

Question 20 (4 marks)

- (a) Identify ONE common household base. 1

Ammonia

- (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               | yellow               | yellow               |
| Methyl red      | yellow               | yellow               | yellow               |
| Thymol blue     | blue                 | blue                 | yellow               |
| Alizarin        | purple               | red                  | red                  |

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

The solutions of A and B are both basic, as the test proved that they had pH's over 8 (as shown by the indicator Thymol blue). However, the conclusion that solution C is acidic is possibly incorrect. Due to the fact that the methyl red to Thymol blue tests gave a pH range of 6–8, the solution may be slightly acid or neutral instead of the basic conclusion that the students reached.