

Cost Effective Techniques for Chemical Analysis

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Abstract :

Practical is an essential part of science stream. It enhances not only the skill but also develops the scientific temperament among the students. But increasing strength and financial stringency created a vacuum in most of the educational institutions. There is a remarkable deterioration in the performance of students due to poor laboratory facilities. Low cost instrumentation and cost effective techniques may be the good choice in place of traditional practices that can provide working opportunity to each and every students.

Keywords : Well trays, Ophthalmic, Bottles, Calibration.

Scientific study is entirely based on experimental work, facing several problems like cost, safety, space and portability. Cost of chemicals and disposal of hazardous chemicals are the major issues in chemistry experiments. Increasing strength of aspirants in higher education led the experimental quality not satisfactory. Institutions are not providing lab. work up to the mark resulting into insufficient growth in research field. Though UGC is committed to improve quality of higher education by providing enormous funds to universities and colleges.

If we go through the lab. work in chemistry, we see that many more students are being deprived of experimentation work by lack of adequate chemicals and costly apparatus of course space too. This may lead the frustration as well as low interest in chemistry. Now it is a big question how to fulfill the necessary requirements for students and how to improve the quality of education. In such scenario there is a little hope if we adopt gradually the use of some kinds of cost effective and small scale practical techniques. We can prepare small kits for practical work by using cheap and easily available poly and plastic made well trays droppers and ophthalmic drop bottles to carry on various practical exercises.

Volumetric Analysis :

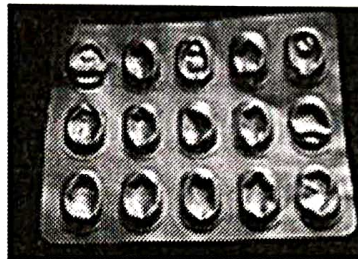
Burettes, pipettes and conical flasks are normally used in traditional method to evaluate results in volumetric analysis. But it requires costly glassware and chemicals.

One of the drawback of such traditional method is wastage of chemical reagents. To avoid this condition we can collect cheaper and micro scale apparatus to conduct the same.

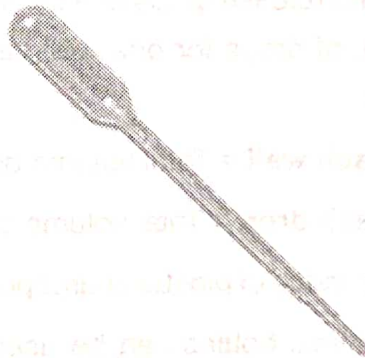
Well Trays:

Polystyrene trays consisting 24 wells (6x4) may be less of different sizes. Empty tablet packs can also be used for this purpose. In such small packs titration or any reaction can be carried out using little amount of chemicals with accuracy. Volume of each well must be calibrated. Volume capacity some grooved tab. packing are as below.

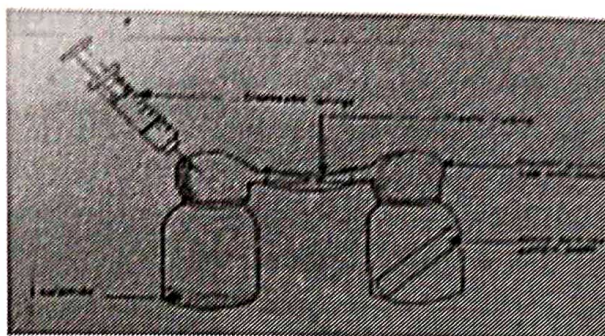
	Tab.name	Volume (CC)
1.	Evion tab. 400	0.5
2.	Digene tab	1.0



Droppers : Plastic or polythene made droppers are useful in the form of delivery tool. These act as micro pipette normally droplets delivered by such droppers are 60 drops.



Ophthalmic Bottles : These are easily available and can be used in chemical delivery especially in qualitative analysis. For detection of anions various reactions can be carried out by passing gas evolved from one bottle to another when attached via rubber tubing or cap.



EXPERIMENTAL :

1. This section consists the calibration of well trays (reaction vessels) and long needle droppers. Calibration may be carried out using distilled water. First fill the wells in a tray with a graduated pipette. Find the total volume accommodated in wells then calculate the volume for each well. In the same manner dropper pipette can be calibrated. Fill also the dropper and release drops one by one and fill the well by delivering free falling drops. Count the no. of drops for one well, finally calculate the volume of each drop in the following way.

Volume of each well = Total volume occupied by all wells / no. of wells

Volume of each drop = Total volume occupied by all drops / No. of drops

(Average drop value of pipette or dropper = 0.04)

2. Ophthalmic bottles can be used in place of test tubes and conical flasks for detecting anions in a salt analysis. A and B bottles are plugged via small rubber cap. One contains salt mixture in which reacting reagent (H₂SO₄/ HCl) is introduced through waste injection syringe. It causes evolution of certain gas which passes via cap to other bottle already containing reagent or filter paper. Evolved gas turns the color of the filter paper or reagent present thus confirms the presence of desired anions.

CONCLUSION :

Cost effective micro analysis techniques can be used in experimental chemistry. Such methods have certain advantages over traditional process. Apparatus designed are cheap, unbreakable and easy to clean. These are not affected by acids, show clear visibility of the color develops. Another important factors concerned are affordable cost and portability. Results obtained are with great accuracy due to smaller volume taken. This practice may be beneficial in case of inadequate budget. This will provide equal opportunity to each and every student with the least expenses and chemical waste also minimizing the environmental threat.

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