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Research Article

COMPARATIVE ANALYSIS OF *ROMAKA LAVANA* AND *VIDA LAVANA* PREPARED BY TWO DIFFERENT METHODS USING XRD AND EDAX

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ABSTRACT

Romaka Lavana and *Vida Lavana* are the two salts mentioned under *Lavana varga* in Ayurveda. *Romaka Lavana* is a naturally occurring salt, which is collected from the banks of Sambhar Salt Lake, Jaipur, Rajasthan. *Vida lavana* is a salt artificially prepared from *Amalaki churna* and *Romaka lavana*. Various methods for the preparation of *Vida Lavana* was mentioned in the classical *Rasasastra* textbooks. In the present study *Rasatarangini* reference was adopted. There are significant challenges to the classical method of preparation of *Vida Lavana* in terms of temperature, time consumed as well as yield of final product. Some of the challenges with the classical methodology can be addressed by an electric muffle furnace, which provides a more uniform and precisely regulated alternative. Hence two different heating pattern as well as time duration was adopted here to prepare *Vida lavana* using an Electric muffle furnace. The final products obtained from these methods and *Romaka Lavana* used for the preparation of *Vida lavana* were analysed by XRD and EDAX to determine the elemental composition. The study findings show that, the product obtained after the two methods predominantly contains sodium chloride.

INTRODUCTION

Lavana Vargas are group of drugs mentioned in Ayurvedic classics which are of great importance. From *Samhita* period onwards, the description of various types of *Lavanas* are available. Based on origin of *Lavana*, it is classified as *Prakritha* (naturally occurring) and *Kritrima* (artificially prepared) *Lavana*. *Romaka Lavana* and *Vida Lavana* are examples of above mentioned types of salts respectively.

Romaka lavana is a salt belongs to *Panchalavana varga.*[1] The salt gets the names *Romaka, Rouma* and *Roma lavana* as it was collected from the banks of '*Roma nadi*' (sambhar salt lake). *Romaka lavana* also known by the names *Sambharam, Sambarodbhavam* and *Shaakambhareeyam* because now a days, the salt is prepared by the evaporation of salty water from sambhar lake. *Romaka Lavana* possesses attributes like *Bhedana* and *Deepanam param*. It is *Atyushna, Laghu, Teekshna, Katu vipaka* and it vitiates *Pitta Dosha*. It has the ability to enter minute channels of the body and is effectively mitigates vitiated *Vata* and *Kapha dosha*.[2]

Vida Lavana is a *Kritrima Lavana* mentioned under *Panchalavana varga*. The *Vida lavana* is known by the names *Kritrimaka, Supakyam, Dravida* and *Kritaka* owing to its artificial preparation method. It has properties like *Laghu, Ushna, Teekshna, Deepana, Ruchya, Sakshara* (possess alkalinity) and *Kaphavata anulomana*. It cures *Ajeerna, Anaha, Vishtambha*, *Shoola* and *Hritgourava*. It pacifies the vitiated *Vata dosha*.[3] There are two artificial method of preparation of *Vida lavana* mentioned in *Rasa Tarangini*. The second method of preparation is adopted for the present study.[4]

In the classical method, the preparation involves subjecting the closed container with *Romaka lavana* and *Amalaki churna* mixture to intense heat for 6 hours. Here the means of heating is not mentioned. However, there are several challenges with present

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scenario such as tedious process, difficulties in maintaining the temperature, more time-consuming, more physical work, and a reduced product yield. Thus, applying advanced techniques can offer more precise control over the preparation procedure. Employing an electric muffle furnace for incineration to prepare *Vida Lavana* can help with some of the issues that arise with the traditional method. It enables more accurate regulation of the heating process's temperature and time. Additionally, it can be configured to maintain the desired temperature for a specific period of time.

The present study focuses on evaluating the preparation process of *Vida Lavana* using electric muffle furnace at two different temperatures for two different time duration. After preparation, *Romaka Lavana* and two different samples of *Vida Lavana* were analysed using XRD and EDAX techniques.

AIM AND OBJECTIVES

- To prepare samples of *Vida Lavana* using an electric muffle furnace at two different temperature and time duration.
- To evaluate the *Romaka Lavana* and two *Vida Lavana* samples by employing XRD and EDAX techniques.

MATERIALS AND METHODS

The general preparation of *Vida Lavana* includes collection of raw materials and heating process.

Collection of raw materials

- *Romaka Lavana* was purchased from Sambhar Salts Limited, Jaipur, Rajasthan. Its authenticity was analysed through XRD technique.
- *Amalaki* was purchased from local market, Thiruvananthapuram, Kerala. Its authenticity was checked through physicochemical parameters based on Ayurvedic pharmacopeia of India.

Heating process for preparation of *Vida Lavana*

Equipment's required:

Khalva Yantra (mortar and pestle*), Sarava* (earthen vessel), cloth, Multtani mitti (clay) and electric muffle furnace.

Procedure

1000 g of *Romaka Lavana* was taken in a *Khalwa yantra* and finely powdered. Then 125gm of finely powdered (passed through sieve no.85) *Amalaki churna* was added to it and mixed thoroughly until obtain homogenous mixture. After that obtained mixture was divided into two equal batches, Batch A and Batch B. In each batch, 562.5gm of mixture is taken in an earthen *Sarava.* Then this *Sarava* was covered with another *Sarava* of same size. The edges of these *Saravas* were sealed properly with a cloth smeared with the paste of multani mitti and water. After drying the layer, the same process of sealing was repeated for six more times.

Batch A

After proper drying, the sealed Batch A *Sarava* was placed in an electric muffle furnace, and the temperature was allowed to rise gradually to 800°C for 75 minutes (1.25 hours) and maintained at 800°C for 1 hour. After that, the electric muffle was switched off and allowed for self-cooling to room temperature. On the 3rd day, the *Sarava* was opened by carefully remove the sealing using a knife. Then the contents were transferred into a clean *Khalva Yantra* and powdered well.

Batch B

In Batch B also, same procedures was followed except the case of temperature and time duration. Here temperature and time were programmed similar to classical method (i.e., *Prakaragani* and two *Yamas*). The temperature was allowed to rise gradually to 850°C for 90 minutes (1.5 hours) and maintained at 850°C for 6 hours. After that, the electric muffle was switched off and allowed for self cooling to room temperature. On the 3r day, the *Sarava* was opened by carefully remove the sealing using a knife. Then the contents were transferred into a clean *Khalva Yantra* and powdered well.

Analytical tools: X-ray Diffraction (XRD) and Energy Dispersive X-ray Analysis (EDAX)

OBSERVATIONS AND RESULTS

Preparation of *Vida lavana*

Table 1: Observations during Preparation of *Vida lavana*

	Batch A	Batch B
Weight of *Romaka Lavana* and *Amalaki Churna* mixture	562.5 g	562.5 g
Weight of *Vida Lavana* obtained	301 g	139.5 g

Table 2: Organoleptic characters of *Romaka Lavana* and prepared *Vida lavana*

Character	*Romaka Lavana*	Batch A	Batch B
Colour	White	Greyish black	Greyish black
Lustre	Lustreless	Lustrous	Lustrous
Odour	Odourless	Odourless	Odourless
Taste	Salty	Salty	Salty
Touch	Rough	Smooth	Smooth

XRD Analysis

The powdered XRD patterns of *Romaka Lavana* and prepared two samples of *Vida Lavana* by two methods are shown in figure 1, 2 and 3 respectively.

EDAX Analysis

The EDAX patterns of *Romaka Lavana* and prepared two samples of *Vida Lavana* by two methods are shown in figure 4, 5 and 6 respectively. The results of EDAX analysis is depicted in table 3.

Table 3: Results of EDAX Analysis of *Romaka Lavana and Vida Lavana*

Elements (Wt%)	*Romaka Lavana*	Batch A	Batch B
Na	37.2	32.25	35.78
Cl	62.8	58.1	64.22
O	-	2.07	-
C	-	7.6	-

RESULTS OF XRD ANLYSIS

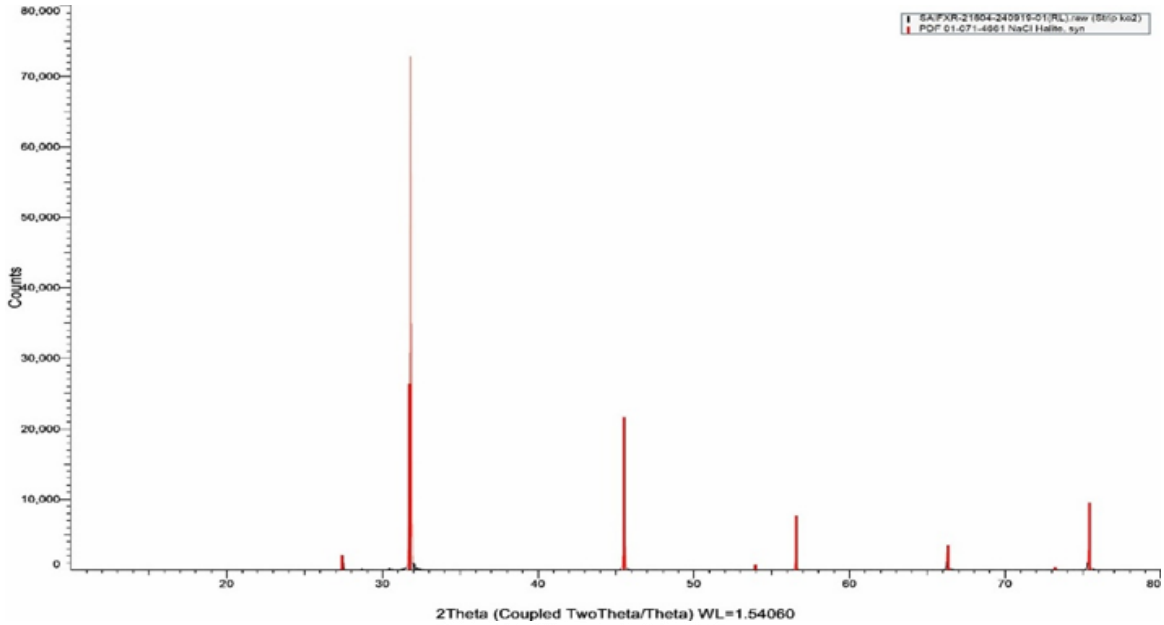

Fig :1 XRD result of *Romaka lavana*

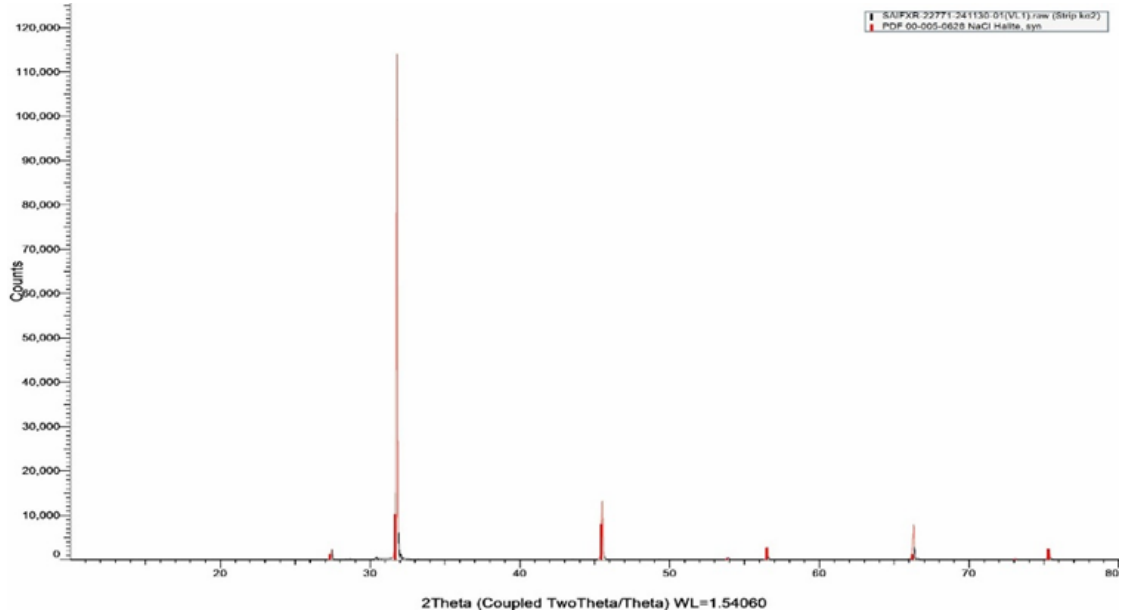

Fig 2: XRD result of Batch A *Vida lavana*

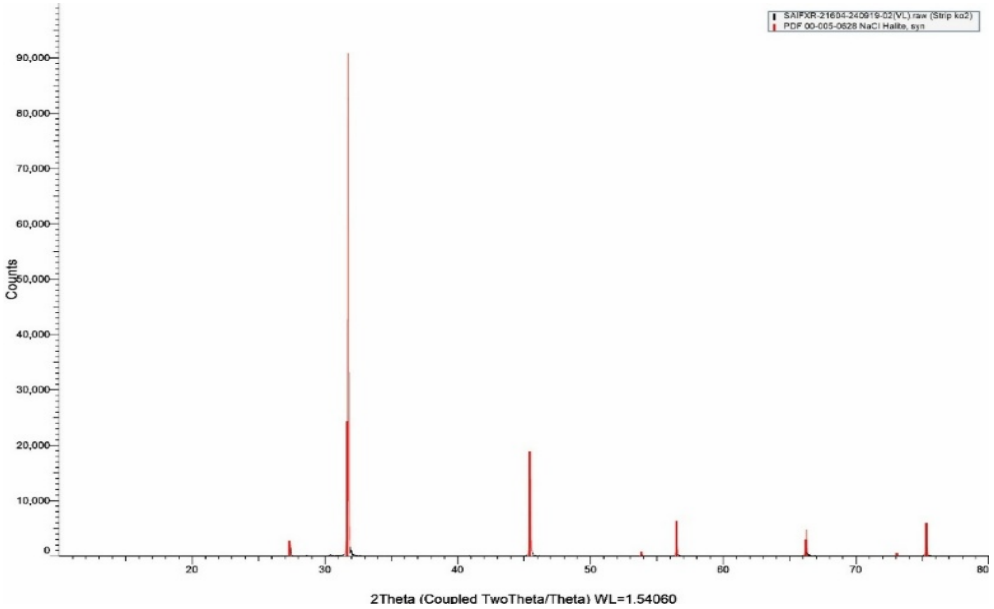

Fig 3: XRD result of Batch B *Vida lavana*

RESULTS OF EDAX ANALYSIS

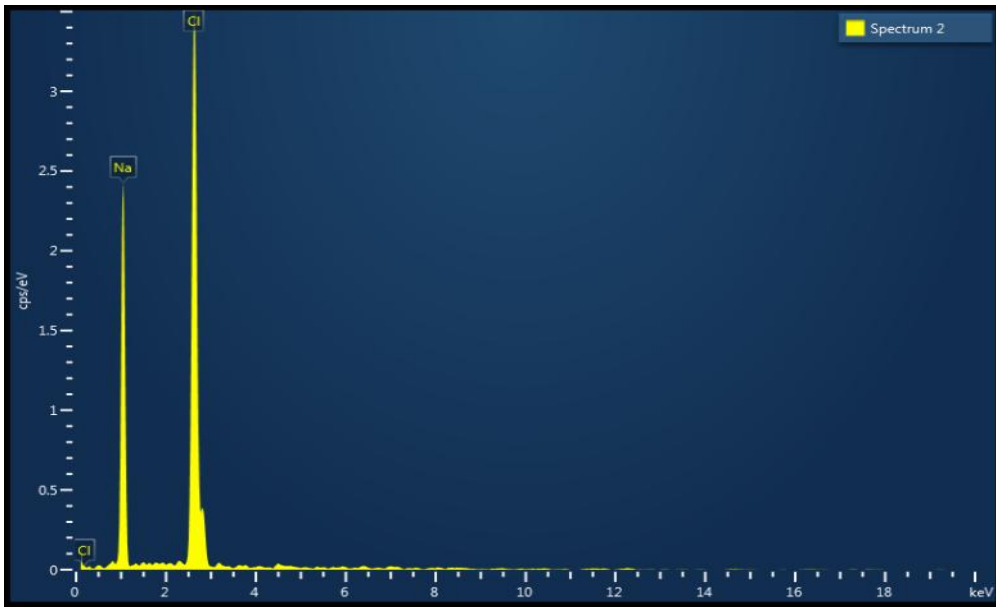

Fig 4: EDAX pattern of *Romaka lavana*

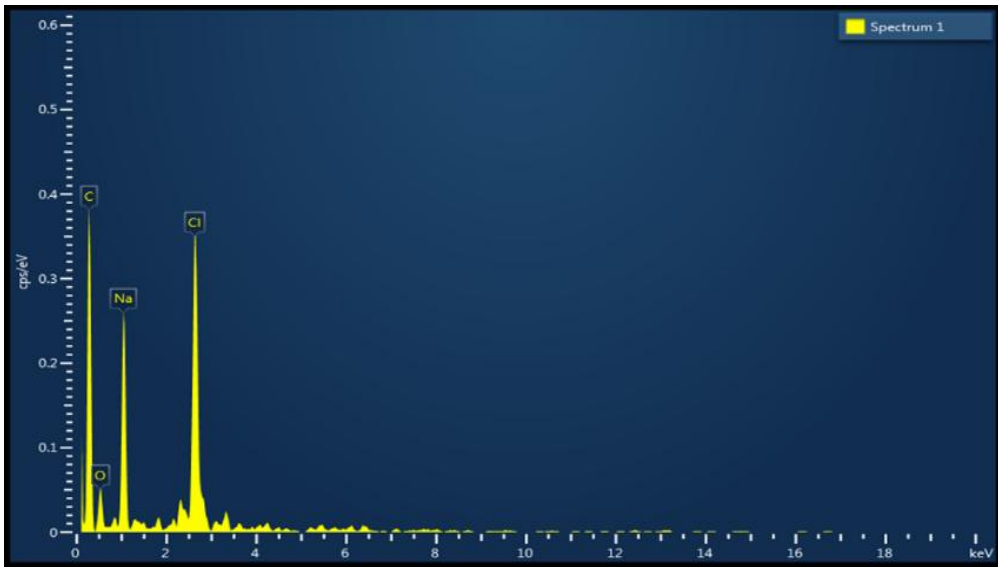

Fig 5: EDAX pattern of Batch A *Vida lavana*

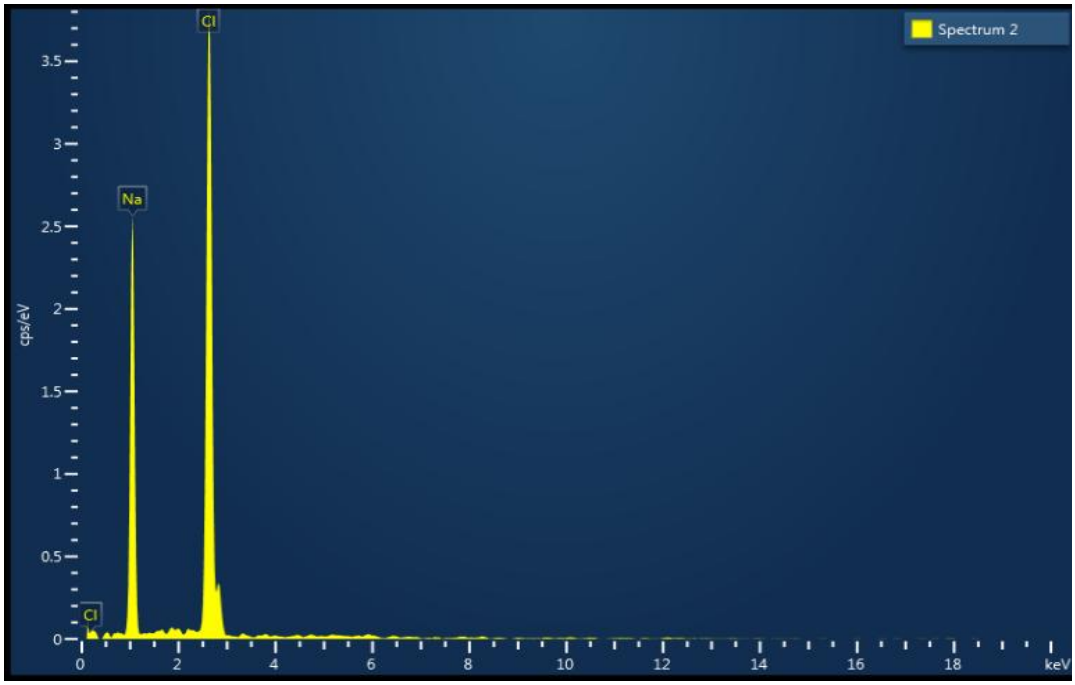

Fig 6: EDAX pattern of Batch B *Vida lavana*

DISCUSSION

The raw material used as *Romaka Lavana* for the study is Sambhar Salt. Predominance of NaCl is revealed by the geochemical analysis of brines and ground water samples from the Sambhar salt.[5] The XRD and EDAX analysis shows that it is NaCl. As the artificial preparation by traditional method is tedious and there is large loss of yield, electric muffle furnace is used here. The method of preparation needs a strong heating similar to incineration, a temperature range of 800°C and 850°C was maintained for two batches with time duration 1 hour and 6 hours respectively. The characters of end product like organoleptic and other features are not mentioned in the classics. Here the white coloured *Romaka Lavana* turns to greyish black shiny particles. The yield of product is 53.5% for batch A and 24.7 % for batch B. This shows that there is more loss of product at high temperature and long-time duration. After the preparation, the sample was analyzed for its elemental content by XRD and EDAX.

The XRD patterns of *Romaka Lavana* and two batches of *Vida Lavana* matches and revealed that the peaks are only due to Halite. This was confirmed after matching the obtained data with standard catalogue and further by EDAX analysis. They had an empirical formula of NaCl and cubic crystalline structure. Based on EDAX, the elemental constitution of *Romaka* L*avana* seems to be predominantly chlorine and sodium. The EDAX result of Batch A shows abundant of chlorine, sodium followed by carbon and oxygen. The presence of carbon and oxygen may be due burning of organic contents in *Amalaki churna*. The EDAX of Batch B shows predominantly sodium and chlorine.

The artificial preparation of *Vida Lavana* by classical method is more challenging due to difficulties in standardizing temperature patterns as well as less product yield. It is possible to regulate the temperature precisely by using an electric muffle furnace. It becomes appropriate to carry out more studies by exploring variation in temperature and time duration patterns

CONCLUSION

In the present study, for the artificial preparation of *Vida Lavana* method from *Rasatarangini* is adopted. There are considerable amount of loss of final product in both batches. The predominant compound in *Romaka Lavana and Vida Lavana* is sodium chloride based on XRD patterns. Based on EDAX patterns also, the predominant elemental constitutions in these *Lavana* are sodium, chlorine and some amount of carbon. So the *Vida Lavana* obtained after the artificial preparation according to *Rasatarangini* reference is sodium chloride.

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