

No Brain Too Small



Level 1 Science Practice Exam 1

90944 Demonstrate understanding of aspects of acids and bases

Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of aspects of acids and bases.	Demonstrate in-depth understanding of aspects of acids and bases.	Demonstrate comprehensive understanding of aspects of acids and bases

You should attempt all the questions in this booklet.

A table of ions (page 2) and periodic table (page 14) are included.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

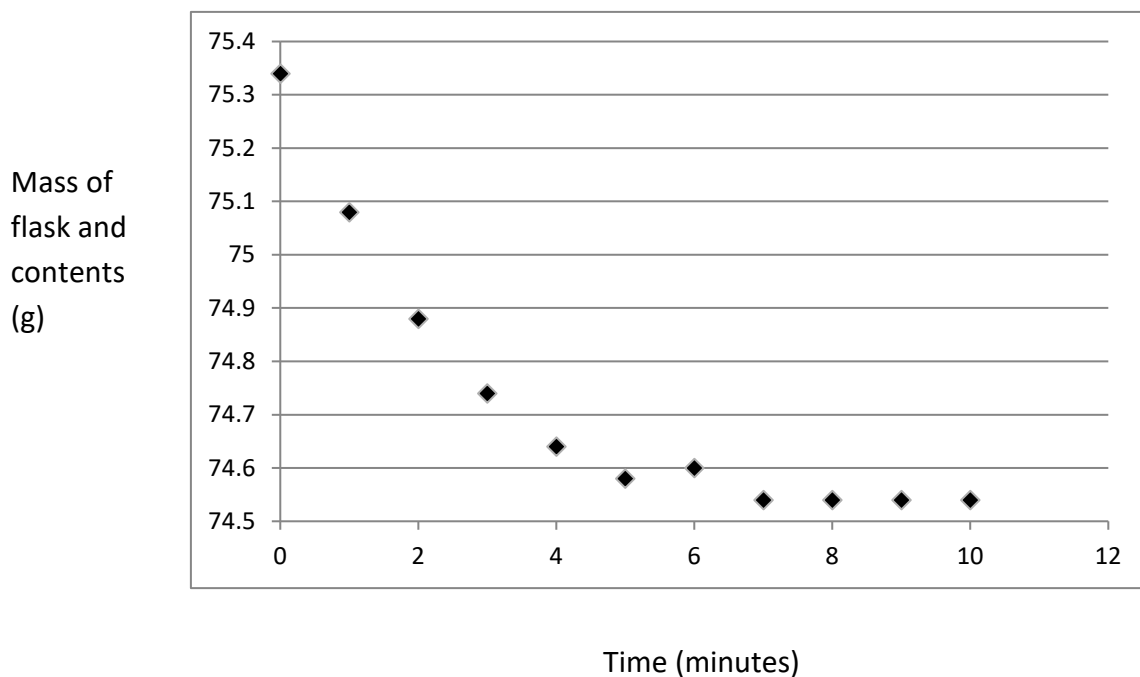
Table of ions

+1	+2	+3	-3	-2	-1
NH ₄ ⁺	Ca ²⁺	Al ³⁺		O ²⁻	OH ⁻
Na ⁺	Mg ²⁺	Fe ³⁺		S ²⁻	Cl ⁻
K ⁺	Cu ²⁺			CO ₃ ²⁻	NO ₃ ⁻
Ag ⁺	Pb ²⁺			SO ₄ ²⁻	HCO ₃ ⁻
H ⁺	Fe ²⁺				
Li ⁺	Ba ²⁺				
	Zn ²⁺				

Question Two: Reaction Rates

Calcium carbonate reacts with dilute hydrochloric acid to produce the gas carbon dioxide.

The graph below shows the results from a reaction when 40 mL of dilute hydrochloric acid was added to one marble chip (calcium carbonate) at room temperature of 20°C. The calcium carbonate was in excess.



- Draw a smooth curve through the reliable points and label it A.
- Sketch on the grid the graph that would be obtained if the same reaction was carried out at 40°C. Label it B.
- Explain your answer to (b) in terms of particle collisions.

(d) Write a word equation AND a balanced symbol equation for the reaction between calcium carbonate and hydrochloric acid.

Word equation:

Balanced symbol equation:

Question Three: Salts

Epsom salts was a favourite medicine of our grandparents.

Its chemical name is magnesium sulfate.



(a) Write down the chemical formula of magnesium sulfate.

Salts can be made in a number of ways.

- I. adding excess metal to an acid
- II. adding excess carbonate to an acid
- III. adding excess hydroxide to an acid

(b) For each of the methods above, give the correct **chemical formulae** of two substances which could be mixed to make magnesium sulfate.

method I.

method II.

method III.

- (c) In each case the magnesium sulfate is formed as a solution in water. A little unreacted metal, carbonate or hydroxide also remains in the mixture.

What would you need to do to produce a pure sample of solid magnesium sulfate?

A student is asked to neutralise 10 mL of nitric acid solution. They add 3 drops of universal indicator solution. They are given some dilute sodium hydroxide solution which they add, drop by drop.

- (d) Write a word equation AND a balanced symbol equation for the reaction between nitric acid and sodium hydroxide.

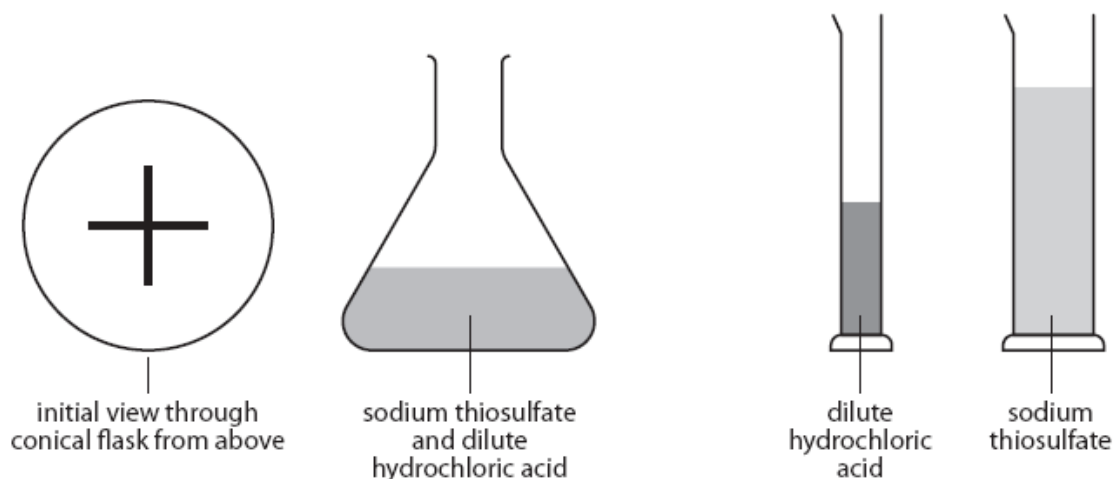
Word equation:

Balanced symbol equation:

Question Four: Rates

When sodium thiosulfate solution, $\text{Na}_2\text{S}_2\text{O}_3(\text{aq})$, is added to hydrochloric acid, yellow sulfur is formed.

When viewed from above the $+$ disappears from view, as more and more sulfur is formed.



The following results table was obtained by mixing various amounts of sodium thiosulfate solution, water and 1 mol L^{-1} hydrochloric acid.

Volume (mL)	$\text{Na}_2\text{S}_2\text{O}_3$	50	40	30	20	10
	H_2O	0	10	20	30	40
	HCl	6	6	6	6	6
Reaction time (s)		7	15	29	58	182

Discuss this experiment.

In your answer you should:

- identify which variable is being altered
- explain why the volume of acid needs to be kept the same
- describe what was measured during the reaction to get the data above
- write a conclusion for this experiment which refers to particle collisions.

PERIODIC TABLE OF THE ELEMENTS

		Atomic Number		1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
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