

# THE SIMPLE CLASSROOM METHOD TO DEMONSTRATE THE LAW OF CONSERVATION OF MASS

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Laboratory methods that are given to verify the law of conservation of mass require an accurate balance and weighed amount of material for performing the activity. Generally, a precipitation reaction is preferred in these activities to show that a chemical reaction has occurred, and verification requires careful mass measurement before and after the reaction. This paper deals with a straightforward and fast method with very low/no-cost involvement and uses environment-friendly materials.

**Keywords:** Chemical change, Physical change, The law of conservation of mass

## Introduction

Most of the teachers use the reaction between barium chloride and sodium sulphate in a closed system as prescribed in the standard laboratory manuals (NCERT, 2008; edu.rsc.org, 2021; Green, 2020; VDOE, (n.d)). An alternative method to verify the law was given in 1943 by Louis Weiss (Weiss, 1943), in which a photoflash bulb was used. Unfortunately, the method could not become popular due to the unavailability of this bulb everywhere. This method also requires an accurate balance. The precipitation reaction is preferred because of its simplicity and safety. The present proposed method is simple and safer than earlier reported methods. The formation of gas in a closed system is used to indicate a chemical reaction.

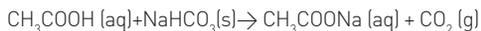
## Materials required

- Empty Plastic bottle of 500 mL capacity
- Vinegar
- Baking Soda
- Rubber balloon
- Thread
- Sketch pen
- Spring balance.

## Method and Observations

- Take an empty mineral water/cold drink bottle of 500 ml capacity. Pour about 100 mL of vinegar solution into it. Tag thread at the mouth of the bottle so that it can be hung on a spring balance. Take a rubber balloon, widen its mouth and fill 1-2 teaspoons full of baking soda in it.

- Stretch the mouth of the balloon and fix it at the mouth of 500 mL bottle containing vinegar solution. Do not pull the balloon upward to avoid mixing baking soda powder with the vinegar solution in the bottle.
- Now hang the above arrangement on the hook of the spring balance with thread and mark the position of the pointer of the spring balance with the help of a sketch pen (Fig. 1).
- Now pull the balloon upward and allow the baking soda powder to pour down into the bottle containing vinegar. Carbon dioxide gas will form according to the following reaction.



- The gas will be released with brisk effervescence and move upward with

pressure. This results in the inflation of the balloon (Fig 2), which is the indication of the occurrence of a chemical reaction.

- Record any change in the position of the pointer of the spring balance after completion of the chemical reaction (inflated balloon).
- The same activity may be performed by taking some crushed ice into the bottle and recording any mass change when all the ice melts (for observing any change in mass for the physical change).
- Teachers may use any citrus juice/tamarind juice /amla juice in place of vinegar and washing soda in place of baking soda as per local availability.

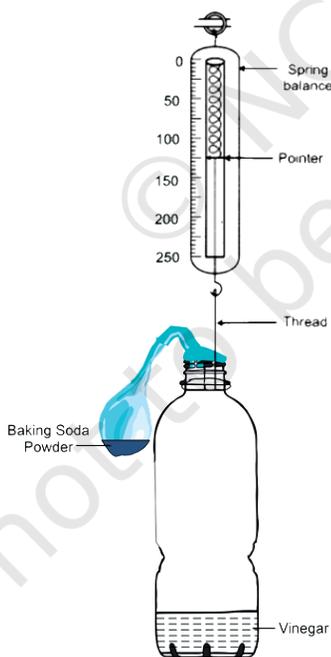


Fig. 1: Before Reaction

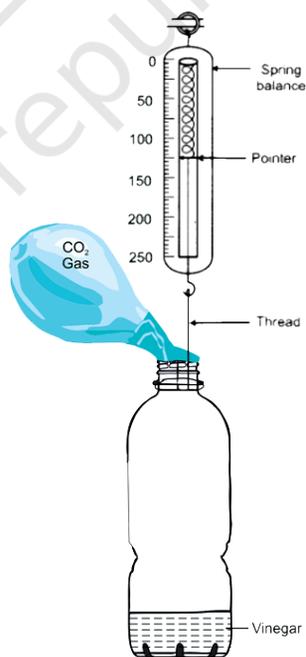


Fig. 2: After Reaction

## Result

No change in that the position of the pointer of the spring balance indicates that mass remains conserved during any physical/chemical change.

## Conclusion

This paper presents a straightforward, safer, and less time-consuming classroom demonstration method to verify the conservation of mass. The materials required are eco-friendly and locally available everywhere, so it is a greener method too.

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