Physico-chemical analysis of a Herbo-mineral compound Vidangadi Lauh

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Abstract
Vidangadi Lauha is herbo-mineral compound described in ayurvedic text. Its main ingredient is Lauha Bhasma. During process of Shodhana and Marana there is physico-chemical changes in the raw Lauha. The present study has been carried out with aims and objectives to develop analytical profile of Vidangadi Lauha and by assessing its physico-chemical parameters including pH, loss on drying, ash value, acid insoluble ash and iron content.

Keywords: Vidangadi Lauha, Lauha Bhasma, Shodhana, Marana, analytical profile.

Introduction
In ancient days, Vaidhya himself was producer and user of Ayurvedic aushadhi. So there was no doubt about genuineness and quality of drug. Due to huge demand the adulteration may be done and short cuts may be adopted at preparation level by commercial producer. So it is necessary to standardize drug on physico-chemical parameter. Physico-chemical analysis provides the objective parameters to fix the standards for quality of raw drugs and finished products. A study of a drug is incomplete without analytical study. It also helps to interpret the pharmacokinetics and pharmacodynamics of a drug. The drugs, which are being manufactured, should be analyzed with the help of different analytical methods like organoleptic tests, physical parameters, chemical parameters, etc.

Materials and Methods
All the raw materials were collected from P.G. Deptt. of Rasa Shastra, Govt. Ayu. College, Patna. These were identified by experts of the Department to confirm their genuineness. This was done by evaluating their quality on various parameters. Lauha Bhasma was prepared. All herbal ingredients were made into fine powder and mixed with Lauha Bhasma. Vidangadi Lauha contains herbs and mineral constituents.

Table No. 1 Ingredients of Vidangadi Lauh

| No. | Ingredient  | Parts |
|-----|-------------|-------|
| 1.  | Lauha Bhasma| 7 parts|
| 2.  | Vidanga     | 1 parts|
| 3.  | Haritaki    | 1 parts|
| 4.  | Bibhitaki   | 1 parts|
| 5.  | Amalaki     | 1 parts|
| 6.  | Shunthi     | 1 parts|
| 7.  | Pippali     | 1 parts|
| 8.  | Maricha     | 1 parts|

Analytical study of Vidangadi Lauha and Lauha Bhasma were carried out in Lab. of Post Graduate Department Government Ayurvedic College Patna and Arbro Pharmaceutical Ltd. (Analytical Division) New Delhi.
The samples were analyzed by two different kinds of parameters i.e. classical and modern parameters.

**Evaluation on classical analytical parameters**
Classical analytical parameters are tools to test the perfection of Bhasma.

**Test for organoleptic characters**
Samples were observed for their colour. Samples were touched for any perceptible coarse powder. Samples were smelt for any type of odour. Samples were tested by tongue for any specific taste. Samples were chewed in between teeth to hear any perceptible sound.

**Nishchandratva test**
A little amount of Bhasma was taken on palm. Observed in sunlight for presence of any lustre particles.

**Varitara test**
Water was taken in a Bikar. Then very small amount of Bhasma was sprinkled from a short distance on the surface of stagnant water in Bikar and noticed whether Bhasma was float on water or not.

**Unam test**
In this test, some grains of rice kept carefully on the layer of floated Lauha Bhasma and was observed whether the grains float or not.

**Slakshanatva**
A little amount of Lauha Bhasma was taken and rubbed between two fingers and observed it was smooth or not.

**Rekhapurnatva test**
In this test, little amount of Lauha Bhasma was taken in between index finger and thumb and rubbed and observed whether the Bhasma fills the minutes lines of the finger tips or not.

**Gatarasatva**
Lauha Bhasma was tested by tongue and observed that there is any taste or tasteless.

**Evaluation on modern analytical parameters**
The modern analytical parameters are based on knowledge of physics and chemistry. These parameters tell about exact physical and chemical characters, and explain the pharmacodynamics and pharmacokinetics of Bhasma. Set up standards for the quality of Bhasma.

**Determination of pH**
This test was performed to determine the acidity or alkalinity of the samples. Procedure 10 gm sample was taken and 100 ml distilled water was added to it. Solution was filtered. The pH of the solution was measured with the help of pH meter.

**Determination of Loss on drying**
This test tells about moisture content of the sample. Procedure 10g of Accurately weighed sample was taken and heated in a hot air oven at 105 °C, till constant weight. Then the dish was removed and after self-cooling it was weighed. The loss of weight after drying was determined and expressed as % w/w.

**Determination of Ash value**
This test was carried out to evaluate the ash content for the sample. Procedure 2 gm accurately weighed sample was kept in a silica dish and subjected for incineration at a temperature not exceeding 450 °C until it became free from carbon. After self cooling it was weighed. From the weight of residue the percentage of ash was determined and expressed as % w/w.

**Determination of Acid Insoluble Ash**
This test was performed to determine percentage of acid insoluble inorganic content of the sample. Procedure The ash was kept in crucible and 25 ml of dilute HCL added to it. The insoluble matter was collected on an ashless filter paper (Whatman). Then, wash with hot water until filtrate was neutral and ignited to constant weight. The
percentage of acid insoluble ash was determined and expressed as % w/w.

Observations & Results
Organoleptic evaluation
The organoleptic characters of Lauha Bhasma.
Table No. 2 organoleptic characters of Lauha Bhasma.

| No. | Parameter          | Lauha Bhasma                                      |
|-----|--------------------|---------------------------------------------------|
| 1.  | Sound              | Not any sound produced during chewing             |
| 2.  | Touch              | Smooth                                            |
| 3.  | Colour             | Pakwa Jambuphala Varna                            |
| 4.  | Taste              | Tasteless                                         |
| 5.  | Smell              | No specific smell                                 |

Evaluation on classical analytical methods
Table No. 3 observations of classical analytical test of Lauha Bhasma

| No. | Parameter               | Result  |
|-----|-------------------------|---------|
| 1.  | Nishchandratva test     | +ve     |
| 2.  | Varitara test           | +ve     |
| 3.  | Unam test               | +ve     |
| 4.  | Slakshanatva test       | +ve     |
| 5.  | Rekhapurnatva test      | +ve     |
| 6.  | Apunarbhavata test      | +ve     |
| 7.  | Gatarasatva test        | +ve     |

Evaluation on modern analytical parameters
Table No. 4 Physico-chemical analysis of Lauha Bhasma

| Parameter               | Result  |
|-------------------------|---------|
| $p^H$                    | 6.92    |
| Loss on drying at 105°C C | 0.77 % w/w |
| Ash value               | 99.17 % w/w  |
| Acid insoluble ash      | 0.2 % w/w  |

Observations of AAS
The percentage of iron content in the Lauha Bhasma is tabulated in following table.
Table No. 5

| Parameter  | Result  |
|------------|---------|
| Iron (as Fe) | 70.21% w/w |

Table No. 6 Organoleptic characters of Vidangadi Lauh

| Appearance | Colour | Touch | Taste | Odour |
|------------|--------|-------|-------|-------|
| Crystalline powder | Red | Slightly rough | Katu | No |

Table No. 7 Physico-chemical analysis of Vidangadi Lauh

| Parameter               | Result  |
|-------------------------|---------|
| $p^H$                    | 3.73    |
| Loss on drying at 105°C C | 3.60 % w/w |
| Total Ash               | 52.25 % w/w  |
| Acid insoluble Ash      | 2.34 % w/w  |
| Iron (as Fe)            | 21.24%  |

Discussion
All the classical analytical parameters describe definite significance. Nishchandratva test of the Bhasma indicates lustrelessness after Marana process. Varitara and Unam test indicate lightness and fineness of the Bhasma. Rekhapurnatva also indicates fineness of the Bhasma. Apunrbhava test shows lack of metallic luster. Analytical test of Lauha Bhasma shows that Lauha Bhasma has high Ash value (99.17%w/w) and very low loss on drying value (0.77%w/w). Ash value indicates presence of inorganic contents of Bhasma. Very high ash value of Lauha Bhasma is indicative of presence of very high inorganic content. Loss on drying indicates moisture content. Low loss on drying of the Lauha Bhasma is indicative of presence of little amount of moisture. Acid insoluble ash indicates insoluble inorganic content of the Bhasma. It tells about physiological availability of the Bhasma. Acid insoluble ash of Lauha Bhasma was found 0.2%w/w. Amount of Iron in Lauha Bhasma was 70.21%w/w.

Loss on drying of Vidangadi Lauh was observed 3.60%w/w. Total ash was found 52.25%w/w. Acid insoluble ash was observed 2.34%w/w. Amount of Iron in Vidangadi Lauh was 21.24%w/w.

Conclusion
Vidangadi Lauh is red crystalline powder. Its $p^H$ was 3.73 which show its acidic nature. Analytical profile of Vidangadi Lauh deals with Ph, loss on drying, acid insoluble ash, total ash and iron content which indicates quality of same.

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