

Question 20 (4 marks)

- (a) Identify ONE common household base. 1

Ammonia - NH_3

- (b) A student used indicators to determine whether three colourless solutions were acidic or basic. The indicators used are shown in the table. 3

Indicator	Colour change	pH range
Methyl orange	red to yellow	3.2-4.4
Methyl red	red to yellow	4.8-6.0
Thymol blue	yellow to blue	8.0-9.6
Alizarin	red to purple	11.0-12.4

Samples of each solution were tested with the indicators. The colours of the resulting solutions are shown in the table.

Indicator added	Colour of solution A	Colour of solution B	Colour of solution C
Methyl orange	yellow >4.4	yellow >4.4	yellow >4.4
Methyl red	yellow >6.0	yellow >6.0	yellow >6.0
Thymol blue	blue >8.0	blue >8.0	yellow <8.0
Alizarin	purple >11.0	red <11.0	red <11.0

- could be acidic/neutral
- would be acidic/neutral
u

The student concluded that each of the three solutions tested was basic. Assess the validity of this conclusion.

The tests show that Solution A and B are basic, however the basicity of solution C is inconclusive

* Solution A: pH of this substance is >11 as indicated by the purple colour of Alizarin. This substance is definitely basic

* Solution B: The blue colour of Thymol blue indicates its pH >8 and the red colour of Alizarin indicates a pH of <11 . This soln is still basic.

* Solution C: yellow colour of Methyl red indicates a pH >6 however the yellow colour of Thymol blue indicates pH <8 . \therefore the pH of this solution could be slightly acidic i.e. between pH 6-7 or neutral (pH of approx 7) \therefore This result indicates that without further testing, the conclusion that all 3 solutions are basic is inaccurate, as soln C's pH is undetermined.

>11 $8-11$ $>8 <11$ $<8 <11$ >6 **6-8**