Marks

Question 20 (4 marks)

(a) Identify ONE common household base. **1**

NaOH

(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.

4.8 → 8

3.2 → 8

Indicator added	*Colour of solution* A	*Colour of solution* B	*Colour of solution* C
Methyl orange	yellow 3.2	yellow 3.2	yellow 3.2
Methyl red	yellow 4.8	yellow 4.8	yellow 4.8
Thymol blue	blue 8.0	blue 8	yellow 8
Alizarin	purple ~~12.4~~ 11	red 11	red

3.2 → 8

basic

8 → 11

3.2 → 11

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

This conclusion is not valid. It is true that the first two solutions A and B are basic, they can be seen because A has a pH range 7 11 and solution B's range is between 8 → 11. For solution C however, the pH range appears to be from 3.2 → 8. In this range solution C could be either acidic or Basic. The other two indicators Methyl red and Alizarin was incapable of determining the pH. Thus, this conclusion is at present invalid, ~~but~~ because of the lack of data to determine the pH range. However, if more evidence is found then maybe the validity of the conclusion can be determined.