



Chemistry and International Mole Day

Solhe F. Alshahateet

Department of Chemistry, Faculty of Science, Mutah University PBOX 7, 61710, Mutah, Jordan

s_alshahateet@mutah.edu.jo, www.mutah.edu.jo

Received 27 Sept 2019

Revised 01 Oct 2019

Accepted 02 Oct 2019

Keywords

- ✓ Mole
- ✓ Chemistry
- ✓ Atom

s_alshahateet@mutah.edu.jo

Phone: +962795260360

Abstract

Mole Day is an unofficial holiday celebrated among chemists, chemistry students and chemistry enthusiasts, which is originated in an article in *The Science Teacher* in the early 1980s. Inspired by this article, Maurice Oehler, now a retired high school chemistry teacher from Prairie du Chien, Wisconsin, founded the National Mole Day Foundation (NMDF) on May 15, 1991. Many high schools around the United States, South Africa, Australia, and Canada celebrate Mole Day as a way to get their students interested in chemistry, with various activities often related to chemistry or moles. The American Chemical Society sponsors National Chemistry Week, which occurs from the Sunday through Saturday during which October 23 falls. This makes Mole Day an integral part of National Chemistry Week [1-4].

The enjoyment of chemistry and the strangeness of this science make it a special template that penetrates the hearts of its learners and makes them love this science, and over time this love turns into an eternal love flowing in the blood of every learner and scientist of chemistry. Chemistry is one of the most spectacular sciences in the world. By studying chemistry, we may observe many striking reactions and transmutations, most of which we can carry out ourselves [5].

We practice chemistry every day without knowing! As soon as we get up in the morning, we start with a variety of chemical reactions. Chemistry teaches that having fuel in a car takes us to work, while one of our years in the lab helps us understand how perfume smells. It's up to the point that as soon as you open your eyes, chemical reactions begins to report for them. Because a small organic molecule in the back of the eye changes shape once light hits it. Your relationship with chemistry may have ended at the end of the textbook, and you may not like it because of theoretically difficult equations, but in fact chemistry is a fascinating science full of surprises [6].

Throughout the ages, the human being has tried to explore the nature of the world around him, motivated by the instinct to look for knowledge. Through this, there have been many important discoveries that have helped develop science and technology, including chemistry, which is a science

concerned with the nature of the material and its components as well as how different materials interact with each other. Thus, the basic function of the chemical world is to know as much information as possible about the nature of matter created by God in the universe [7].

The beginnings of chemistry dated back to the time of Mughal in the third century BC. In both China and India, chemotherapy was practiced. This knowledge and ingenuity moved westward to the empires of Persia and ancient Egypt. The Arabs contributed to the development of chemistry as they were the first to work in chemistry as a science with its rules and laws since the second century AH, and they applied their production in pharmacy in particular. The origins of Arab chemistry had a great impact on the West during the Middle Ages as the translations of their works moved to Europe in the twelfth century AD, which became famous after the Arab conquest of Andalusia in (711 AD). At Arab universities in Barcelona and Toledo, science students from all over Europe learned the art of chemistry [8].

Modern chemistry dates back to the 17th century through Boyle's research, which divided things into raw materials (elements, compounds, and mixtures), followed by Black and Lavois's research in combustion and oxidation. Bartley discovered oxygen in the air, and Cavendish discovered the formation of water, and then (Dalton) studied and expanded the law of multiple ratios, which states that if two elements can be combined to form a number of possible compounds, the ratio between the different blocks of one element that combine with a fixed mass of the other is a simple integer [9].

After that, was discovered the Rutherford model, which is a conceptual model of the structure of the atom formulated by the scientist Ernest Rutherford, scientists began to realize that an atom is not ultimately a single particle, but consists of much smaller particles. Subsequent research identified the exact atomic structure that led to the Weatherford experiment of the gold foil. Scientists eventually discovered that atoms have a positively charged nucleus, with an accurate atomic number of charges in the center, with a radius of about $1.2 \times 10^{-15} \text{ m} \times [\text{atomic mass number}]^{1/3}$. Electrons were then discovered to be much smaller [10].

Generally, Chemistry is the study of matter and energy and the interaction between them, and sometimes is called the "central science" because it connects other sciences to each other, such as biology, physics, geology, and environmental science, and Chemistry scientists have made many chemical discoveries that have changed the course of life on the planet. These discoveries have been made over many years when scientists have been trying to come up with puzzling answers about nature [11].

The mole is the unit of measurement of the amount of matter in chemistry [12]. It is a core unit of the International System of Units and is one of the few units used to measure physical quantity; the term "mol" came from the German word Mol, where Wilhelm Ostwald was the first to name it in 1893 although the "equivalent weight", was in use a century ago. It has been assumed that the name is derived from the word "Molekül" meaning "molecule" [13]. And just as 12 things are considered a dozen, the mole is simply Avogadro's number of things. In chemistry, as these things are atoms and compounds, you can theoretically have a mole of baseball or anything, but if it does, a mole of baseball will cover the globe for several hundred miles high. It would be very tiring to find a good practical use for a mole for anything larger than atoms or molecules, so the mole is only used in chemistry. So, how did "Amedeo Avogadro" intersect chemistry?



Amedeo Avogadro was born in Turin, Italy, on August 9th, 1776. His family background was aristocratic. His father, Filippo, was a magistrate and senator who had the title of Count. His mother was a noblewoman, Anna Vercellone of Biella. Amedeo Avogadro inherited the title of Count from his father. In fact, Amedeo Avogadro's full name was Count Lorenzo Romano Amedeo Carlo Avogadro di Quaregna e di Cerreto – quite a mouthful!

Amedeo Avogadro is best known for his hypothesis that equal volumes of different gases contain an equal number of molecules, provided they are at the same temperature and pressure. His hypothesis was rejected by other scientists. It only gained acceptance after his death. It is now called Avogadro's law. Avogadro was also the first scientist to realize that elements could exist in the form of molecules rather than as individual atoms [14-15].

Avogadro initially worked as a lawyer, but as he became increasingly fond of mathematics and physics, he went on to study them until he became the first university professor of physics in Italy. His fame stemmed from his hypothesis, in which he assumed that the equal sizes of different gases contained the same number of molecules at the same temperature. The number $6.02214076 \times 10^{23}$ "the Avogadro number" was chosen so that the mass of one mole of a chemical compound, in grams, is numerically equal "for all practical purposes" to the average mass of one molecule of the compound, in Dalton's. Thus, for example, one mole of water contains $6.02214076 \times 10^{23}$ molecules, whose total mass are about 18.015 grams, and the mean mass of one molecule of water is about 18.015 Dalton's. The mole is widely used in chemistry as a convenient way to express amounts of reactants and products of chemical reactions [14-15].

Mole Day originated in an article in *The Science Teacher* in the early 1980s [16]. Inspired by this article, Maurice Oehler, now a retired high school chemistry teacher from Prairie du Chien, Wisconsin, founded the National Mole Day Foundation (NMDF) on May 15, 1991 [17], and Many high schools around the United States, South Africa, Australia, and Canada celebrate Mole Day as a way to get their students interested in chemistry, with various activities often related to chemistry or moles [18], Mole Day is an unofficial holiday celebrated among chemists, chemistry students and chemistry enthusiasts on October 23rd, between 6:02 a.m. and 6:02 p.m [19]. The time and date are derived from the Avogadro number, which is approximately 6.02×10^{23} , defining the number of particles (atoms or molecules) in one mole (mol) of substance, one of the seven base SI units [20].

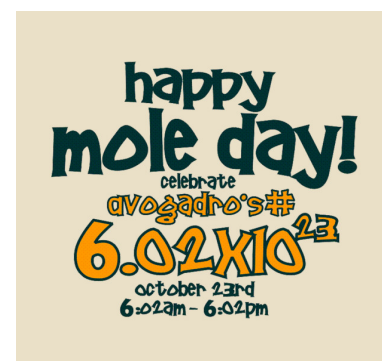


Figure1: HAPPY MOLE DAY [22]

Mole Day also typically falls during National Chemistry Week, an annual, and There are many different activities related to chemistry, most of which are related to the mole and calculations. Examples Put jokes or writes songs about the mall, and Make some calculations. A sound knowledge of chemistry requires you to be familiar with other fields of science, which is why chemistry study is either mandatory or recommended by many other university disciplines. And most importantly, chemistry is really charming and fun. If you want to understand the world around you, chemistry is the answer! [21].

References

1. ["Happy Mole Day"](#), *"Scienceblogs"*, October 23, 2009.
2. ["History of National Mole Day Foundation, Inc"](#). *moleaday.org*. Archived from [the original](#) on October 23, 2010.
3. ["What Is Mole Day? Date and How to Celebrate"](#), *"ThoughtCo."*, Jul. 16, 2018 .
4. ["Mole Day"](#), *"American Chemical Society"*, October 2018
5. ["Chemistry In The Spotlight"](#), *Chemical & Engineering News*, **88** (50), December 13, 2010, retrieved February 14, 2010.
6. ["What Is the Importance of Chemistry?"](#), *"ThoughtCo."*, September 14, 2019
7. ["What is Chemistry?"](#). *Chemweb.ucc.ie*. Retrieved 2011-06-12.
8. ["International Year of Chemistry – The History of Chemistry"](#). *G.I.T. Laboratory Journal Europe*. Feb 25, 2011. Retrieved March 12, 2013.
9. Bernadette Bensaude-Vincent, ["Philosophy of Chemistry"](#) , ["Chemistry: a Science of Harmony"](#), *"ScienceDirect"*, 2012
10. ["Rutherford model"](#), *"Encyclopaedia Britannica"*, Sep 5, 2019
11. ["What is Chemistry?"](#). *Chemweb.ucc.ie*. Retrieved 2011-06-12.
12. de Bièvre, Paul; Peiser, H. Steffen (1992). ["Atomic Weight' — The Name, Its History, Definition, and Units"](#). *Pure and Applied Chemistry*. **64** (10): 1535–43.
13. Furio, C; Azcona, R; Guisasola, J. (2002). ["The learning and teaching of the concepts 'amount of substance' and mole - a review of the literature"](#). *Chemistry Education: Research and Practice in Europe* **3** (3): 277–292
14. ["Amadeo Avogadro"](#), *"History of National Mole Day Foundation, Inc"*
15. ["Redefining the Mole"](#). NIST. 2018-10-23. Retrieved 24 October 2018
16. ["What Is Mole Day?"](#), *"National Mole Day Foundation, Inc"*.

17. *Happy Mole Day! Archived 2014-07-29 at the Wayback Machine*, Mary Bigelow. SciLinks blog, National Science Teachers Association. October 17, 2013.
18. *"Chemical club wins national recognition"*. Central Michigan Life. September 27, 2004. Retrieved October 8, 2012.
19. *This Week in Chemical History*, American Chemical Society, archived from *the original* on July 24, 2011, retrieved February 14, 2010
20. *"Fun Holiday – Mole Day", "timeanddate.com"*
21. *"National Chemistry Week Celebrates 20 Years"*, *Chemical & Engineering News*, **85** (51), December 17, 2007, retrieved February 14, 2010
22. *"HAPPY MOLE DAY CELEBRAT AVOGADRO'S"*, *"askideas"*, September 8, 2017

Short Biography

Solhe F. Alshahateet was born in Irbed, Jordan on May 21st, 1969. He is a Professor of Organic and Supramolecular Chemistry graduated in 2003 from the University of New South Wales (UNSW, Australia). He worked as the President of Aqaba University of Technology (AUT, 2017-2019, Jordan). He works as a Full Professor at Mutah University (Jordan) since 2007. He received many awards such as Australian Research Council and Jordanian Ministry of Higher Education scholarships. He engaged in many projects from local and international funding agencies. Professor Alshahateet attended many conferences worldwide. He published more than 73 articles mostly in international journals dealing with crystal engineering and supramolecular chemistry involving industrial



applications. In addition, he is working as a referee and editorial board member for many international specialized journals. Highlights of his research have been in the area of synthesis and characterization of semiconducting materials, organic materials for and industrial applications (functional materials) such as pharmaceutical industry. After completing his PhD (2003) at the UNSW, he undertook research in new synthesis chemistry as a Research Fellow at UNSW for about one year. Since then he had undertaken research into synthesis of new organic materials at the Institute of Chemical and Engineering Sciences ICES, Singapore. He had research visitor appointments at the University of New South Wales (Australia) and at the University of South Florida (USA).

(2019) ; <http://www.jmaterenvirosci.com>