

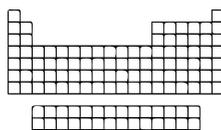
# DETERMINATION OF THE MOLAR MASS OF STUDENTS IN A CHEMISTRY CLASS

SANGEETHA BALAKRISHNAN

**A not-quite-procedure for not-really-an-experiment for chemistry educators**

**Aim:** To determine the molar mass of students in a chemistry class<sup>1</sup>.

**Things required:**



Periodic Table



Paper



Pen

**Non-things required:** A group of chemistry students.



**Principle:** Ineffably fun. And funnily ineffable.

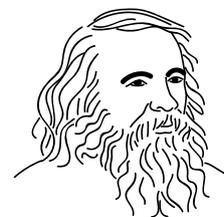
**Setting:** Best done impromptu. Especially when you begin to detect signs of boredom in the class.

## Procedure

1. Pose the following question or some variant of it (semantics is your friend) to the students: "So, shall we continue with this topic, or do you want to play a game?" Chances are exceedingly high that upon posing the question, you'll go unimpeded to the next step<sup>2</sup>.
2. Tell the students that they'll now be playing a game called 'Who is the heaviest of all?' involving the periodic table. Make sure your enthusiasm is infectious.
3. This step is titled: A very, very short introduction to the periodic table. Lavoisier, Doebereiner, Newlands, Mendeleev and the four newly discovered elements – that's more or less your timeline here. You are, in essence, covering 300 plus years of work on the periodic table in a minute. Foray into the philosophy of the periodic table. This part of the step may be omitted depending on factors best known to you. Time for testing waters: 4 seconds. Time for your entire monologue: 56 seconds (because: foray<sup>3</sup>).
4. This step shall never be omitted. Talk to the students about some of the ways in which the periodic table has been used outside of curricular instruction. Do not forget to mention the **Periodic Table Table**<sup>4</sup>.



Antoine Lavoisier



Johann Wolfgang Döbereiner



John Newlands

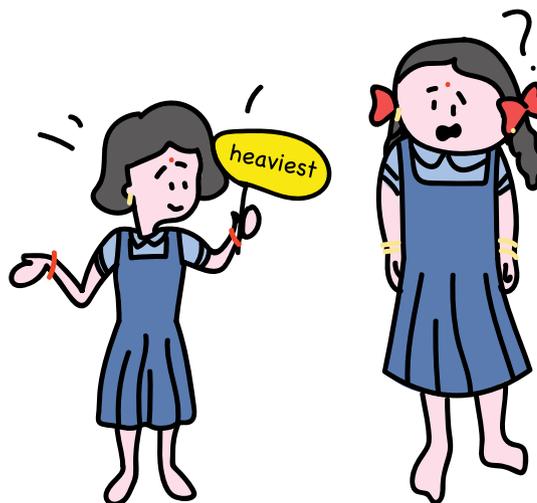


Dimitri Mendeleev



5. This is the **procedure per se** of the procedure. Write your first name on the black /green /white board in the classroom. Make the letters big and bold. Circle symbols of elements in your name. Write down the atomic masses of those elements on the board. Add them up. The resultant number is your molar mass in atomic mass units (amu). Put a big, bold polygon around it.
6. Task for the students: ask students to calculate their molar mass as per the **procedure per se** of the procedure. Instruct students to choose the heavier combination of elements in their first name. For example, if **Marvin the Paranoid Android** were your student, among the following two elemental combinations available to him in his first name, Marvin would go with the first one:
  - a. Ar (argon), V (vanadium), I (iodine) and N (nitrogen). This combination affords a molar mass of 231.8006 amu.
  - b. Ar (argon), V (vanadium) and In (indium) which affords a molar mass of 205.7075 amu.

7. Announce a small prize for the 'Heaviest student of all'.
8. Announce another small prize for students with Nh (nihonium), Mc (moscovium), Ts (tennessine) and Og (oganesson) in their first names.
9. Ask students to carry out the task, and shout out their mass if they beat yours written on the board.
10. Brace yourself for gleeful outbursts from the students<sup>5</sup>.
11. Record every new 'top chemical molar mass' on the board with the student's name.
12. Look for the 'winner' as per 7.

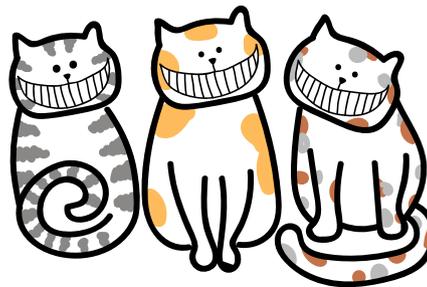


13. Separately, look for 'winners' as per 8.
14. Grin. Put an entire clowder of Cheshire cats to shame.

## Result

Happy students. They think the Periodic Table was never more fun.

A happier teacher. You think the Periodic Table was never more fun<sup>6</sup>.



## Precautions

Colleagues might pop their heads into your classroom wondering if you and your students have smuggled nitrous oxide from the lab into the class.

On detection of such quizzical looks, smile beatifically.



### Notes:

1. Exercise done in class with inspiration drawn from Journal of Chemical Education 2015, 92 (10), 1757-1758.
2. Personal experience and anecdotal evidence.
3. Foray (n): a short period of time being involved in an activity that is different from and outside the range of the usual set of activities. Source: <http://dictionary.cambridge.org/dictionary/english/foray>. Also, it is assumed that a foray lasts less than a minute.
4. <http://theodoregray.com/periodicTable/>
5. Being in the midst of this will be a heartening experience.
6. Each class is unique, and the teacher is the best judge of when and how to introduce any activity therein. The author used this activity to break the monotony of lecturing. However, it can easily be used as an add-on activity for school students when introducing the Periodic Table to them; or better yet, when teaching molar masses. It is hoped that since this activity engages students on a personal level, it will help them grasp the underlying chemical concepts better.
7. Credits for the image used in the background of the article title: Chemistry Test. Thebarrowboy, Flickr. URL: <https://www.flickr.com/photos/thebarrowboy/6283758878>. License: CC-BY.

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