

### Task 3 Volumetric Analysis Practical Test

Name: Solutions.

**Task description:** You are required to determine the concentration of ammonia ( $\text{NH}_3$ ) in the undiluted household cleaner. You can use any pieces of chemistry equipment in the laboratory.

#### Equipment in tray:

- Bromothymol blue – dropper bottle
- Methyl orange – dropper bottle
- Phenolphthalein – dropper bottle
- Plastic pipette – x2
- Plastic distilled water bottle

#### Equipment in stock bottles at the front of the room:

- 0.1M HCl solution – standardised solution
- Household cleaner solution – undiluted approximately 2M

#### Initial planning section:

1. Within the area below, with the assistance of labelled diagrams, explain how you are going to perform the activity. (5 marks)

Diagram - (1)

Labelled - (1)

Explanation - dilution of bleach - (1)  
method

- record volume in  
burette (titre) - (1)

- what is the aliquot  
and what is the titre  
(specific chemical) - (1)

2. Which indicator are you going to use? methyl orange. (1 mark)

3. Explain why you chose that particular indicator? You may want to use a labelled pH titration graph to help. (2 marks)

(1)  
Methyl orange has an end point which is close to the equivalence point between a strong acid and weak base.



Assuming base in aliquot.  
or acid equivalent. - oic

Perform the experiment – check with your teacher first that your activity is safe

4. Results:

(3 marks)

Table. - title - (1)

- ruled - (1)

- column titles and units - (1)

## During the experiment

5. What did you use to rinse the burette with? The solution. - (1)

Why? Using  $H_2O$  would dilute the solution and other reagent would react with the solution.

(1 mark)

6. What did you use to rinse the pipette with? The solution. - (1)

Why? as above

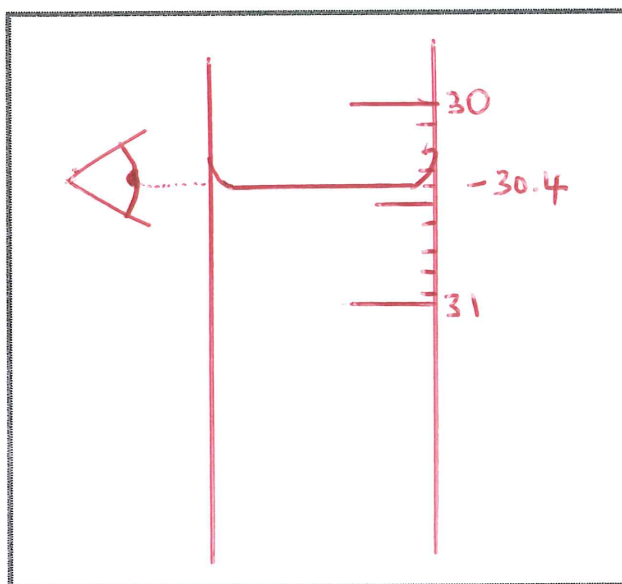
(1 mark)

7. What did you use to rinse the conical flask (aliquot) with? distilled  $H_2O$ .

Why? The pipette will deliver a specific number of moles. Adding/rinse with  $H_2O$  will not affect the mole value hence reaction. - (1)

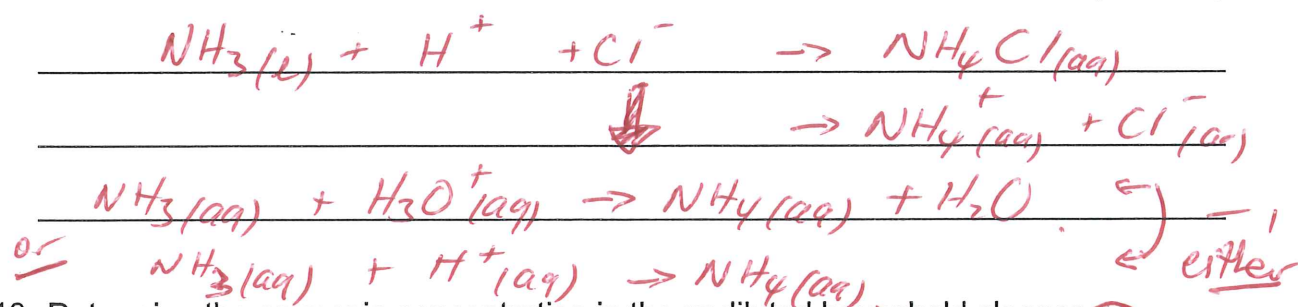
(1 mark)

8. Use a diagram to show how you accurately read the fluid level in the burette. (1 mark)



### Analysis of results:

9. Write a balanced equation for the reaction between hydrochloric acid and ammonia (2 marks)



10. Determine the ammonia concentration in the undiluted household cleaner (4 marks)

$$n(\text{H}^+) = n(\text{NH}_3) \quad - (1)$$

$$\begin{aligned} n(\text{H}^+) &= c \cdot V \\ &= \frac{x}{\quad} \quad - (1) \end{aligned}$$

$$n(\text{NH}_3) = x \quad - (1)$$

$$\therefore [\text{NH}_3] = \frac{x}{V(\text{NH}_3)} \quad - (1)$$

+ dilution

Depends on experimental arrangement.



## Post activity analysis:

11. Give two (2) system errors associated with you activity (1 mark)

11.1 instrumental - lack of calibration

11.2 methodological - wrong indicator

12. How does the accuracy of the burette affect the results? (1 mark)

Affecting V in concentration calculation.

Not the true volume. <sup>①</sup> calibration required.  
yet true Δ volume.

13. If you happened to use the incorrect indicator, how could that have affected your overall result? (2 marks)

An incorrect indicator will have an incorrect endpoint  
to suit the equivalence. The difference in volume  
will affect the conc =  $\frac{n}{V}$  value. Either ↑ or ↓

14. Give 3 ways in which you could improve your activity. Explain how they would improve the activity. (3 marks)

14.1 Reducing errors - random

- Systemic

① × 3.

14.2

- Gross

14.3

Any 3 valid  
improvements +  
explanation

15. Ammonia is a very effective cleaning agent and disinfectant. Why is the concentration of ammonia in household cleaner so low? (1 mark)

Ammonia in high concentrations causes injury  
to the respiratory system and can decompose at high temps →  $H_2$  explosion.  
or similar.

16. If concentrated ammonia was spilt on the floor in the laboratory, what would be the safest way to have it cleaned up? Why? (2 marks)

Dilute with either water then mop up  
or a <sup>very</sup> weak acid ( $CH_3COOH$ ) and mop up.  
or similar

END OF TASK

131 marks.