

Candidate Name

Centre Number

Candidate Number

NDLEVO

LWAZI

LOWER SIX



ZIMBABWE SCHOOL EXAMINATIONS COUNCIL
 General Certificate of Education Advanced Level

CHEMISTRY

9189/6

PAPER 6 Practical Test

NOVEMBER 2013 SESSION

1 hour 10 minutes

Candidates answer on the question paper.

Additional materials:

As listed in Instructions to Supervisors

TIME 1 hour 10 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [] at the end of each question or part question.

You are advised to show all working in calculations.

Use of a Data Booklet is unnecessary.

Qualitative analysis notes are printed on pages 6 and 7.

FOR EXAMINER'S USE	
1	
2	
TOTAL	

This question paper consists of 7 printed pages and 1 blank page.

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1 **FA4** is an aqueous solution containing one cation and two anions.

You are required to carry out tests to identify the ions in **FA4**.

In all tests, the reagent should be added gradually until no further change is observed, with shaking after each addition. Record your observations and the deductions you make from them in the spaces provided.

Observations should include

- (i) descriptions of colour changes, precipitates formed and the stages at which they occur,
- (ii) the names of gases evolved and details of the test used to identify each one.

Write any deductions you make alongside the observations on which they are based.

No additional or confirmatory tests for ions present should be attempted. Candidates should be reminded that definite deductions might be made from tests with negative results.

TEST	OBSERVATIONS [12]	DEDUCTIONS [6]
(a) To a portion of FA4 add aqueous sodium hydroxide.	grey precipitate	
(b) To a portion of FA4 add aqueous ammonia. Filter the mixture. To the filtrate add silver nitrate followed by nitric acid.		

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(c) To a portion of FA4 add solid sodium carbonate.		
(d) To a portion of FA4 add aqueous hydrogen peroxide followed by aqueous sodium hydroxide and boil for two minutes.		
(e) To a portion of FA4 add aqueous barium chloride followed by aqueous nitric acid.		
(f) To a portion of FA4 add aqueous potassium iodide.		

Summary

Cation: _____

[1]

Anions: _____ and _____

[2]

[Total: 21]

ASSESSMENT OF PLANNING SKILLS

DO NOT CARRY OUT YOUR PLAN

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- 2 Fig. 1 shows the structural formula of acetylsalicylic acid, an acidic organic compound, in aspirin tablets.

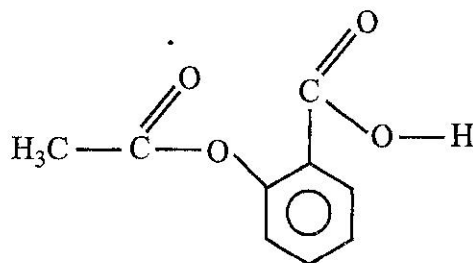


Fig. 1

You are to devise an experiment to determine the percentage of acetylsalicylic acid in aspirin tablets.

Assuming that you are provided with the following:

- 4 aspirin tablets
- 1 mol dm⁻³ NaOH_(aq)
- 0.1 mol dm⁻³ HCl_(aq)
- Phenolphthalein indicator
- chemical balance
- distilled water
- titration apparatus

Present a plan, in a sequence of numbered steps and show how you would use your results to determine the percentage of the acidic compound in aspirin tablets.

The Plan

Treatment of results

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[14]

[Turn over

QUALITATIVE ANALYSIS NOTES

[Key ppt = precipitate]

1 Reactions of aqueous cations

	reaction with	
	NaOH (aq)	NH ₃ (aq)
aluminium, Al ³⁺ (aq)	white ppt. soluble in excess	white ppt. insoluble in excess
ammonium, NH ₄ ⁺ (aq)	ammonia produced on heating	
barium, Ba ²⁺ (aq)	no ppt. (if reagents are pure)	no ppt.
calcium, Ca ²⁺ (aq)	white ppt. with high [Ca ²⁺ (aq)]	no ppt.
chromium(III), Cr ³⁺ (aq)	grey-green ppt. soluble in excess giving dark green solution	grey-green ppt. insoluble in excess
copper(II), Cu ²⁺ (aq)	pale blue ppt. insoluble in excess	blue ppt. soluble in excess giving dark blue solution
iron(II), Fe ²⁺ (aq)	green ppt. insoluble in excess	green ppt. insoluble in excess
iron(III), Fe ³⁺ (aq)	red-brown ppt. insoluble in excess	red-brown ppt. insoluble in excess
lead(II), Pb ²⁺ (aq)	white ppt. soluble in excess	white ppt. insoluble in excess
magnesium, Mg ²⁺ (aq)	white ppt. insoluble in excess	white ppt. insoluble in excess
manganese(II), Mn ²⁺ (aq)	off-white ppt. insoluble in excess	off-white ppt. insoluble in excess
zinc, Zn ²⁺ (aq)	white ppt. soluble in excess	white ppt. soluble in excess

[Lead(II) ions can be distinguished from aluminium ions by the insolubility of lead(II) chloride.]

2 Reactions of anions

<i>ion</i>	<i>reaction</i>
carbonate CO_3^{2-}	CO_2 liberated by dilute acids
chromate (VI) $\text{CrO}_4^{2-}(\text{aq})$	yellow solution turns orange with $\text{H}^+(\text{aq})$; gives yellow ppt. with $\text{Ba}^{2+}(\text{aq})$; gives bright yellow ppt. with $\text{Pb}^{2+}(\text{aq})$
chloride. $\text{Cl}^-(\text{aq})$	gives white ppt. with $\text{Ag}^+(\text{aq})$ (soluble in $\text{NH}_3(\text{aq})$); gives white ppt. with $\text{Pb}^{2+}(\text{aq})$
bromide, $\text{Br}^-(\text{aq})$	gives cream ppt. with $\text{Ag}^+(\text{aq})$ (partially soluble in $\text{NH}_3(\text{aq})$); gives white ppt. with $\text{Pb}^{2+}(\text{aq})$
iodide. $\text{I}^-(\text{aq})$	gives yellow ppt. with $\text{Ag}^+(\text{aq})$ (insoluble in $\text{NH}_3(\text{aq})$); gives yellow ppt. with $\text{Pb}^{2+}(\text{aq})$
nitrate, $\text{NO}_3^-(\text{aq})$	NH_3 liberated on heating with $\text{OH}^-(\text{aq})$ and Al foil
nitrite, $\text{NO}_2^-(\text{aq})$	NH_3 liberated on heating with $\text{OH}^-(\text{aq})$ and Al foil, NO liberated by dilute acids (colourless NO – (pale) brown NO_2 in air)
sulphate, $\text{SO}_4^{2-}(\text{aq})$	gives white ppt. with $\text{Ba}^{2+}(\text{aq})$ or with $\text{Pb}^{2+}(\text{aq})$ (insoluble in excess dilute strong acid)
sulphite, $\text{SO}_3^{2-}(\text{aq})$	SO_2 liberated with dilute acids; gives white ppt. with $\text{Ba}^{2+}(\text{aq})$ (soluble in excess dilute strong acid)

3 Test for gases

<i>gas</i>	<i>test and test result</i>
ammonia, NH_3	turns damp red litmus paper blue
carbon dioxide, CO_2	gives a white ppt. with limewater (ppt. dissolves with excess CO_2)
chlorine, Cl_2	bleaches damp litmus paper
hydrogen, H_2	pops' with a lighted splint
oxygen, O_2	relights a glowing splint
sulphur dioxide, SO_2	turns potassium dichromate(VI) (aq) from orange to green