

Iron ore see "Roscoe," p. 200, l'n XXII
 Tinstone see "Roscoe," p. 205, l'n XXIII.
 Zinc ore see "Roscoe," p. 192, l'n XXI.
 Copper ore see "Roscoe," p. 221, l'n XXV.
 Lead ore see "Roscoe," p. 216, l'n XXIV.

We will describe the smelting to obtain Zinc:

The powdered ore is wasted, or exposed to air at a high temperature, to convert the Sulphide or Carbonate into the Oxide; The wasted ore is then mixed with charcoal, and strongly heated in crucibles or retorts. Zinc Oxide is reduced by the Carbon—Carbon Monoxide escaping as a gas. The Zinc distils over and may be condensed.

VI.

I.—Give the formulas for the two Carbonates of Sodium.

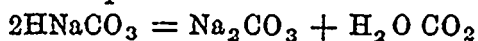
II.—Explain how the one may be obtained from the other.

III.—How much neutral Carbonate will one pound of the Bicarbonate produce?

I.—The neutral Carbonate is Na_2CO_3 $10\text{H}_2\text{O}$ that is crystallizes with 10 molecules H_2O of crystallization. The Bicarbonate is HNaCO_3 .

II.—Pass CO_2 through a solution of neutral Carbonate, and the Bicarbonate is produced; or, pass CO_2 over trays containing the efflorescent neutral Carbonate and the Bicarbonate is produced.

III.—Heat the HNaCO_2 , and Na_2CO_3 is formed. Equation is as follows:



Or, 168 parts by weight HNaCO_2 gives 106 parts by weight of Na_2CO_3 ; 1 lb. accordingly give

$$\frac{106}{168} \text{ or } \frac{53}{84} \text{ lb. } \text{Na}_2\text{CO}_3.$$

VII.

I.—Describe the general qualities of an Alkali.

II.—Explain the action of Soda with Hydrochloric Acid, Sulphuric Acid, Zinc Sulphate and Stearine.

I.—The Alkalies united with water give a peculiar taste resembling that of soap or

washing soda, but it is neither salt, bitter nor sour. Their action on certain vegetable coloring matter is the opposite to that of acids, that is, they turn red litmus blue; red cabbage green, etc.; Neutralize acids, that is form Neutral Salts with them. They absorb and combine with CO_2 .

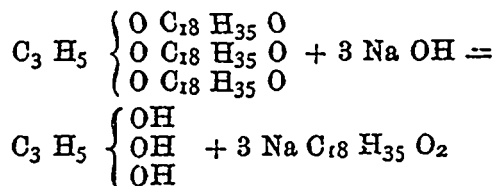
II.— $\text{NaOH} + \text{HCl} = \text{NaCl} + \text{H}_2\text{O}$, the Na of the NaOH , replaces the H in the HCl and common salt is formed

(a) $\text{NaOH} + \text{H}_2\text{S}'\text{O}_4 = \text{HNaS}'\text{O}_4 + \text{H}_2\text{O}$ or the Sodium replaces one atom of H in the Sulphuric Acid and Hydrosodic Sulphate is formed.

(b) $2\text{NaOH} + \text{H}_2\text{S}'\text{O}_4 = \text{Na}_2\text{S}'\text{O}_4 + 2\text{H}_2\text{O}$. In this reaction both atoms of H in the Sulphuric Acid are replaced by Sodium—the reaction requiring more heat.

(c) $2\text{NaOH} + \text{ZnSO}_4 = \text{Zn(OH)}_2 + \text{Na}_2\text{SO}_4$ In this reaction Zinchydroxide is precipitated—Sodium Sulphate remaining in solution.

The action of Soda on Stearin consists in the formation of an Alkaline Stearate and the liberation of Glycerin. For illustration we shall make use of the Tristearin:



Popularly speaking the reaction consists in the formation of Glycerin $\text{C}_3 \text{H}_5 (\text{OH})_3$ and Soap or Sodium Stearate $\text{Na C}_{18} \text{H}_{35} \text{O}_2$

VIII.

I.—What is meant by graphic, simple and constitutional formulæ? Give illustrations.

II.—Give the graphic formulæ for Phosphoric Chloride and Sulphuric Acid.

III.—Give the formulæ, simple and constitutional, of Common Salt, Lead Peroxide, Iron Peroxide and Silver Phosphate.

I.—The Simple or Empirical formulæ are those in which the constituent elements are written down together. It shews the number of atoms of each substance in the compound, as H_2SO shews that there are 2H, one S