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Natural Sciences Grade 9
Marks: 35 converted to 20

Practical Task / Investigation
Memorandum

Acids, bases and the use of an indicator

PART 1

Table of results (For universal indicator)

Test tube	Colour	pH	Acid, base or neutral
1 (Vinegar)	Red	Any value below 7	Acid
2 (Water)	Green	7	Neutral
3 (Bicarbonate of soda)	Blue/Purple	Any value above 7	Base

Conclusion:

1. (Distilled) water✓ (1)
2. 7✓ (1)
3. Vinegar✓ (1)
4. The pH of an acid is (below✓ / above) seven. (1)
5. Bicarbonate of soda✓ (1)
6. The pH of a base is (below / above✓) seven. (1)
7. An indicator is a substance, which indicates whether a solution is an acid, a base or neutral✓ through a colour change. ✓ (2)

PART 2

VERY IMPORTANT:

Teachers **MUST** do a test run or two themselves before the learners do this experiment. Results may vary a lot due to the different concentrations of the solutions.

Hypothesis:

When vinegar is treated with bicarbonate of soda✓ the pH will increase.✓

OR

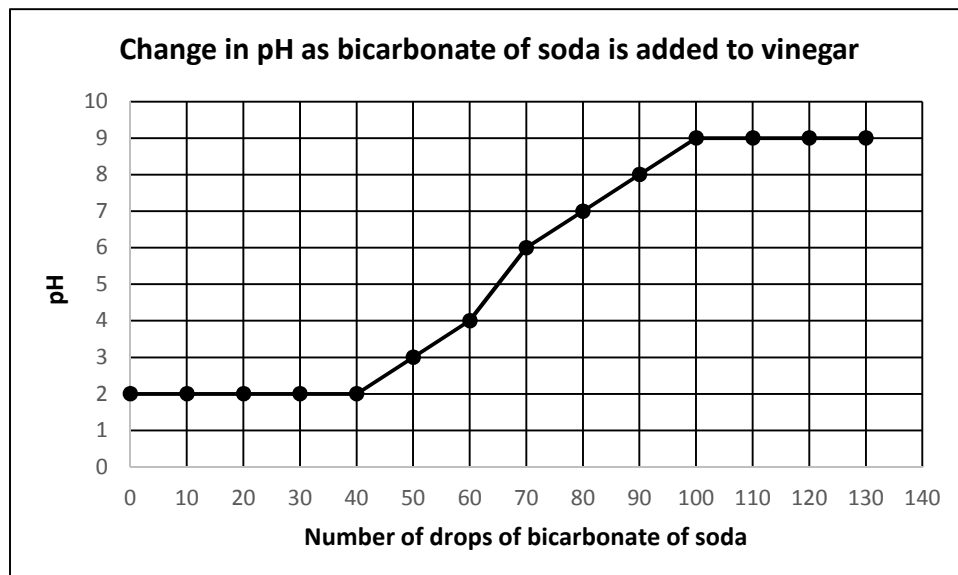
When vinegar is treated with bicarbonate of soda✓ the pH will decrease.✓ (2)

Table of results: (For universal indicator)

Total number of drops of bicarbonate of soda	Colour	pH
0	Red	2
10	Red	2
20	Red	2
30	Red	2
40	Red	2
50	Orange red	3
60	Orange	4
70	Greenish yellow	6
80	Green	7
90	Greenish blue	8
100	Blue	9
110	Blue	9
120	Blue	9
130	Blue	9

Marking criteria for table of results	Marks
Colour and pH values below 7	✓✓
Colour and pH value at 7	✓✓
Colour and pH values above 7	✓✓

(6)

Graph of the results:

Marking criteria for graph	Marks
Heading	✓
Label on x-axis	✓
Label on y-axis	✓
Half of points plotted correctly	✓
Rest of points plotted correctly	✓
Line of best fit drawn through the points	✓

(6)

Conclusion:

NOTE: Whether the hypothesis has been confirmed or rejected, depends on the learner's hypothesis above.

Treating vinegar with bicarbonate of soda causes the pH to increase. ✓
The hypothesis has been confirmed/rejected. ✓

OR

When the number of drops of bicarbonate of soda increases, the pH of the mixture increases. ✓
The hypothesis has been confirmed/rejected. ✓

OR

When the volume of bicarbonate of soda (base) increases, the vinegar/mixture becomes less acidic and the pH increases. ✓
The hypothesis has been confirmed/rejected. ✓ (2)

Questions:

- Carbon dioxide OR CO_2 ✓ (1)
- Acid + metal carbonate $\rightarrow$ Salt ✓ + H_2O ✓ + CO_2 ✓ (3)
- 80 drops ✓ (This answer depends on the graph of the learner.) (1)
- From the table of results:** After 80 drops of bicarbonate of soda have been added to the vinegar, the pH of the solution was 7, ✓ the solution was green, the colour of a neutral solution. ✓ (The number of drops depends on the results.)

OR

From the graph: A pH of 7 was reached after 80 drops ✓ of bicarbonate of soda have been added to the solution, indicating a neutral solution. ✓ (The number of drops depends on the results.) (2)

- 5.1 Number of drops of NaHCO_3

OR

Volume/Amount of bicarbonate of soda ✓ (1)

- 5.2 pH ✓ (1)

6. Bicarbonate of soda, which is a base, neutralises✓ the acidic chemical✓ that is injected into the skin during a bee sting. (2)

TOTAL: 35