

# Amateur chemistry

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**Amateur chemistry** or **home chemistry** is the pursuit of chemistry as a private hobby.<sup>[1]</sup> Amateur chemistry is usually done with whatever chemicals are available at disposal at the privacy of one's home. It should not be confused with clandestine chemistry, which involves the illicit production of controlled drugs.<sup>[a]</sup> Notable amateur chemists include Oliver Sacks and Sir Edward Elgar.<sup>[2][3]</sup>

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## History

### Origins

Amateur chemistry shares its early history with that of chemistry in general. Pioneers of modern chemistry such as Robert Boyle and Antoine Lavoisier were gentleman scientists who pursued their research independently from their source of income.<sup>[4][5]</sup> Only with the coming of the industrial era, and the rise of universities as research institutions, did any significant distinction between amateurs and professionals emerge. Nevertheless, amateur progress lasted well into the 19th century. For example, in 1886, Charles Martin Hall co-invented the Hall-Héroult process for extracting aluminium from its oxide whilst working in a woodshed behind his family home.<sup>[6]</sup> The history of amateur chemistry ties in well with that of chemistry in general. The history of chemistry represents a time span from ancient history to the present. By 1000 BC, civilizations used technologies that would eventually form the basis to the various branches of chemistry. These processes include extracting metals from ores, making pottery and glazes, fermenting beer and wine, extracting chemicals from plants for medicine and perfume, rendering fat into soap, making glass, and making alloys like bronze.

### Chemistry as a hobby

Throughout much of the 20th century, amateur chemistry was an unexceptional hobby, with high-quality chemistry sets readily available, and laboratory suppliers freely selling to hobbyists. For example, Linus Pauling had no difficulty in procuring potassium cyanide at the age of eleven.<sup>[2]</sup> However, due to increasing concerns about terrorism, drugs, and safety, suppliers became increasingly reluctant to sell to amateurs, and chemistry sets were steadily toned down.<sup>[7]</sup> This trend has gradually continued, leaving hobbyists in many parts of the world without access to most reagents.

## Notable amateur chemists

- Internet pioneer Vint Cerf, Intel co-founder Gordon Moore, and Hewlett Packard co-founder David Packard all used to practice amateur chemistry.<sup>[1]</sup>
- British neurologist Oliver Sacks was a keen amateur chemist in his youth, as described in his memoir *Uncle Tungsten: Memories of a Chemical Boyhood*.<sup>[2]</sup>
- Nobel Prize winning chemist Linus Pauling practised amateur chemistry in his youth.<sup>[8]</sup>
- Wolfram Research co-founder Theodore Gray is a keen amateur chemist and element collector.<sup>[9]</sup> His exploits (most notably the construction of a wooden table in the shape of the periodic table, having compartments holding real samples of each element) earned him the 2002 Ig Nobel prize for chemistry,<sup>[10]</sup> which he accepted as a great honor.<sup>[11]</sup> He writes a column for *Popular Science* magazine, featuring his home experiments.<sup>[12]</sup>
- Amateur rocketeer (and later NASA engineer) Homer Hickham, together with his fellow Rocket Boys, experimented with a range of home-made rocket propellants. These included "Rocket Candy" made from potassium nitrate and sugar, and "Zincoshine" made from zinc and sulfur held together with moonshine alcohol.<sup>[13]</sup>
- Composer Sir Edward Elgar practised amateur chemistry from a laboratory erected in his back garden.<sup>[3]</sup> The original manuscript of the prelude to *The Kingdom* is stained with chemicals.<sup>[14]</sup>
- Robert Boyle is largely regarded today as the first modern chemist, and therefore one of the founders of modern chemistry, and one of the pioneers of modern experimental scientific method.

## Restrictions

Whilst the hobby is probably legal in most jurisdictions,<sup>[b]</sup> the relationship between amateur chemists and law enforcement agencies is often fraught. Hobbyists are often affected by laws intended to fight drugs and terrorism. Furthermore, many chemical supply houses refuse to sell to amateurs, with such policies sometimes being stated openly.<sup>[15][16]</sup>

### Canada

In Canada, a wide range of basic laboratory reagents such as nitric acid and hydrogen peroxide are restricted as "explosives precursors".<sup>[17]</sup>

### Germany

German amateur chemists have been raided by the police, despite not being in the possession of illegal

chemicals.<sup>[18][19]</sup>

## United States

In the United States, some regions have stringent regulations concerning the ownership of chemicals and equipment. For example, Texas requires the registration of even the most basic laboratory glassware.<sup>[20]</sup>

United Nuclear, an amateur science supplier based in New Mexico was raided at the behest of the U.S. Consumer Product Safety Commission,<sup>[1]</sup> and subsequently fined \$7,500 for "Selling Illegal Fireworks Components".<sup>[21]</sup>

The United States Drug Enforcement Administration maintains lists regarding the classification of illicit drugs, which contain chemicals that are used to manufacture the controlled substances/illicit drugs. The lists are designated within The Controlled Substances Act, 21 U.S.C. § 802 (<https://www.law.cornell.edu/uscode/text/21/802>), paragraphs 34 (list I) and 35 (list II).

## See also

- List of commonly available chemicals
- Element collecting

## Notes

- **a.** <sup>^</sup> The terms "amateur chemistry" and "clandestine chemistry" are not rigidly defined, and may depend upon context. For clarity, this article defines "amateur chemistry" to be the practice of chemistry as a hobby, and not as the means to an illegal end.
- **b.** <sup>^</sup> The legal status of amateur chemistry *per se* is somewhat ambiguous. Whilst there appears to be no legislation explicitly banning the activity, there is also little evidence to confirm its legality.

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