Do not write outside the box

0 7 A scientist does two tests on four white solids. The solids are labelled **A**, **B**, **C** and **D**.

Test 1 Adds the sample of the solid to distilled water and stirs.

Test 2 Measures the pH of the solution after **Test 1**

Table 2 shows the results.

Table 2

Solid	Appearance after stirring	pH
A	colourless solution, no solid	14
B	colourless solution, no solid	3
C	colourless solution, solid remains	9
D	colourless liquid, solid remains	7

These four solids are:

- magnesium oxide
- phosphorus oxide
- silicon dioxide
- sodium oxide.

Table 3 shows the solubility of these four solids in water.

Table 3

Solid	Solubility in grams per 100 cm^3 of water
Magnesium oxide	0.01
Phosphorus oxide	52
Silicon dioxide	0
Sodium oxide	109

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0 7 . 1 Identify the solids **A**, **B**, **C** and **D**.

Explain your answers.

[6 marks]

Question 7 continues on the next page

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0 7 . 2 10 cm^3 of solution **B** is added to a beaker.

Distilled water is added to the beaker until the final volume in the beaker is 1000 cm^3

The pH of the solution is measured before and after distilled water is added.

Table 4 shows the results.

Table 4

Volume of solution in beaker	pH of solution B
10 cm^3	3
1000 cm^3	**X**

Calculate the value of **X**.

[2 marks]

X = _____

8

Question	Answers	Mark	AO / Spec. Ref.
07.1	**Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO3
	Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	AO3
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	AO1 AO2
	No relevant content	0	
	Indicative content: A is sodium oxide B is phosphorus oxide C is magnesium oxide D is silicon dioxide **linked statements:** A is sodium oxide because it has highest pH **or** pH = 14 **or** is a strong alkali B is phosphorus oxide because it has lowest pH **or** pH = 3 **or** is an acid C is magnesium oxide because it has 2nd highest pH **or** pH = 9 **or** is a (weak) alkali D is silicon dioxide because it is neutral **or** pH = 7 **or** A and B are sodium oxide **or** phosphorus oxide because both soluble **or** no solid remains C is magnesium oxide because it will be the colourless <u>solution</u> with solid remaining D is silicon dioxide because it will be the colourless <u>liquid</u> with solid remaining for **level 3** the solids must be correctly identified		5.1.2.3 5.4.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.2		an answer of (pH=) 5 gains **2** marks		
	dilution by a factor of 100	allow pH changes by 1 when solution is diluted by factor of 10 **or** allow pH changes by 2	1	AO1 5.4.2.5
	(pH=) 5		1	AO3 5.4.2.5
Total			**8**	