

**Requirements for candidates**

In addition to the apparatus and fittings found in a Chemistry laboratory, each candidate will require the following.

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| 1. about 100cm ³ of solution F | 14. clock or stop watch |
| 2. about 50cm ³ of solution G | 15. 2 boiling tubes |
| 3. 30cm ³ of solution M | 16. one CLEAN METALLIC spatula |
| 4. 30cm ³ of solution N | 17. 6 clean dry test-tubes |
| 5. one burette 0 – 50ml | 18. one test-tube holder |
| 6. one pipette 25ml | 19. at least 6cm length of universal indicator paper |
| 7. two conical flasks | 20. 0.5g of sodium hydrogen carbonate |
| 8. 100ml measuring cylinder | 21. pH chart pH 1 – 14 |
| 9. 200ml or 250ml beaker | 22. Bromine water supplied with a dropper |
| 10. About 500ml distilled water | 23. 0.5g of solid K – oxalic acid. |
| 11. Phenolphthalein indicator | 24. 0.5g of solid P – Sodium sulphite |
| 12. thermometer (0 – 110 ⁰ C) | |
| 13. Source of strong heat (preferably Bunsen burner) | |

The students should have access to the following

- 2.0M NaOH solution with a dropper
 - 1.0M barium nitrate solution with a dropper
 - Bromine water with a dropper
 - Acidified potassium manganate (vii) with a dropper
 - 2.0M HCl with a dropper
- Bromine water is prepared by adding 1ml of liquid bromine to 100cm³ of distilled water and shaking thoroughly in a fume cupboard.
 - Acidified potassium permanganate is prepared by adding 3.16g of solid potassium permanganate to 400cm³ of 2M sulphuric acid and diluting to one litre of solution using distilled water.
 - Solution M is made by dissolving 12.6g of oxalic acid in 400cm³ distilled water and making it to 1 litre.
 - Solution N is prepared by dissolving 3.16g of potassium manganate (VII) in 200cm³ of 2M sulphuric acid and adding more water to make 1 litre
 - Solution F is prepared by dissolving 4g of sodium hydroxide pellets in about 800cm³ of distilled water and diluting it to one litre solution.
 - Solution G is prepared by dissolving 9.0g of oxalic acid (ethan-1,2-dioic acid) in 200cm³ of distilled water and diluting it to 250cm³ solution.