

CHEMISTRY.

INTERMEDIATE FORM.

1. What is meant by a "simple" and a "compound" substance?

2. How would you prepare pure Nitrogen?

3. How many cubic millimetres of Oxygen at 15°C and 752 mm pressure do I need to burn 79 cubic centimetres of Hydrogen at 47°C and 749 mm.?

4. How many oxides of Nitrogen are there? Give name, symbol, molecular weight, and density of each.

5. Describe and explain the preparation of (a) Chlorine, (b) Potassium Chlorate, (c) Bleaching Powder.

6. How would you proceed to detect the presence of a soluble (a) Chloride, (b) Iodide and (c) Fluoride?

7. How would you show that water is not an element (a) analytically, (b) synthetically?

8. How would you detect the presence of Arsenic in solution?

ANSWERS.

1. (a). "Simple" substances are those out of which nothing different from the original body can be obtained: and it is generally believed that they consist of only one substance, e.g. from pure silver nothing but silver can be obtained, so with gold, sulphur and other bodies; these bodies are therefore called "Simple."

(b). "Compound" bodies are those from which, two or more different substances may be obtained, each of which differs from the others, and also from the original body. Oxide of Mercury may be resolved into Oxygen and Mercury—it is therefore called a "Compound" body.

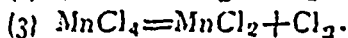
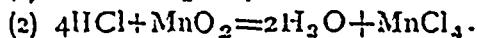
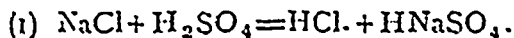
2. Pure Nitrogen is obtained by passing air (which has been purified by passing through Potassium K, moistened with Sulphuric Acid H_2SO_4 to absorb the watery vapor and Ammonia, and Caustic Potash KHO to absorb the Carbonic Acid CO_2) over red hot finely divided copper in a porcelain tube; the copper takes the Oxygen from the air forming copper Oxide CuO , and the Nitrogen may be collected.

3. 79 cc will become $\frac{79}{1} \times \frac{273}{273} \times \frac{760}{760} = 66.42$ cc at 0°C and 760 mm, and as 2 parts H. unite with 1 of O, 66.42 cc of H will require $\frac{66.42}{2} = 33.21$ cc of O at 0° and 760 mm; but this O is measured at 47°C and 749 mm: therefore $\frac{33.21}{1} \times \frac{273}{273} \times \frac{760}{752} = 35.48$ cc, or 35.48 mm ans.

4. There are five Oxides of N as follows:

	Name.	Symbol.	Molecular wt.	Density.
1	Nitrogen Monoxide,	N_2O	44	22
2	" Dioxide,	N_2O_2 or NO	30	15
3	" Trioxide,	N_2O_3	76	38
4	" Tetroxide.	N_2O_4 or NO_2	46	23
5	" Pentoxide,	N_2O_5	108	54

5. (a). Chlorine is usually prepared from one of its compounds as Sodium Chloride, by heating it with Sulphuric Acid and Manganese Dioxide. These substances are brought together in a flask and on the application of heat Cl_2 is evolved. The reaction expressed generally is $2(\text{Na. Cl.}) + 2\text{H}_2\text{SO}_4 + \text{MnO}_2 = \text{Na}_2\text{SO}_4 + \text{MnSO}_4 + 2\text{H}_2\text{O} + 2\text{Cl}_2$ or expressed particularly to show different steps of the reaction:



(4) The excess of H_2SO_4 combines with the MnCl_2 forming $\text{MnSO}_4 + 2\text{HCl}$, and the HCl again attacks a fresh molecule of MnO_2 ,