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Elemental analysis of Arsenicum album 30

Dr. AK Dwivedi and Dr. MK Tiwari

Abstract

From the time of Hahnemann to the present day, Arsenicum has been realized one of the most frequently used medicine in Homeopathy system. Arsenicum is a classical remedy and its wide-ranging medicinal applications are predominantly known to all homeopaths. Arsenicum album is one of the fifteen most important remedies in homeopathy. However, long term exposure or consumption of all the forms of Arsenic compounds (both organic and inorganic) poses serious hazards and it is a matter of great concern to human health. According to the world health organization (WHO), arsenic compounds are one of the 10th top harmful chemicals and therefore it is important to deem risk management recommendations for the acceptable limit of the Arsenic compounds for their daily consumption, as precautionary measures to be intended for use as the basis for regulation and standard setting worldwide. In this paper detailed elemental analysis of 'Arsenicum album 30' has been carried out using total reflection X-ray fluorescence technique to determine absolute concentration values of the As element as well as other metallic impurities present in this medicine.

Keywords: Arsenicum album, homeopathy, medicines, trace elemental analysis, total reflection x-ray fluorescence spectroscopy

Introduction

In homeopathy medicinal system, 'Arsenicum album' is considered as a materia medica of the Arsenious Acid. It acts as an acid because of its very poor combining properties with alkali compounds. It is one of our great, -4 metallic poisons. It has scarcely any taste thus it can very advantageously be used for criminal purposes as well. Arsenic poisoning, therefore, is very common and many of the symptoms of the remedy are derived there from.

The mother tincture of Arsenicum is usually obtained by mixing analytical reagent (AR) grade Arsenic trioxide (As₂O₃) powder, completely dissolved in a solution of glycerine, strong alcohol and purified water. To produce a potency-1 of Arsenicum album, 1 ml of the mother tincture solution is diluted in 99 ml of purified spirit (containing ~ 90% ethyl alcohol). After then ~ 10 machine operated, moderate, equal and successive jerks are applied. In the similar vein, again ~ 1 ml of the drug solution of potency-1 is taken and added with 99 ml of 90% ethyl alcohol and successive 10 jerks are given to produce potency-2. This process of successive potentization is repeated until we obtain 30th and 200th potencies of Arsenicum Album.

Arsenicum album is prepared in the solution form by diluting aqueous arsenic trioxide generally until there is little or no arsenic remaining in individual doses. Arsenicum also has its sphere of usefulness in diseases of the respiratory organs. Arsenicum is particularly efficacious in many affections of the lungs, where the breathing is very much oppressed. Arsenicum also affects profoundly the nervous system. To the characteristic restlessness, of which we have said so much, is added great prostration.

For homeopathic use, arsenicum album is prepared by separating arsenic from iron (as in arsenopyrite), cobalt, or nickel by baking at high temperatures. The powder is then ground and diluted with lactose. In the final dilution, statistically most pills will contain zero molecules of the original arsenic used; some might contain a single molecule. The final product is sold as tinctures (liquid), tablets, pellets, or powder.

Arsenic affects each part of man; it seems to exaggerate or lower almost all his faculties, it can excite or disturb all his functions. It is a substance easily proved because of its active nature, and from its very abuse we have learned much of its general nature.

In the Earth's crust Arsenic (As) is found in various oxidation states e.g. -3, 0, +3 and +5, usually in the forms of sulfides or metal arsenide's or arsenates. In water, it is expected that, As is mostly present in the arsenate form (+5), but in anaerobic conditions, it is likely to be present as arsenite (+3) also.

In natural waters, it is usually exist in the concentrations ranging ~ 1–2 µg/l (or 1-2 ppb).

However, in the case of ground-waters, where mostly sulfide mineral deposits and sedimentary deposits deriving from volcanic rocks are present, the concentrations can be significantly elevated. The acceptable limit of concentration of arsenic in the drinking-water is ~10 µg/l or (10 ppb), as per the WHO guidelines.

Arsenic (As) is highly toxic when it is present in the form of arsenite (+3) as compared to that of the arsenate form (+5). The United States' Environmental Protection Agency states, that all forms of arsenic are a serious risk to human health.

However, Arsenic in various alloy forms is widely used in traditional Indian Ayurveda medicinal system as well as in the homeopathy branch.

In the homeopathy system, it is expected that nano-particles of Arsenic alloys or other metallic alloys in the liquid medium are generated after following extraordinary dilution process. The power of a homeopathy medicine increases if the dilution of the liquid medium enhanced because it elevates the probability for the size of a medicinal molecule to be present in the nanometer domain. In this form, a metallic compound interacts with the human body organs in a completely different manner as expected from their bulk properties.

The physical and chemical properties of the nano-materials are completely different from their bulk properties. Thus, if a material is toxic in nature at macroscopic or bulk scale, it does not necessarily imply that it will also be toxic at nanoscale level.

Until now, working mechanisms of these medicines are not exactly known or fully understood. More R&D efforts are

thus required to reestablish our old Indian Ayurvedic medicinal system and homeopathy system to explore its hidden capabilities in a detail manner along with the modern scientific calibrations in order to define their convincing quantitative dose which is required to cure a particular disease in a shortest possible time frame. In this paper we have presented the elemental analysis of Arsenicum Album to prove its medicinal values.

Elemental Analysis of Arsenicum Album 30

Total reflection X-ray fluorescence (TXRF) spectroscopy is one of the advanced technique for elemental analysis. The high detection sensitivities of TXRF technique makes it a valuable tool for trace and ultra-trace element analysis. Using this technique, almost all elements ranging from sodium (Z=11) to uranium (Z=92) in the periodic table can be detected and analyzed in wide concentration range only in a single shot of measurement.

Synchrotron based TXRF measurements have been carried out for a homeopathy medicine ‘Arsenicum album 30’ to determine exact value of Arsenic amount as well as concentrations of other different elements that are present in this medicine. As mentioned above, TXRF technique is a very sensitive methodology and it comprises of the capability to evaluate concentrations of different elements in various liquid specimens (e.g. Water) at parts per billion levels. The homeopathy medicine ‘Arsenicum album 30’ is recently prescribed by *Ministry of Ayush Govt. India* as an immunity booster during the present COVID-19 pandemic situation.

Experimental measurements

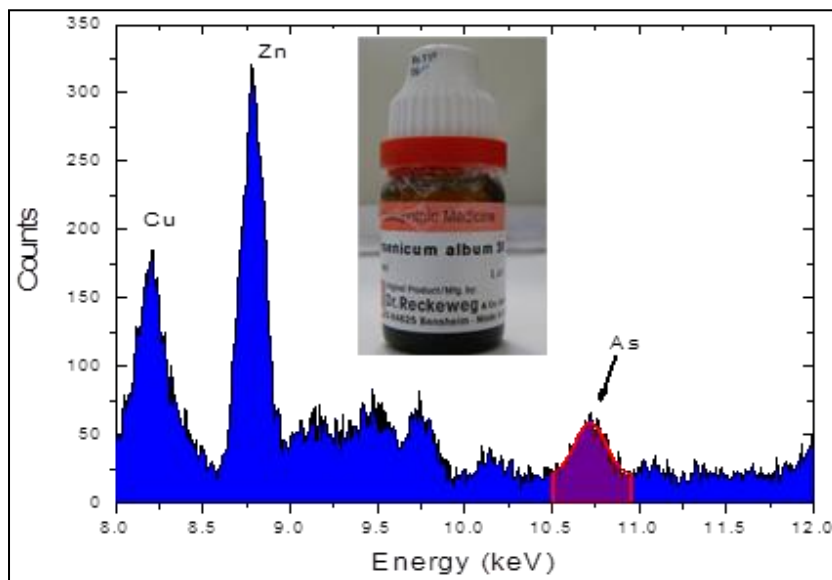


Fig 1: Measured X-ray Fluorescence Spectrum of the ‘Arsenicum album 30

Results and Discussions

The analysis report for different elements present in Arsenicum Album 30.

Concentration of Various Elements in Arsenicum Album 30

Element Concentration (in ppb)

- 19 (K): 1993
- 20 (Ca): 1140
- 26 (Fe): 96

- 29 (Cu): 16
- 30 (Zn): 25
- 31 (Ga): 100 (Internal Standard)
- 33 (As): 2.2 ± 0.2 (very low quantity)

The results clearly indicates that typical value of Arsenic in the ‘Arsenicum album 30’ ranges ~ 2 µg/liter or (2 ppb), which is fairly below the acceptable limit of arsenic concentration in the drinking water (~10 µg/l or 10 ppb), as defined by the WHO guidelines.

Conclusion

From our findings we found that the arsenic content Arsenicum album 30' is well below the concentration levels of arsenic defined by WHO in drinking water so it can be easily said that the 'Arsenicum album 30' can be used as medicines without any side effects.

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