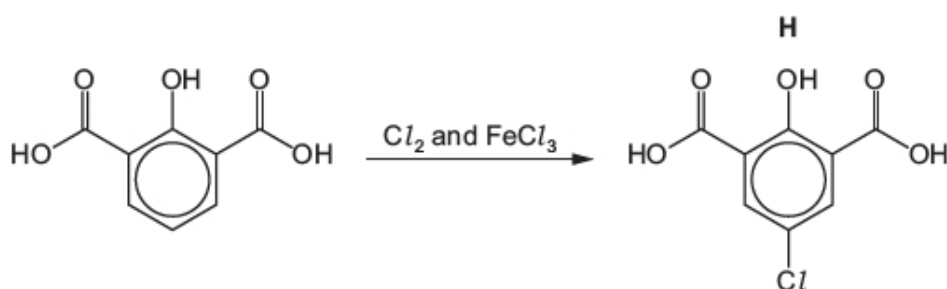
Learning outcomes

Candidates should be able to:

- recall the reactions by which halogenoarenes can be produced:
 - substitution of an arene with Cl_2 or Br_2 in the presence of a catalyst, AlCl_3 or AlBr_3 to form a halogenoarene, exemplified by benzene to form chlorobenzene and methylbenzene to form 2-chloromethylbenzene and 4-chloromethylbenzene
- explain the difference in reactivity between a halogenoalkane and a halogenoarene as exemplified by chloroethane and chlorobenzene

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(c) Compound H is formed in one step of a different synthesis, as shown.



(i) State the role of FeCl_3 in this step.

..... [1]

(ii) Use the *Data Booklet* to suggest **two** reasons why the chlorine atom in compound H substitutes into the ring at the position shown, instead of the other positions in the ring.

1

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2

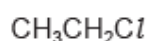
..... [2]

Q# 2/ ALVl Chemistry/2019/s/TZ 1/Paper 4/Q# 9 /www.SmashingScience.org :o)

9 (a) Organochlorine compounds can undergo hydrolysis.



State and explain the relative rates of hydrolysis of the following compounds.



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..... [3]



Mark Scheme ALvl Chem 31 EQ 22m to 09w Paper 4 Halogen compounds 6marks

Q# 1/ ALvl Chemistry/2020/m/TZ 2/Paper 4/Q# 4 /www.SmashingScience.org :o)

4(c)(i)	catalyst / halogen carrier	1
4(c)(ii)	M1 —OH directs to 2,4 AND both 2 positions occupied / only position 4 is available M2 —COOH directs to 3 position AND only position 3 is available / 5 is occupied	2

Q# 2/ ALvl Chemistry/2019/s/TZ 1/Paper 4/Q# 9 /www.SmashingScience.org :o)

9(a)	M1: $\text{CH}_3\text{COCl} > \text{CH}_3\text{CH}_2\text{Cl} > \text{C}_6\text{H}_5\text{Cl}$ M2 & M3 any two from: <ul style="list-style-type: none">in $\text{C}_6\text{H}_5\text{Cl}$ (no hydrolysis) C-Cl bond is part of delocalised system OR p-orbital on Cl overlaps with π system OR electrons from Cl overlap with π systemCH_3COCl carbon in C-Cl bond is more electron deficient since it is also attached to an oxygen atom (ora) or C-Cl bond strength is weakest in CH_3COCl (ora)$\text{CH}_3\text{CH}_2\text{Cl}$ carbon in C-Cl bond strengthened by positive inductive effect of alkyl group	3
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