

## ACETIC ACID.

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This important compound or its derivatives, organic and inorganic, are extensively used in various industries. By itself it is widely used as solvent, in nitration operations, in the preparation of vinegar and pickles. Enormous quantities are used in coal-tar colour industries. For indigo alone the annual consumption is about 3,000 tons. It is the chief ingredient, besides its important derivative acetic anhydride, in the preparation of cellulose acetate—the basic material for the preparation of acetate silk, toys, cinematographic and photographic films, cellophane paper and lacquer varnish. It is extensively used in the preparation of various esters used in synthetic fruit essences and important synthetic perfumes. Ethyl acetate and amyl acetate, besides being used in flavouring agents, are well known as solvents. Benzyl acetate, terpinyl acetate, geranyl acetate are indispensable in synthetic perfumes. Both acetyl chloride and acetic anhydride, which are derived from acetic acid, are extensively used in organic operations. The well-known drugs aspirin and antifebrin are derived from acetyl chloride and acetic acid.

Many metallic acetates are used as mordants for cloth dyeing, *e.g.*, aluminium acetate, iron acetate, chromium acetate, copper acetate. Basic lead acetate is used in medicine. Cupric acetates besides their uses as mordants give various grades of colour known as verdigris. The well-known pigment white lead is derived from lead acetate.

The foregoing uses would indicate that acetic acid is a basic product for numerous chemical industries. In fact, like its partner sulphuric acid in the inorganic field, acetic acid may be considered to give a definite pointer in consumption to the degree of development of organic chemical industries in a country. India mainly imports finished goods, chemicals and drugs derived from acetic acid; her imports of acetic acid and vinegar in 1937-38 were worth Rs.1,74,000 (7,271 cwt.) and Rs.20,331 (18,429 gallons) respectively. Her production in the only wood distillation works of Bhadravati as calcium acetate is about 15-16 tons per year most of which is taken by ordnance factories where acetone is prepared from it.

There are the following sources for the preparation of acetic acid:—

- (a) Wood distillation.
- (b) Acetic fermentation of molasses.
- (c) Oxidation of ethyl alcohol.
- (d) Acetylene (from calcium carbide).

Pyroligneous acid, derived from wood distillation, has the following composition:—

- 7- 10% acetic acid.
- 1- 2% methyl alcohol.
- 0.1-0.5% acetone.
- Rest . . water and other impurities.

This is neutralised with lime—methyl alcohol and acetone distilled and the acetate solution is concentrated and then dried whence grey acetate of lime is obtained. There are various methods of obtaining acetic acid, *e.g.*,

- (1) Grey acetate of lime  $\xrightarrow{\text{Conc. H}_2\text{SO}_4}$  70-75% acetic acid.
- (2) Grey acetate of lime + sodium pyrosulphate  $\rightarrow$  90% acetic acid.
- (3) Grey acetate of lime (80%) + acetic acid (60%) + 92%  $\text{H}_2\text{SO}_4 \rightarrow$  glacial acetic acid.
- (4) Grey acetate of lime  $\rightarrow$  dil. acetic acid (70-75%)  $\rightarrow$  sodium acetate  $\xrightarrow{\text{Conc. H}_2\text{SO}_4}$  glacial acetic acid.
- (5) Dil. acetic acid (70-75%)  $\xrightarrow{\text{azeotropic distillation}}$  glacial acetic acid.

Attempts are being made in Bhadravati and Bangalore to prepare glacial acetic acid by various methods but the cost price seems to be too high (5-6 as. a lb. whereas Japan landed glacial acetic acid in Calcutta at 3 as. a lb.). The production of acetic acid by acetic fermentation of molasses is being attempted at Cawnpore. From a very dilute acetic acid 4-5% (granting that other impurities are absent) Dr. H. D. Sen claims to have obtained glacial acetic acid by entrainment with ethyl acetate—a commodity not manufactured in India. The experiments are, however, very interesting.

For the last two years in our laboratory we have been busy with the preparation of acetic acid by the oxidation of alcohol and by hydration of acetylene. We have reached 80% yield by the former and 30% by the latter method. For both these operations various new catalysts are being tried with success. Incidentally we have been able to hit upon some catalysts which act simultaneously as oxidation and esterifying agents. Starting from ethyl alcohol and air, a good yield of ethyl acetate is obtained. We hope to develop this process in the near future. These researches are being subsidised by the Bengal Chemical and Pharmaceutical Works, Ltd., Calcutta.