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Original Research Paper

The Mercurial Medicine: an Analysis of '*Rasa-Shastra*' for Advancements in Pharmaceutical Technology

Engineering

KEYWORDS :

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ABSTRACT

Mercury metal is considered to be highly toxic. Ancient Indian medicine suggests techniques to remove the toxicity and make Mercury fit for use in Medicine. The Rasa Shastra is a branch that deals with preparations having Mercury as the central element. This article is a compilation of facts stated in the Rasa Shastra. This would serve as a guide for further research in the engineering discipline.

Introduction:

Mercury metal and it's other forms, as we know today (from modern science), are supposed to be highly toxic and thus unfit to be used in Medicine. Research is now being carried out to understand the medicinal value of this metal. The ancient Indian medicine forms the basis of this research. Ancient Indian medicine has a separate branch that deals with Mercury. The Rasa Shastra is a work that deals with several '*Parad*' (Mercury) based preparations. It is a curse on us that we have lost this knowledge. The Ayurveda, of which Rasa Shastra is also a part, says that Mercury (properly processed and purified) can serve as a '*sarva roga nivarini*' (one that cures all kinds of disease). Several deadly diseases (Eg. Cancer) could be cured with these preparations. Western medicine has no concrete solution for cancer. Hence, it is high time that we start realizing the importance of the past. The major step to be taken towards bringing lost science to existence, is to understand the purification and preparation techniques/ procedures mentioned in these texts and find out ways to incorporate modern engineering techniques in them. This would help the society at large. Engineering techniques can help in the following ways.

It can make large scale production possible. (makes the medicine available for all at a reasonable rate)

It can help automate the entire process. (reduces time consumption)

Mercury- An Overview:

Symbol	Hg
Nature	Metal
Atomic Number	80
Block in the Periodic Table	d

Toxicity of Mercury:

Mercury, in it's natural forms, is highly toxic. Mercury Poisoning is a modern medical condition caused by exposure to Mercury and it's compounds. Raw mercury consumption can lead to death. However, there are techniques that can be employed to remove the toxicity of Mercury and make it fit for use in medicine. These techniques are explained in the Rasa Shastra.

Dust and Malignancies in Mercury:

The *Siddhars* from the southern part of India have said that the dust and malignancies are the reasons for the toxic nature of elemental Mercury. They say that removing these constituents can render Mercury fit for use in medicinal preparations. According to Siddha Medicine, there are eight types of malignancies and seven types of dust in Mercury. The eight types of malignancies are as follows.

1. Undeenam
2. Koudilyam
3. Anavarththam
4. Sangaaram
5. Sandathvam
6. Panguthvam
7. Samalathvam
8. Sabishthavam

The seven types of dust (*Sattai* in Tamil) are,

1. Naagam
2. Vangam
3. Akkini
4. Malam
5. Vidam
6. Kiri
7. Sabalam

Purification of Elemental Mercury:

As discussed in the previous section, purification of Mercury involves removal of the dust and malignancies. The techniques laid down in the Rasa Shastra are discussed in this section.

Technique-1:

Name of the *Siddhar*: Thirumoolar

Ingredients for Purification:

Rock Salt

Aloe Barbadensis

Technique Description:

Rock salt (*kal uppu* in Tamil) is mixed with extract of Aloe Barbadensis (*Kumari Poo* in Tamil). The quantity of salt taken should be equal to the quantity of mercury to be purified. The *salt-aloe vera extract* mixture is ground with mercury for three days. This process purifies mercury and thus the purified mercury can be recovered from the mixture through cleaning.

Technique-2:

Name of the *Siddhar*: Konganavar

Technique Description:

The technique is similar to the one suggested by *Thirumoolar*. The major advantage is that *Konganavar's* script gives details about the exact quantities of reactants and the equipment to be used. *Konganavar* suggests the use of '*Kalvam*' (a kind of roller made out of stone, that is used for grinding).

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** *The names mentioned in this section are the names of those who have laid their respective techniques.*

Compounds of Mercury:
Several compounds of mercury are mentioned in Rasa Shastra. Each compound in it's purified form can help cure several deadly diseases. The compounds are mentioned below.

Name of the Compound	Scientific Name
Rasa Karpooram	Mercurous Chloride
Veeram	Mercuric Chloride
Jathilingam	Red Sulphide of Mercury
Pooram	Mercury Subchloride

A number of Ayurvedic and Siddha medicines can be prepared with the purified forms of these compounds. Rasa Sindoor, an Ayurvedic preparation can be used to cure several diseases such as syphilis, genital disorders etc. This is also used for rejuvenation. NAVAPASHANAM is a Siddha preparation that is capable of curing all kinds of disease. This preparation could be administered on cancer patients for complete cure.

Rasa-Sindoor:
- Ingredients:
- Cow's Milk
- Ghee
- Ficus benghalensis (Banyan Tree)
- Mercury
- Sulphur

Purification:
Mercury-
Mercury is purified by Sublimation.

Sulphur-
Sulphur is mixed with ghee and heated to its melting temperature. The liquid obtained is filtered and the filtrate is collected in a vessel containing boiled milk. The process is repeated seven times and the deposits are collected and washed with hot water. The substance is finally dried.

Mercury and Sulphur are purified in the ratio 1:6. They are mixed with the juice of aerial root of banyan tree. The mixture is placed in an iron mortar and crushed till the mixture is converted into a fine black, lusterless powder. The powder is called Kajjali. Kajjali is filled in a glass bottle and subjected to controlled intermittent heating. The temperature is gradually heated till the blue flame disappears and the bottom of the bottle becomes red hot. The Sulphur accumulated at the neck of the bottle is burnt using a red hot iron rod. The sublimate deposited at the neck of the bottle is collected after sufficient cooling. The process requires 7-8 hours of heating. The highest temperature required is 650 degree Celsius.

NAVAPASHANAM:
Ingredients:

Ingredient	Chemical Name
Veeram	Mercury Chloride
Pooram	Mercury Subchloride
Jathilingam	Red Sulfide of Mercury
Rasam	Mercury Metal
Vellai Pashanam	Arsenic tri-oxide
Gauri Pashanam	Arsenic Pentasulfide
Mridharsinghi	Lead Monoxide
Kandhagam	Raw Sulphur
Shilajith	Mineral Pitch

Purification:
Veeram-
Mercury Chloride is soaked in cow's milk. This is followed by exposure to sunlight for three days. The final product is washed and dried.

Pooram-
A paste is prepared with black pepper and betel leaves. The paste is mixed with water. Mercury Subchloride is kept in a cotton cloth. The cloth containing the Hg compound is placed in a pot containing the pepper-betel solution. The contents are boiled till the solution evaporates completely. The final product taken from the cloth is washed and dried.

Jathilingam-
Equal quantities of lime juice, milk and Acalypha Indica are mixed. Red Sulphide of Mercury is placed in an earthen plate. The mixture is added to the Hg compound little by little. The plate is simultaneously heated. The procedure is carried out for three hours.

Rasam-
Mercury metal is ground well with brick powder. This step is carried out till the color turns white. The substance is further ground with turmeric powder till the color turns black. The black substance is separated from the turmeric powder. The partially purified Mercury metal is boiled with juice of *Acalypha* plant. The substance is finally washed and dried.

NAVAPASHANAM, as the name suggests, is a preparation made out of nine poisons. NAVA means nine and PASHANAM means poison. The ingredients include various other toxic chemicals. As we can see, there are compounds of Arsenic and Lead which are also used. It is interesting to find that the techniques to purify these compounds are also mentioned in the Shastras. One may then wonder why *Rasa Shastra* is named so. The central element with which the science deals is Mercury. Mercury and its compounds are used in combination with other such compounds for effectiveness. Each of the Mercury compounds discussed in this article has its own benefits. Proper purification and mixing in the right proportions are very essential.

The purification techniques for other compounds are discussed below.

Vellai Pashanam-
Betel leaf is ground and mixed with lemon juice. Arsenic tri-oxide is scrubbed with this mixture and dried. The procedure is carried out six times.

Gauri Pashanam-
Powdered Arsenic Pentasulfide is taken in a ladle and heated with a small amount of ghee.

Mridharsinghi-
Lead Monoxide is boiled with goat urine for 24 minutes.

Kandhagam-
Powdered Sulphur is allowed to dry under the Sun. The dried substance is scrubbed with milk.

Scope for Chemical Engineers:
The pharmaceutical industry depends on the Chemical Engineering discipline for growth and advancements. Many new medicines are being found to treat patients suffering from several dangerous diseases. Yet modern medicine

does not present complete solution for diseases such as cancer. It is high time that we start realizing the importance of the past. A thorough analysis of ancient medicine can enlighten us on several health related matters. The role of Chemical Engineers would be to research further and make large scale production possible. In-depth knowledge of the techniques suggested in the Rasa Shastra is very important. Implementation would involve the consideration of the following factors.

Sources of Raw Materials

Safety while handling toxic chemicals

Plant Design

Economics

Environment Factors

Conclusion:

The basic concepts of Rasa Shastra have been compiled and presented with brevity. This literature analysis has thrown light on several unknown facts about Mercury. Incorporating engineering aspects would help in making the science more relevant to the modern world. This analysis has also helped us realize that the field of Medicine was at the peak in terms of advancements in the past. This re-establishes that 'Old is Gold'. Bringing back these to existence will go a long way in helping man lead a healthy life. It is simple, 'Health is Wealth and it is Tax Free'.

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