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Task 1 13% of the total

An environmentally friendly aldol condensation

1a	1b	1c	1d	1e	1f	1g	Total
1	1	13	20	6	1	2	44

a) Record the pH of the solution.

b) Report the mass of the crude product.

c) Using UV light to visualize, draw around the spots on the plate in pencil to show where they are, copy your plate onto the answer sheet, and place your plate in the Ziploc bag labeled with your student code.

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Record the relevant R_F values.

Chemical	R_F

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d) Report the mass of the purified product.

e) Product **A** could have one of two formulae: $C_{18}H_{18}O_4$ or $C_{18}H_{16}O_3$.

Draw the structure of every stereoisomer with formula $C_{18}H_{18}O_4$ that could be formed in this reaction. Indicate how many peaks you would expect in total in the ^{13}C NMR spectrum of each.

For $C_{18}H_{18}O_4$:

Structure	Number of ^{13}C NMR signals expected:

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Draw the structure of every stereoisomer with formula $C_{18}H_{16}O_3$ that could be formed in this reaction. Indicate how many peaks you would expect in total in the ^{13}C NMR spectrum of each.

For $C_{18}H_{16}O_3$:

Structure	Number of ^{13}C NMR signals expected:

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f) With the aid of the ^{13}C NMR spectrum given in the practical instructions, decide which is the correct formula. Mark **one** of the two boxes below to indicate which you have chosen:

$C_{18}H_{18}O_4$: ❑ $C_{18}H_{16}O_3$: ❑

g) Calculate the percentage yield of purified product, based on the formula you gave for its structure.

Percentage yield:

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Task 2 13% of the total

Analysis of a Copper(II) Complex

2a	2b	2c	2d	2e	2f	2g	2h	Total
15	1	2	15	1	2	4	4	44

Titration to determine the proportion of copper ions:

	Mass of complex / g	Volume of EDTA solution needed / cm^3	Mark box if using this data in the calculation for part **(a)**
Sample 1			
Sample 2			
Sample 3			

a) Calculate the volume of EDTA solution needed to react completely with 0.100 g of complex.

b) Give an equation for the titration reaction:

c) Calculate the percentage by mass of copper in the sample:

Percentage by mass of copper:

Titration to determine the proportion of chloride ions:

	Mass of complex / g	Volume of silver nitrate solution needed / cm^3	Mark box if using this data in the calculation for part **(d)**
Sample 4			
Sample 5			
Sample 6			

d) Calculate the volume of silver nitrate solution needed to react completely with 0.200 g of complex.

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e) Give an equation for the titration reaction:

f) Calculate the percentage by mass of chloride ions in the sample:

Percentage by mass of chloride ions:

g) Mark which element in the complex has the greatest percentage error in the determination of its proportion:

Cu Cl O C H N

h) Determine the formula of the copper complex:

Formula:

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Task 3 14% of the total

The critical micelle concentration of a surfactant

3a	3b	3c	Total
2	34	2	38

a) Give the concentration of the stock SDS solution you have made up:

b) Record your results in the table below and plot, on the graph paper provided, a suitable graph to determine the critical micelle concentration (CMC).

Volume of stock SDS solution / cm^3	Volume of H_2O / cm^3	c / mmol dm^{-3}	σ / μS cm^{-1}

Volume of stock SDS solution / cm^3	Volume of H_2O / cm^3	c / mmol dm^{-3}	σ / μS cm^{-1}

c) State the concentration at which micelles begin to form (the critical micelle concentration):

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