Auto analysis

The word automation is inspired by word automatic. Automatic means exercising control without interference. So automation means getting work done by machines which can run on their own without our continuous monitoring Automation refers to machines with intelligence and adaptability which reduces our workload and need for nonstop supervision.

Auto Analyzers were used mainly for routine repetitive medical laboratory analyses, they determine levels of albumin, alkaline phosphatase blood urea nitrogen, bilirubin, calcium, cholesterol, creatinine, glucose, inorganic phosphorus, proteins, and uric acid in blood serum or other bodily samples.

Types of auto analyzer: It can be divided into two type

a. Continuous flow processing: The principle of a continuous flow analyzer (CFA) is made of different modules, such as:

Sampler, pump, mixing coil, Heater/incubator, Sample treatment chamber (dialysis, distillation etc), Signal detector, Read out device (data generator).

This provides man analysis per analyte for one sample at a time. The main principle of Continuous flow processing is the flowing carrier solution passes through small tubes continuously.

The procedure technique of CFA:

1. Sample collection from the patient.

2. sample is injected into a flowing carrier solution then mixes with diluents and reagent and it is sent through the tubing and mixing coils.

3. The machine prevents carry over effect between different samples by injecting bubbles of air, which create separate space for different reactions to take place inside the tubing and mixing coils.

4. The tubing passes the samples from one apparatus to the other. There are different apparatus for different functions, such as ion exchange, heating, incubation, and finally recording of the signal.

5. The flow conditions are regulated. When reaction is taking place, the optical density of the color formed is read and results are obtained. So we do not have to wait till the reaction ends, For example, for better understanding. In a nephrotic syndrome patient, you want to analyze total protein, albumin and creatinine.

In case of continuous flow processing analyzer, the patient sample will be sucked by the instrument and injected into the tubing with reagents for protein, and diluents if needed). Next air bubbles will be injected and patient sample will be sucked again. This time instrument will inject reagent for albumin. Mixing will be done inside the tubing and mixing coils. Again the process will be repeated for creatinine estimation. The 3 reactions will occur inside the same long tubing but they will remain separate due to air bubbles in between.

As the sample and standard are treated in the same manner, mixed in same condition, travel the same length of tubing, it removes the difference between the two. So the difference in reading for test-tube from that of standard gives the answer. Even though originally, CFA was designed to process only colorimetric reactions, later on CFA were designed to read reactions based on ion selective electrode, flame photometry, flurometry etc. depending on the need of laboratories.
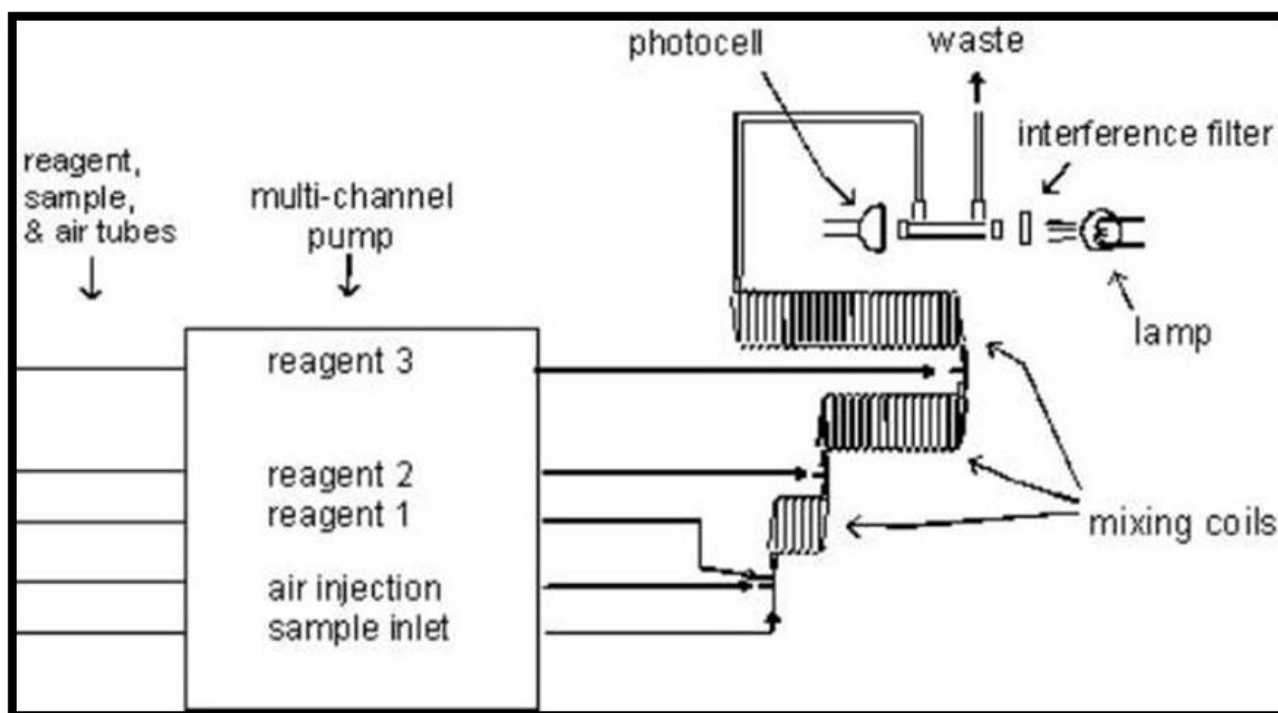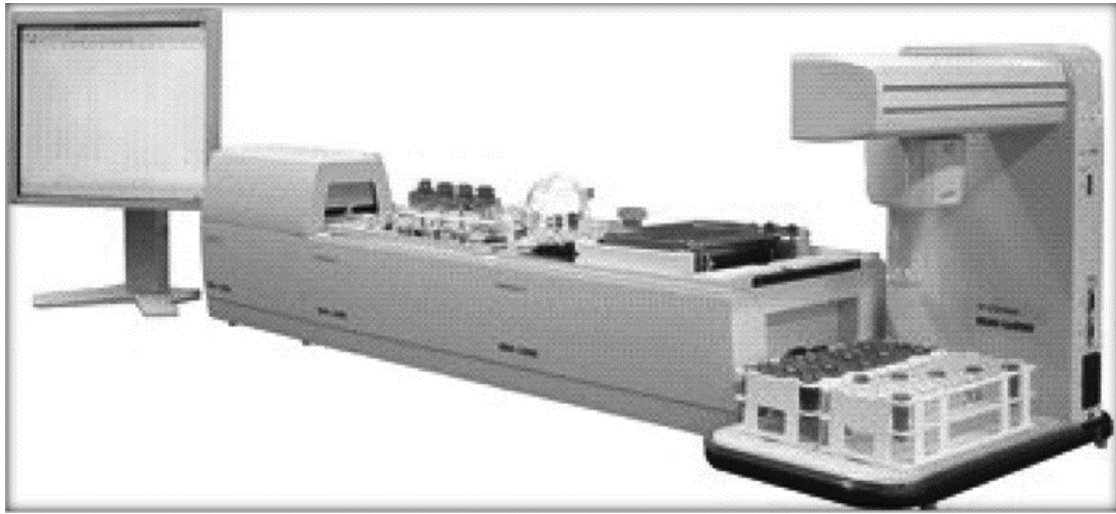

Fig (1) shows the CFA analyzer

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The disadvantage of CFA:

1. Even when there is no test to be done, reagents are drawn to maintain the flow. This adds to the cost per test

2. Maintenance of instrument is required more frequently

3. The probe and internal tubing must be free of clogs. When there is no sample the probe must be dipped in distilled water to avoid blockage or precipitation

4. The machine itself occupies large space.