Semi-automated Biochemistry Analyzer Issues and Troubleshooting

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History

- Colorimeters

- Semi autoanalysers

- Fully automated analysers

Colorimeter

- Basic equipment for photometric measurement.
- Based on the measurement of a coloured compounds in solution.
- Suitable for majority of chemistries.

Disadvantages:

- High sample & reagent requirement
- Calibration facility not available
- Kinetic assays are not feasible
- No data storage facility
- Frequent change of filters
- Result calculation facility not available

Semiautoanalyser

- Initial part of the procedure i.e. pipetting of reagent and specimen, mixing and incubation is carried out externally by the technician.

- Rest of the procedure i.e. setting of incubation temperature (for kinetic determinations), zero setting, photometric readings, result display, automatic printing and data management and processing is carried out by the analyser.

Advantage of semiautoanalysers

- Requires less quantity of reagent & sample. Hence economical.
- Calibration facility, calibration data storage
- Enzyme determinations by kinetic methods are performed accurately.
- Data storage, data transfer to external computer, printer etc are available
- Tests are programmed in advance & hence are automatically selected.
- Automated calculation of results.
- Use of non corrosive & monostep reagents
- Cheap and compact

Disadvantages of semiautoanalysers

- Sample & reagent requirement is more than fully automated analysers.
- Multistep calibration not feasible
- Limited data storage facility
- Time consuming
- Lot of human intervention & hence more errors
- Works as an batch analyser & not an random axis.
- Difficult to process stat samples
- Limited capacity to handle workload
- Auto dilution facility not available
- QC data analysis i.e. LJ charts, Westgard multirule applications – Not available on the equipment.
- ………….

Solution ???

- Fully automated random axis chemistry analyser.

- Workload

- Cost

Issues and Troubleshooting of Semi automated analysers

Reagent Errors

Poor quality of Reagents/ Controls /Calibrators

Human Errors

- Incorrect programming
- Pipetting errors
- Wrong calibrations or controls

Equipment failures

- Aspiration error
- Weak lamp
- Weak peristaltic tubings
- Dirty cuvette
- Carryover

Reagent errors

Reagent means all – Reagent, Controls, Calibrators or Standards

- Reagent deterioration
- Expired reagents
- Improper reconstitution & stability
- Poor reagent quality

Human errors

- Mismatched patient identity

- Pipetting errors
    Routine assay or dilution

- Wrong Programming
    Sample volume
    Reagent volume
    Factor
    Incubation period
    Assay type
     etc, etc, etc……..

Equipment errors

Aspiration Probe

Improper cleaning

Inadequate probe wash

Blocked probe

Temperature control problems

Too high ambient temperature

Poor ventilation

Exhaust fan not working

Lamp problems

Aged lamp

Fog in lamp

Damaged lamp

Bad Cuvette:

Accumulation of dirt

Bubble in the flow cell

Unstable Results

☐ Check whether the

  ☐ analyzer is powered by the demanded voltage

  ☐ analyzer is properly grounded

☐ Problems with flow cell:

Problem	Cause	Solution
Dirty flow cell	Cleaning not enough or thorough	Soak flow cell with cleaning solution
Leaking flow cell	Bad flow cell quality or poor maintainance	Replace
Clogged flow cell	Bad cleaning or Bad Serum	Soaking or pressurized washing
Flow cell cant exclude bubbles	Aged pump hose	Replace pump hose

Troubleshootings…..

Problem	Recommended action
No screen display	Check power, Fuse
No sample sucking	Check peristaltic tubings, flowcell
Abnormal result	Inadequate warming up time, Air bubbles in flow cell, High or low environmental temperature, voltage fluctuation
Abnormal QC result	Poor reagent quality Check Test Program Check QC material Check water quality

Important parts to be taken care of

- Peristaltic tubing
- Aspiration tubing
- Peristaltic pump
- Internal tubings
- Flow cell
- Lamp

Take home message

- Semiautoanalysers are good equipments for small set up.

- They have precision & accuracy as good as an autoanalyser

- Understanding the principles of estimation, programming, basic troubleshooting is a must for trouble free & accurate analysis.

- Routine equipment maintenance is duty of technologist & should be done very efficiently.

- It is advisable to enlist all the problems faced & discuss them in routine departmental/ Laboratory meetings.

- If facility available, then inter instrument comparison with similar or high end analyzer should be routinely carried out.