E2-68 Low-cost colorimetric device for secondary level chemical education

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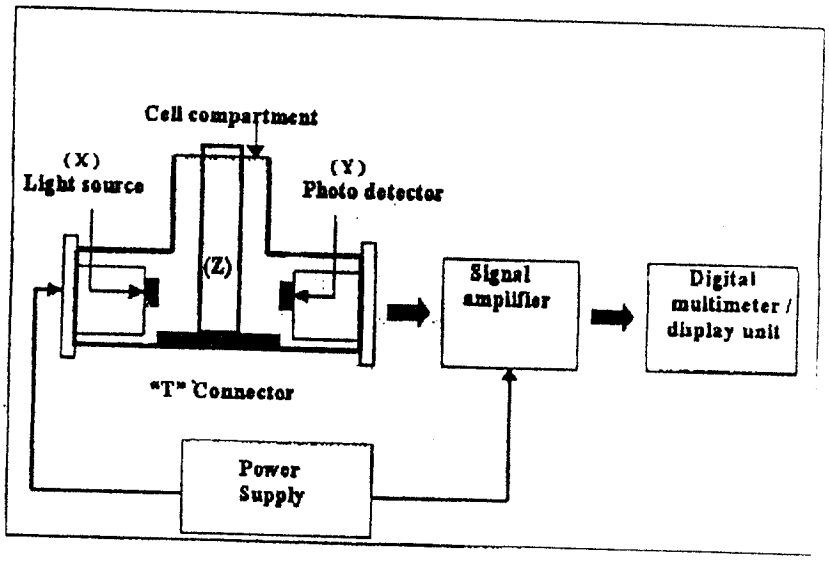
The development of low-cost analytical instrumentation is a major step forward to upgrade and improve chemical education in Sri Lanka. Colorimeter has been selected to provide the foundation to build a close link between chemistry, physics and instrumentation. The main feature of our design is that all the components are in compact form without the need to maintain at a high cost.

A schematic diagram of the developed colorimeter is shown in figure I. The cell compartment, radiation source and the radiation detector of the device are fixed at the three openings of a "T" shaped PVC (polyvinyl chloride) connector. Light emitting diodes (LEDs) are employed as radiation sources. A photo diode detects the transmitted radiation and the signal is amplified by the signal amplifier. The constructed regulated dual power supply (+5V,0V,-5V) provides DC power to the device. A digital voltmeter (multimeter) is used to display the amplified output of the detector and a 10 turn potentiometer is connected to adjust the transmittance to a desirable value.

Radiation emitted from the LED (I_o) interacts with coloured analytes and as a result, I_o can be compared with transmitted radiation (I_t). Two parameters absorbance (A) and transmittance (T) can be calculated using I_o and I_t.

The cost of this colorimeter is approximately Rs. 3,000/-, which is much less than the price of a conventional colorimeter (above Rs. 40,000/-). Since LEDs

Figure I: The schematic diagram of the developed colorimeter



are employed as radiation source, filters (not available locally) are not needed to be used unlike in the conventional colorimeter.

Financial assistance by NARESA (Research grant RG/97/C/07) is acknowledged.