

كلية المستقبل الجامعة

قسم هندسة تقنيات
الأجهزة الطبية



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اسم المادة	كيمياء سريرية
عنوان المحاضرة	Continuous –Gow analysis : the Auto Analyzer



AUTOANALYZER

Purpose of Autoanalyzers

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An autoanalyzer sequentially measures blood chemistry through a series of steps of

- mixing,
- reagent reaction and
- colorimetric measurements.

A continuous/segmented flow analyzer

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- consists of different modules including
 - ▣ a sampler, pump, mixing coils, optional sample treatments dialysis, distillation, heating, etc,
 - ▣ a detector, and data generator.

Most continuous flow analyzers depend on color reactions using a flow through colorimeter

It consists of

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- **Sampler:**
 - ▣ Aspirates samples, standards, wash solutions into the system
- **Proportioning pump:**
 - ▣ Mixes samples with the reagents so that proper chemical color reactions can take place, which are then read by the colorimeter
- **Dialyzer:**
 - ▣ The purpose of a dialyzer is to separate the analyte from interfering substances such as protein, whose large molecules do not go through the dialysis membrane but go to a separate waste stream
 - ▣ The analyte infuses through the diaphragm into a separate flow path going on to further analysis

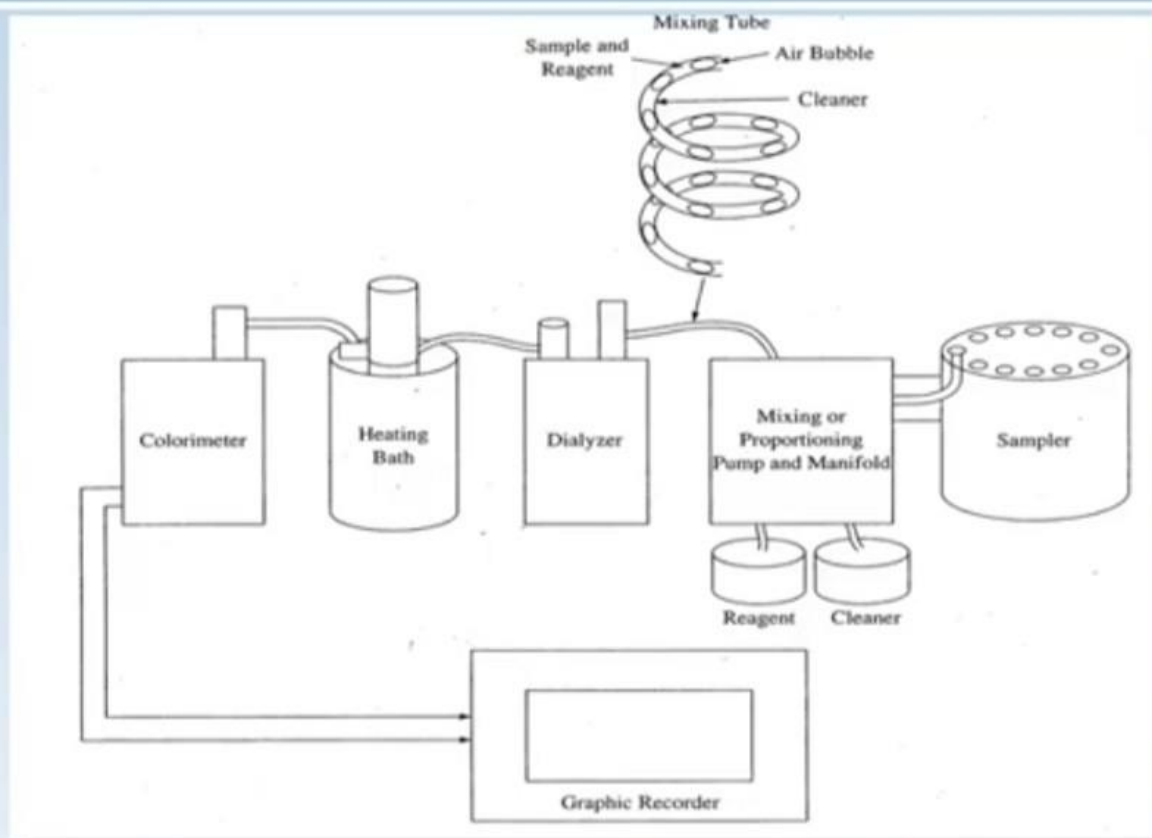
It consists of

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- **Heating bath:**
 - ▣ Controls temperature (typically at 37 °C), as temp is critical in color development
- **Colorimeter:**
 - ▣ Monitors the changes in optical density of the fluid stream flowing through a tubular flow cell. Color intensities proportional to the substance concentrations are converted to equivalent electrical voltages (Pulses, square wave signal)
- **Recorder:**
 - ▣ Displays the output information in a graphical form.

Block diagram

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Autoanalyzer

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Printer

colorimeter

Proportioning pump

Sampler



Calibration and adjustment

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Mechanical

- Tubing
- Moving pump parts

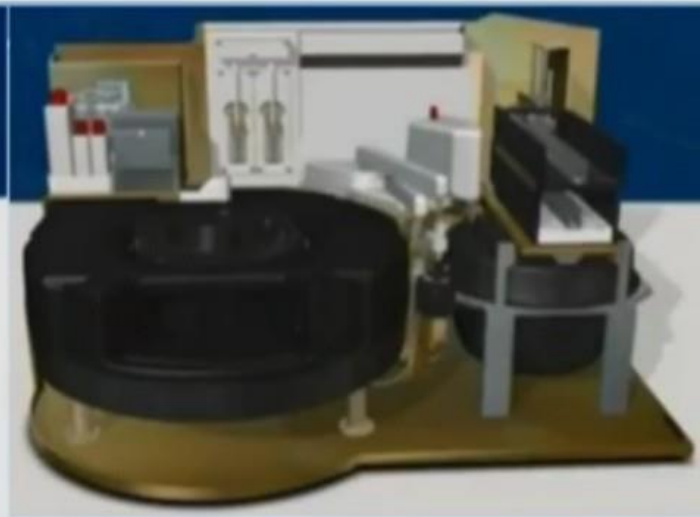
Electrical

- Switches
- Motors

Electronic failures are rare

Another autoanalyzer "HORIBA"

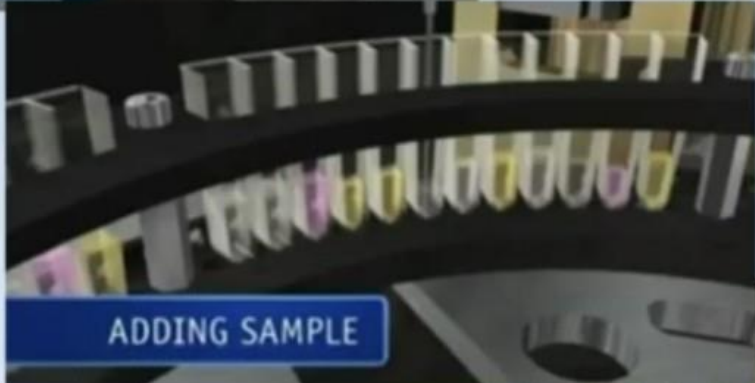
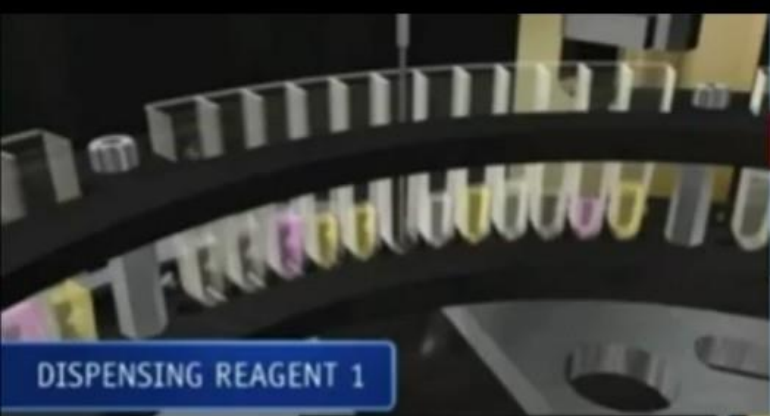
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PATIENT

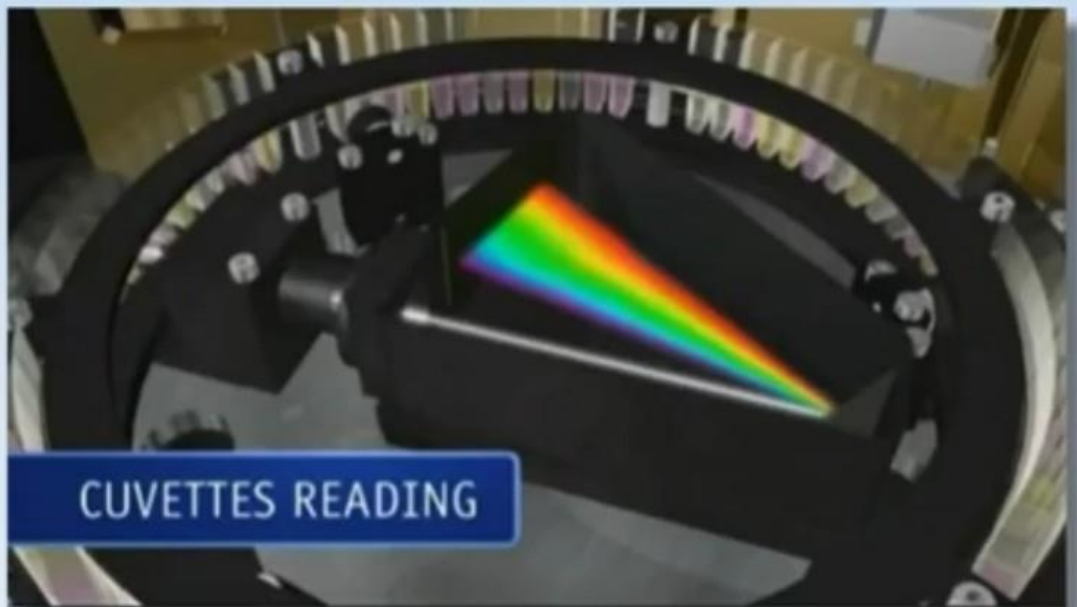
SERUM	PLASMA	URINE	Whole Blood
ALT AST CHOL HDL Chol CREA CRP GGT GLU TRIG URIC	Na K Cl	μ ALB	HbA1c

Mixing



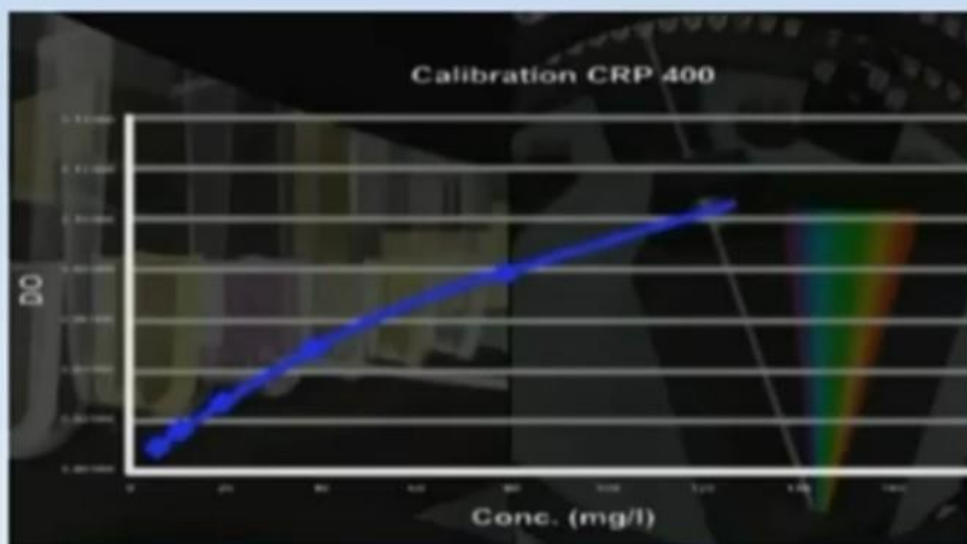
Reading the sample

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Calibration curve

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The screenshot shows a medical device interface with a status bar at the top indicating 'Running'. Below the status bar, there are several tabs: 'Sample validation', 'Test validation', 'Grouping results by patient', and 'WBC validation'. The main display area is divided into sections for patient demographics, sample characteristics, and sample results. The sample results are organized into three categories: SERUM, PLASMA, and WHOLE BLOOD. A hand is visible at the bottom right, interacting with the interface.

PATIENT VALIDATION

SERUM	
ALT	30 U/L
AST	25 U/L
CHOL	2.2 g/L
HDL Chol	0.5 g/L
CREA	11 mg/L
CRP	10 mg/L
GGT	35 U/L
GLU	1.8 g/L

PLASMA	
Na	140 mEq/L
K	4.2 mEq/L
Cl	101 mEq/L

URIN	
μ ALB	21 mg/L

WHOLE BLOOD	
c	8.5 %