

Exemplar Materials: Unit 10 Synthesising Organic Chemicals

Exemplar Portfolio Work – 10.1	Commentary on Mark Allocation
<p><u>Risk Assessment</u></p> <p>A full and detailed risk assessment should be completed in addition to evidence from the assessor that the student has safely completed the practical work, with evidence of independent work where appropriate.</p> <p><u>Details of Preparation of Iodoform</u> (Method from Mann & Saunders) – was researched and found by the student.</p> <p>A sample of Iodoform was prepared using the method shown below</p> <ol style="list-style-type: none"> 1. Dissolve 4 g of potassium iodide in 40 cm³ of distilled water and put this into a 250 cm³ conical flask. 2. Add 15 cm³ of 2M sodium hydroxide solution to this to and then add 1 cm³ of propanone to this and stir well. A 10 cm³ measuring cylinder was used. The instructions then said to add 30 cm³ of sodium hypochlorite solution, this was not available, so instead the same quantity of fresh thin colourless bleach was used. 3. The mixture should turned yellow on stirring and yellow crystals will form. 4. leave this for ten minutes and stir every so often. 5. After ten minutes filter the mixture through a Buchner funnel, using a water pump. 6. The yellow triiodomethane should remain in the filter paper. 7. Wash the yellow crystals with a little distilled water and let them drain. <p>The crystals should now be recrystallised using a minimum amount of the solvent ethanol and dries in the drying oven at 50°C.</p> <p>A sample of golden yellow crystals of iodoform were produced. To assess the purity of the sample a melting point should be taken</p> <p>I did not seem to have made many crystals so I drained off the liquid and put the crystals on a weighed filter paper. I then put the filter paper in the drying oven which was set at 50 °C.</p>	<p>The candidate should show evidence of the use of COSHH data, hazcards or similar material.</p> <p>And consider the properties of the product being made. As well as the reactants being used.</p> <p>Method used needs to be checked by the teacher before it is attempted.</p> <p>In order to have evidence that the candidate has planned and safely completed this preparation- a statement from the teacher should be included and the completion of a (work plan) as shown (Table 1). A range of techniques has been used but no justification has been provided why these particular techniques were chosen.</p> <p>The candidate has therefore not achieved marks in MB3 and MB2 can be achieved.</p>

Where I found my method

I used the method found in the book 'Introduction to Practical Organic Chemistry' by Mann And Saunders, 2nd edition, published in 1971.

I also used the internet and found another method but this use different chemicals. It told me to use iodine, but I found out that this is corrosive so I used the book method instead.

Observations and results

Weight of filter paper = 0.74 g
Weight of filter paper and crystals = 0.86 g
Weight of crystals = 0.12 g

Melting point of my pure crystals is 116 - 118 °C
Book value for the melting point is 119 °C.

pure triiodomethane was yellow crystals. They smelt of hospitals

Calculating the percentage yield



1 mole gives 1 mole

1 cm³ of propanone was used, so the number of moles of propanone is mass / relative molecular mass

$$= \frac{1}{58} = 0.0172413$$

0.0172413 mole of triiodomethane gives 100% yield.

Number of moles of triiodomethane made = $\frac{\text{mass}}{M_r}$

$$= \frac{0.12}{394} = 0.0003045$$

$$\% \text{ Yield} = \frac{\text{actual yield of CHI}_3 \times 100}{\text{theoretical yield}}$$

$$= \frac{0.0003045 \times 100}{0.0172413} = \underline{\underline{1.7661081}}$$

The candidate has recorded limited observations from this preparation. In addition he has presented the results to an appropriate level of precision.

The observations are not detailed enough for MB3 and therefore MB2 awarded.

The candidate has processed the results from this preparation. He has not considered the use of significant figures in a meaningful way. This has limited the marks awarded to MB2.

Evaluation

I was very pleased with the way in which my method worked and I seemed to obtain a lot of triiodomethane before recrystallisation.

Although I tried not to lose any of the yellow crystals when I purified them by recrystallisation from alcohol, I only obtained a yield of about 2% of the pure solid.

I was pleased to see that they were pure, because they had a melting point similar to the value given in the book that I used.

The candidate has attempted to draw conclusion and to evaluate his experiment.

However, despite realising the poor yield he has not suggested alternative strategies for increasing the actual yield of the product. The marks awarded are in MB1.

TABLE 1 – POSSIBLE SUGGESTION OF LAYOUT OF EVIDENCE OF PLANNING

Work Plan: Preparation of Triiodomethane Date: _____ Name: _____		
Give Tasks Necessary Time Allocation	Work Needed	Date Completed/Signatures Comments by Assessor
Research method.	Research for Suitable method. Photocopy/record and attach to plan. Checked by supervisor before order equipment.	Method checked and suitable.
Risk assessment.	Full risk assessment.	
Carry out practical work.	Check all chemicals available. Look for alternative if needed.	Practical work safely completed in the allocated time. Independent work.
Record observations.	Table of all observations made during preparation. Weigh product and any starting reagents if necessary.	
Calculation of % Yield	% yield found.	
Evaluations/Conclusions	Information on how successful the practical was and any information on how it could be improved.	