

Forays into Alchemical Pottery, Part 1: India, with some Chymical Arguments and Alchemical Retorts

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Notes on pottery from Indian alchemical traditions



Soma and Crucible: Preliminary Remarks on Cinnabar as Soma

(A more complete exposition of this theory is forthcoming on ChymicalPhilosophers.org)

"By drugs and incantations (*chou she*) one can change bronze into gold. By skillful use of chemical substances, silver can be changed into gold...By spiritual power a man can change even pottery or stone in gold" from "Nagaruna" in Indian *The Maha-Prajnaparamito-padesa Sastra* (translated to Chinese in 406 AD *TA CHIH TU LUN*)

Alchemical pottery might be as evasive in definition as alchemy itself. In some sense all technologies born of fire are alchemical, from infusing herbs in water with hot rocks in gourds, to making pottery, cooking, evolving to metallurgy. Although the *Epic of Gilgamesh* is really the heroic search for the plant that conquers death, the linking of gold, plants and botanical metaphors, with notions of immortality might have arisen in India. As scholars have noted of Indian alchemy, if alchemy is defined by the use of mercurials then alchemy in India is quite late. But if it is a sacred metallurgy of gold and immortality then it dates back to the Vedic *soma* cult.

Some scholars date the introduction of alchemy into India as late as Muslim conquests, but Needham (1974) and others have demonstrated that there was thriving mercurial alchemy well before this in the earliest Tantric texts (to the 4th century, and based on oral traditions that go back to the earliest metallurgical guilds of the ancient world).

Mercury seems to have been used prior to this in China, and as mercury is conspicuous by its absence in early Vedic texts (and its lack of indigenous supply means it was imported from Dardistan), it may well have been part of the metallurgical allegories that accompanied the *soma* rites. Indian scholars have suggested that Soma is a metaphor for electrum with elegant theories that refute the speculations of Wasson's mushroom hypothesis. Cinnabar has been found at Mohenjo-daro (SanaUllah 1931) (quantities unknown) and increasing archeometallurgical publications report that more is being found inlaid in various artifacts (Pigott 1999). Cinnabar powder (*hingula*) was also used, it was the original substance, which has been replaced, for the *bindi* or dot on the middle of the forehead. Some of the earliest literary references to the use of mercury distillation comes from Indian treatises such as the Arthashastra of Kautilya dating from the late first millennium BC onwards (Srinivasan and Ranganathan 2012).

As Joseph Needham notes, the earliest alchemy in China took the form of creating magical vessels of alchemical alloys. This evolved into consuming the metals in colloidal forms to compounded pills, but the magical cups and plates continued to be made even into modern times. This accords with the soma cup, or drone, that was used for the soma. Perhaps the variety of plants named as *soma* were consumed at various times in these cups (wood gilded with "electrum"), or in combinations such as we speculate in other writings (forthcoming *Plant as Guru* from The Yogi's Pharmacopoeia). Both Needham and Wasson speculate that the *Amanita muscaria* rite was one of the highest secrets in the Daoist cannon, as discussed in *Thunder Among the Pines* (Dannaway 2009) in the context of the evolving alchemical technologies that flowed back and forth from India to China. Alchemical alloys suddenly burst forth in Tantra, with doctrines, cosmology, technologies fully intact, merely updating the soma to amrita and deifying fixed mercury/silver alloys. As we intend to address this theory in depth elsewhere, remarks will be confined to pottery that was used to produce these mystical alloys, in traditions that persisted into Arabic, Jewish, and European sources. The proto-alchemical mystical metallurgy is, except for brief poetic allusions, free of concepts of immortality and the rejuvenative elixirs of India, China, and the Arabic and European heirs to these traditions (Needham 1976).

Indian Alchemical Pottery (a work in progress)

The following is compiled from as many sources as possible concerning the components of the clay that were used in Indian crucibles in proto-alchemy or alchemy. Whenever possible details of intended use, shape and other specifics will be provided or updated as they become available. It is interesting to compare the

ingredients with the given data on the heat-resistant variants of specific crucibles. Crucibles are truly ancient in India, going back into the Harappa Valley period, and archeological digs have unearthed ones of variable size, curved linear and linear-sided specimens. They are made of straw-tempered clay, coating of “sand or light dusting of quartz sand on inside surface of at least some crucibles.”

They were likely poured out by tipping and not lifting as the interior was stretched too thin to support molten metal and all of them were heated from above sources of heat “vitrifying the interiors and rims of the crucibles not the exteriors or bases.” These were likely fired in simple furnaces with bellows from above. Scholars note the lack of standardization as indications of a diverse group of independent artisans and smiths, meaning there is no central authority or control (Miller 2005). Scholars speak of ancient metallurgy in dry archeological language without the least indication that the arts and techniques of fires were one of the highest and most sacred rites and mysteries of the ancient age. So although these archeological discussions discuss all this in the seemingly mundane context of jewelry, cups and vessels, and ritual implements, they must be seen as part of a much deeper magico-religious complex of a hierarchy of metals and health. It is perhaps even the hierarchy of metals that originated the India caste system, with the Brahmins represented by and hoarding gold to the noble metals and downward to the base, crude lead of the Kshudra.

But returning to the archeologists in the Mohenjo-Daro and Harappa sites, the mold fragments are simple, open molds with a sandy clay layer over a straw-tempered clay base. The copper smelting produced household goods, as well as smelting copper “to create specific metal alloys” (Miller 2005). Miller questions the variations of finds at multiple sites, speculating that perhaps the central Indus Valley people were more interested in experimenting with alloys. Scholars hoping for ethnobotanical or metallurgical proof of respective theories are constantly frustrated by lack of evidence, except for incidents of cinnabar here or samples from ceramics there, and no copper ingots are found in these excavations so it's unknown really what all this metallurgy was producing and how, and in fact “no large metal fragments or objects were found” in the trench. This could be for efficient recycling of metals, or that these were sacred sites and the excess metal would have been processed alchemically as *bhasmas* which is an early alchemical preparation in India. Scholars discuss this region as a simple “copper smelting site” because early investigators found “a quantity of copper ore.” Also found are alchemical ingredients the world over, including fragments of chrysocolla, chalcopyrite, hematite, lollingite (arsenic and iron), antimony, cinnabar (sulfur of mercury), cerussite (carbonate of lead), galena, unidentified type of lead ore, and they reluctantly admit, “some of these metallic minerals may have been used in melting and alloying processes, but just as likely as for other purposes, e.g. as colorants, medicines and poisons” (Pigott 1999).

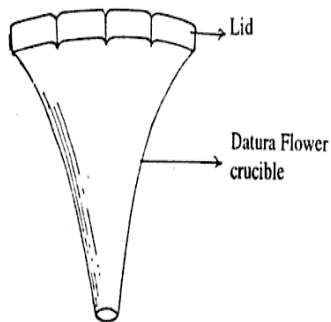
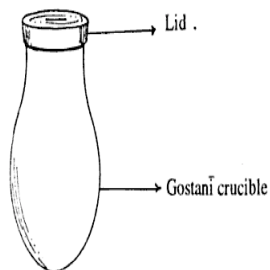
I submit that these can be, for the medicines and alloys, one in the same. As

stated above the oldest metallic alchemy (as distinguished from botanical/visionary elixirs) in China consisted of alloyed metals that were thought to imbue their immortal qualities to the substances contained inside. They were processed in focused operations that leave little waste or residue. I submit that this itself suggests these operations are outside the realm of pure industry or artisan craftwork, and the presence of alchemical ingredients, many of which will show up in ancient China as they transition from plant of immortality to vessel of immortality to drug of deathlessness. These are the very ingredients to countless elixirs and alchemical alloys that will persist in China, merge into Arabian and Jewish alchemy and translate into European texts. These emerge in Paracelsus, who also discusses magical “electrum” of the ancients that was made to detect poisons, ward of evil and secure ever-lasting health. As this is the subject of a lengthy treatment in *Living Waters* and *The Volatile and the Fixed*, these comments must suffice. Even minute quantities of cinnabar would be quite rare in India, as David Gordon White and others note it's not a native product and must have been imported and brought from a few ancient sources. Certainly, and alchemically significant, is the overlay of cinnabar found on some shells, in symbolism that echoes all over the ancient world. In some of the earliest burial sites in the regions of Asia are the skeletons of the dead painted with cinnabar linking this drug with notions of death, preserving the bones which has spiritual dimensions of immortality as well.

There was obviously botanical, mineral and metallurgical crossovers both of use in ingesting magical herbs/fungi, as code words/symbols for metals (as gourds were for crucibles), as well as used in the actual manufacture of the crucibles (as seen below). Drugs like triphala were used in alchemical recipes as well (Madhihassan date). *Soma/haoma* rites evolved, suddenly ceased or went underground (Zoroaster forbid the *haoma* in Persia), and this can account for the countless additives, substitutes, etc. as discussed in *Plant As Guru* (Dannaway 2012). But the great soma rites of actual metallurgical, alchemical alloying (with mercury, as demonstrated) would symbolically be represented in the obligatory daily soma rites and homa fire cults that stretched all over the ancient Indo-Iranian world persisting into fire rituals of Tibet and the *goma* Tantric fire rituals of Japan. Of course fixed mercury *parad* is still a highly venerated alchemical product for medicine and worship, (There is a forthcoming monograph on mercury.)

Ray (1956) writes of the earliest crucibles in Indian metallurgy or proto-alchemy, “Earth of black, red, yellow and white color...burnt husks of paddy, soot, earth from the ant-hill, well-burnt excrements of goat and the horse---rust of iron---These are the ingredients used in various proportions for making crucibles (*musa*), retorts, etc.” He continues, “There are two kinds of crucibles, viz., open and covered (lit. blind)--- the covered one resembles the nipple of a cow and is fitted with a lid, which has a raised head...For the purification of silver, the crucible is best made of two parts of the ashes of *Schrebera swietenoides*, and one part each of brick dust and earth.”

GOSTANĪ AND DHUSTŪRA PUṢPA MŪṢĀ
(COW-NIPPLE LIKE AND DATURA FLOWER
LIKE CRUCIBLES)

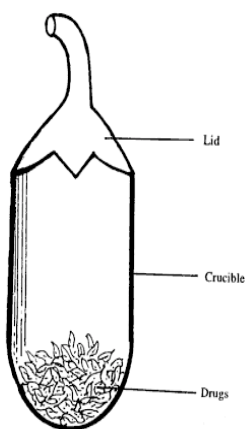


On the Ingredients for Crucibles, etc. from the Rasaratnasamuchchaya Book X (Ray 1956)

We here list the primary ingredients, entries are omitted when the details were too scant to be worth recalling, or when there was significant overlap. For instance, many of the size, shapes and functions are indicated for the same processes with little or no appreciable differences in the recipes for the clay or dimensions.

“Earth which is heavy and of a pale color, sugar or earth from an ant-hill, or earth which has been mixed with the burnt husks of paddy, fibers of the hemp plant, charcoal and horse-dung pounded in an iron mortar, and also rust of iron, are to be recommended for crucible-making.”

VRNTĀKA MŪṢĀ
(BRINJAL SHAPED CRUCIBLE)



Vrntaka crucible: -- A crucible of the shape of the *brinjal* (*Solanum melongena*) to which is attached a tubular end, expanding towards its mouth like the flower of *Datura stramonium*, and which is either twelve or eight digits in length, is suitable for the extraction of the essence of calamine and other readily fusible minerals. It is usually of 6” length and 2” breadth, at the top where the flower stem is, there is a 4” tube inserted, called *vrntaka musa* (Dash 1986).

Notes on Crucibles (Mukherji 1998):

Main ingredients in crucibles are mud and iron, the mud is yellow, reddish yellow, touch, devoid of pebbles, and its capable of standing fire for a long time. In absence of such mud, preference is to be given to the mud created by white ants, or the mud used by potters. An ordinary crucible is prepared with mud, mixed with burnt husk, hemp fibres, cow dung or horse stool, mixed and hammered by means of an iron rod.

The mud used in the preparation of crucibles is to contain, in sufficient quantities, white stone finely powdered, burnt husks, cow dung, hemp fibers, horse's stool, oxidized iron, and black mud.

Which crucible for what operation:

Calcination, Roasting, etc. When metals have undergone roasting they cannot be roasted to their former condition (i.e. they lose their own properties) and they acquire superior qualities. A quadrangular pit, two cubits in length, breadth and depth respectively, is filled with 1,000 cow-dung cakes. The drugs to be roasted are placed in one crucible; this is covered with a second crucible, the rims being luted with clay (see below for luting ingredients). The crucibles are deposited over the cow-dung cakes and five hundred more thrown over them: fire is now applied. Cupels and crucibles were made clay mixed with bone-ash of goats and lined internally with borax. The crucible is called *Musa* because it helps cardiacating blemishes from mineral drugs. Some of these recipes may date back to Nagarjuna.

From *Text Book of Rasa Sastra* (Reddy 2007)

Musa crucible:

For heating in low (*Mrdu*), moderate (*Madhya*), and high temperature (*Tivragni*), arose in development of *rasasastra*, more than 20 types, usually have two parts, lower or basal is known as *musa*, for heating drugs the lid or covering is called (*Pidhanaka*). See section below for sealing lids, and luting.

Krauncika

As *Musas* are made usually made from soil from Kraunca hill or their shape resembles bird Kraunca, hence synonym *Krauncika*.

Kumudi, resembles the *kumuda puspa* (white lotus)

Pacini, from *Pacana* used for heating

Vahnimitra "tolerate" heat, friend of fire *Vahni Mitra*.

Musa: Ingredients in making

1. *Dagha tusa* (burnt husk)
2. *Dagdha vastra* (burnt cloth)
3. *Balmika Mrttika* (Hillock soil)
4. *Angara* (burnt charcoal)
5. *Purana lohakitta* (old iron slag)
6. *Swetasma* (white stones)
7. *Dagdhagara* (burnt clay)
8. *Dagdha Balmika Mrttika* (Burnt hillock soil)
9. *Dagdha Gajamala* (burnt elephant dung)
10. *Daghaswamala* (burnt horse dung)
11. *Krsna Mrttika* (Black soil)
12. *Nara kesa* (man's hair)
13. *Bhunaga satwa* (metallic extract of worms)
14. *Sana* (jute)
15. *Kupi curna* (glass bottle powder)
16. *Sukti curna* (powder of marine shell)
17. *Istika curna* (brick powder)
18. *Vida lavana* (a type of salt)
19. *Vajra valli* (a herbal drug)
20. *Jala* (water)
21. *Chagi dugdha* (goats milk)
22. *Mahisi ksira* (buffalo milk)
23. *Bala rasa* (sida cardifolia juice)
24. *Matkuna Sonita* (blood of bed bugs)
25. *Pasana curna* (stone powder)
26. *Bhunagamrttika* (earth worm soil)
27. *Rakta mrttika* (red soil)
28. *Rajta varga curna* (powder of red group of drugs)
29. *Rakta varga rasa* (juice of red group of drugs)
30. *Tuvari* (alum) and
31. *Puspakasisa* (white ferrous sulphate)

Soils for *Musa*

1. *Valmika Mrttika* (Hillock soil)
2. *Kalini Mrttika* (Black soil)
3. *Bhunaga Mrttika* (earth worm soil)
4. *Rakta Mrttika* (red soil)
5. *Pita Mrttika* (yellow soil)
6. *Sweta Mrttika* (white soil)

Soils “greyish or blackish in colour, coarse but without sand content, greasy, sticky and heavy may be best for making Mrttika.”

Vajra Musa

Three parts clay (sandy mud, yellowish white with big particles), one part *sana*, one part of horse-dung, one part of ash or paddy husk and half part of *mandura* (iron rust) all pounded together. Used for taking out *sattva* (essence) of extremely hard substances like diamond, mentioned in *Rasarnav, Rasaratnakara, R. Cudamani*, etc. shaped like the cow's breast (*Gostanakara*) round oval. Constituent material, *Dagdha Tusa, Dagdha Vastra, Valmika Mrttika, Angara, Purana loha Kitta, white stone, Dagdha gara, Dagdha Valmika Mrttika, Dagha Gajamala, Dagdha Aswamala, Krsna Mrttika, Narakesa, Bhungaga satwa, Sana, Glass Bottle, Sukti and Istika curna, Vida lavana, Pasana behda patra*. These are mixed with *Bhavana drugs, Vajra vallirasa, Jala, Ajadugdha, Mahisi dugdha, Balarasa, Matukuna sonita*. Method of preparation: All powdered and added together, mixed with *Tusa, Vastra, Kupicurna, Sukti curna Narakesa, Sana, Vida lavana*, pound till mixed well. Now triturate mixture with liquids of *Bhavana drugs* for 3 days or till paste becomes soft, smooth and sticky, mold into round-oval shape, dry shape, Heat and harden, said to stand strong heat for four *yamas* 12 hours . Dash (1994) writes it is made from mud of ant-hill (one part) and ash of human hair (one part) triturated by adding small amount of goats milk.

Mukherji (1998) writes, "A Vajra Musha is prepared with the following: three parts of mud, one part of hemp fibre, one part of cow dung or horse's stool, one part of burnt husk and powdered stone combined, and half a part of oxidized iron. This crucible is used in the extraction of essences of metals."

Used in calcination of mercury, from Dash (1986).

Gara Musa

Materials Dagdha Gara, Loha kitta, Angara, Sana, Krsna Mrttika, Bhunaga satwa, Dagdha Tusa, and Mahisiksira.

Mukherji (1998) made of "Buffalo's milk, mud immersed in water a long time, and six times weight of the milk, oxidized iron, charcoal, jute fibre, and black soil are to be rubbed together and made into a crucible.

Method of Preparation : All drugs to be finely powdered and triturated with *Mahisa Ksira* and *Jala* for 15 days to make the paste soft and smooth. Now mold it like *Vajra Musa*, dry and heat. Good for *Rasakarmas*. Can stand strong heat for 2 *yama*, 6 hours. Black-soil (one part) and ash of paddy-husk (six parts) should be mixed with adequate quantities of *mandura* (iron rust) *sana*, etc. and used for preparation of the crucible (Dash 1986).

Vajra Dravan musa (also *Vajradravanika Musha*)

Materials: Gara, Bhunagasatwa, Sana, Dagdha Tusa, Mahia ksira. Lepana drugs,

Matkunsonita, Baldhwani mula Tanduliyaka rasa.

Mukherji (1998) “Mud, immersed in water for a long time, soil raised by-earth worms, jute fibers, and burnt husk, each in equal quantity, and the mud for crucibles, rubbed with buffalo’s milk, plastered with a paste of blood of bugs, balaka, and the root of the tanduliyaka” makes a crucible strong enough to smelt diamonds (vajra).

Method of preparation: All the drugs powder, mixed, triturate them with for 15 days to make the paste soft and smooth. Mold like *Vajra musa*, etc. when dry, paint with liquids of *lepana* drugs and heat in strong fire. It can resist heat for 2-4 *yama*, when full of material, otherwise only for 2 *yama* or six hours.

Varna Musa (or *Vara*)

Materials: Powdered *Rakta Varga* drugs, Powdered *Rakta Mrttika* (red soil) without stones.

Mukherji (1998) “Powdered iron (or mica, or diamond, or quartz), charcoal, burnt husk, one part each, mud for crucible– four parts, mud immersed in water a long time. “

Bhavana drugs, Juice of the *Rakta varga* drugs.

Lepana drugs: *Tuvari Puspakasisa*

Methods of preparation: Mix the powdered drugs with *Bhavana* drugs and triturate well until paste soft and smooth. Mold like *vajra musa*, paint with *lepana* drugs and allow it to dry. Fire to dry. This crucible has ordinary heat resistance.

Andha Musa: Scant details.

Raupya musa: also called *Varna* in Mukherji (1998). Mukherji, “Powdered stone, red earth, rubbed with the juice of that group of plants called the *rakta-varga* are to be made into a crucible which is to be plastered with catechu and green sulphate of iron. This is called “*Varna musha*” and Is intensifies color of red metals. If plastered with the *shweta varga* , then this is called *Raupya* (elsewhere in this manuscript *Swetavarga*). The *rakta-varga* refer to red plants, *kusumbha*, *khadira*, *laksha*, *manjistha*, *rakta chandanam*, *akshi*, *vandhujiva*, *karpura-ganghini*, and *makshika*. The *Swetavarga* or *Shvetavarga* plants, *tagara*, *kutaja*, *kunda*, *shveta-gunja*, *jinvanti*, and root of white lotus.

Materials, white soil without stones, powder of *Swetavarga* drugs

Lepana drugs: Spatial

Preparation: Mix the finely powdered drugs and triturate them with the decoction of swetavarga drugs till the paste becomes soft and smooth. Now mold it like *Vajra musa* and paint it with *lepana* drugs and allow it to dry.

Bhasma musa

Materials: one part brick powder and two parts of *tila bhasma*

Preparation: Mix all drugs and triturate these with water to make soft and smooth. Now mold it like an ordinary *Musa* and allow it to dry. In the end heat it strongly to make it strong and heat resistant. Ordinary heat.

Yoga musa

Materials: *Dagdha Tusa, Dagdhangara, Mrttika, Valmika mrttika* and *vida*

Mukherji (1998) made of “burnt charcoal, burnt husk, mud and earth of white ants, mixed with sufficient quantity of *vida*, suited to the requirements...Inner side of crucible to be plastered with sufficient quantity of same *vida*, mercury heated in this crucible, becomes more powerful than before. “

Preparation: Mix all powdered drugs triturate with water. Mold it to *musa* form and paint with *Vida*, allow it to dry and heat it strongly make the same strong and heat resistant. For mercury processings. Heat ordinary.

Prakasa Musa

Shape, is like a sarava (lid) with hole in the middle, here *Musa* and *Pidhanaka* are joined together by *Sandhibandhana*, lets *Prakasa* (light) enter into the *Musa* and hence the name.

Method of preparation: *musa* and *Pidhanaka* are made separately and then joined together to make them *musa* form.

Pakwa Musa shape of the pot *bhanda* of the potmaker.

Gola Musa, two round cups, joined together, for the potentiation of mercury (*rodhana* and *dravana melting*) ordinary heating. Mukherji (1998), *Gola musa* is a ball-shaped crucible, without any mouth. It is made to have the material that is to be subjected to heat be kept in the crucible at the time of preparation, and it is considered an efficient crucible in terms of time and heat loss.

Maha musa, shape lower portion like elbow joint, like *brinjal*, according to *Rasa Tarangini* is round and flat and broad mouth, as the *musa* is long and broad. Mukherji (1998) pointed at the bottom, gradually widening, resembles a big egg fruit in appearance, use for extraction of essences and incineration of iron, mica.

Manduka (Manjusa) musa: Shaped like the *Manjusa* (*Petika* or box) or like a *Manduka* (frog) i.e. it is square in shape having the depth, length, breadth, and height of about 6 *angulas* each.

Musal Musa: flat-bottomed crucible, ingredients similar to other *musa*.

Dirgha musa, generally made of iron, a long crucible.

Preparation: make ordinary *musa* cover its top with a dish (*sarava*) seal the joints, attach long tube similar to *Dhattura puspa* to the *Samputa* through hole in its middle.

Garbha Musa, Suska musa, etc. are for ordinary uses and of ordinary composition, see Reddy (2007) for more detailed list.

Materials: *Dagdha Tusa, Vastra, Angara, Mrttika Kupicurna, Pasana curna, Bhunaga Mrttika*

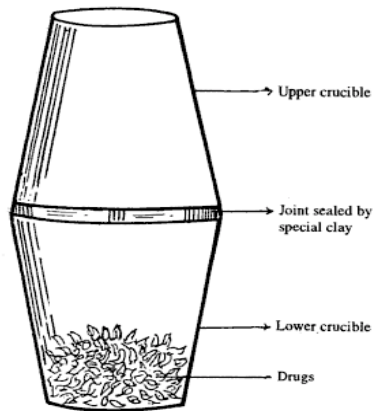
Method of Preparations: Powder all the drugs finely and triturate with water till the paste becomes soft and smooth. Now mold it like *Vajra-Musa*, dry it and heat it, etc. Can resist heat for only 1 *yama*, about 3 hours.

Suska Musa: made of *Dagdha tusa, Lohakitta, Gairika, Kulala, Mrttika, Sweta Mrttika,* and Chalk. Method of preparation is the similar crucible form, with above ingredients made into a soft, smooth paste.

Prakata Musa: shaped like *Sravaka*, made of same as ordinary *musa*. Make same as *Vajra Musa* deep like *Sravaka*, hole in the middle the same is called *Prakata musa*.

Samanya Musa: A crucible for general use. Made of charcoal, ash of the paddy husk, fibres of *sana* (*Crotalaria juncea* Linn.) and horse-dung are taken together and mixed well by pounding with a hammer. A cone or funnel shaped crucible prepared of this material is called *samanta musa* (crucible for general use) if any specific type of crucible is not prescribed, then this general type of crucible is used in pharmaceutical process. It is used for mixing two metals together, then it is called *dvandva melapana musa*. It is prepared according to the size/shape of the nipple of cows called *gostani musa*, and is generally used for taking the *sattva* (essence) of mica, etc. If it is shaped like *Dhatura* flower, it is called *dhattura puspa musa*.

MALLA MŪṢĀ
(APPARATUS PREPARED OF TWO CRUCIBLES)



Malla Musa, is when two round crucible are face to face. Dash (1994) add it should be burnt after smearing with two layers of *malla* (arsenic).

The following on crucibles from Mukherji (1998)

Gostani musa, Shape of cow's udder with a cover with a handle, used for extraction of essences and purifying metals.



Modern *gostani musha*, in shape of cow's nipple, modern Zirconium crucible, and contemporary clay designs all used in modern Rasa Shastra, Ayurveda and Rasayana.

Luting, sealing pastes for Indian crucibles:

Toya mrttika: Finely powdered *Mandura* (oxide of lead) is mixed with equal quantity of *guda* (jaggery, a type of unrefined sugar) and Curna (lime). This mixture is vigorously ground in the semisolid *kwatha* (decoction) of *Babbula*, then boiled until a semisolid sticky glue. This paste-like substance is known as *Toyamrttika* or *Jalamrttika* (Notice the *Amrtti*, *amrita* connected with the hermetically sealing of the crucibles that contain healing, or immortal drugs), used for sealing the joints, and making the joints water proof.

Vahni Mrttika This is made of the fine powder of *Khatika* (chalk), salt, *Mandura* (oxide of lead) in equal quantities of buffalo's milk. This is called *Vahnimrttika* and can sustain very high heats. "As a man cannot disentangle himself from the grip of matured love of a sensuous woman, in the same way *Parada* (mercury) cannot escape from the crucible which is sealed with the help of such *Vahnimrttika*, even under the impact of intensive fire. Nobody has the knowledge of the power this *Vahnimrttika*, except the *Rastasastra* scholars like *Nandi*, *Nagarjuna*, *Brahmajyothi*, *Muniswara* and *Sri Somadeva*."

Dash (1994) has a recipe for sealing joints of crucibles, etc. with pieces of cloth, smeared with clay made of chalk, salt, paste of *masa*, jaggery, *gugulu*, *atasi*, and powder of stone. Another, Muf of ant-hill (common referene), charcoal, rust of iron, white clay, in equal amounts and made into powder, mixed with equal quantities ash of paddy husk, then water trituration until it forms a paste. There is a recipe for *Saivalabhaksa*: two parts of paddy-husk, one part of cloth-pieces, three parts of mud mixed with water and pounded. To this human hair is added until paste becomes sticky, and kept moist for seven days, then used for wrapping glass bottles and sealing joints of crucibles.

Conclusion

The above entries hope to condense the scattered references to crucibles from a variety of texts and to place them online for potters, alchemists, practitioners of Ayurveda, rasayana etc., and for researchers and scholars. The different crucibles and ingredients demonstrate systematic exploitation of different muds, oxides of metals, stone, diamond and quartz powders, with dungs, hair, salts and metals added into achieve the optimum granulometric composition to avoid thermal stress. Herbs and plant ashes were used, perhaps adding silicates and salts, as were the different soakings of the mud, additions of animal fats and milks used to achieve different densities capable us keeping its integrity in high heats from a prolonged time. This is by no means exhaustive, and will updated as notes are updated to the document. There is a companion pieces of earthenware in Indian alchemy that discusses other apparati, kilns, ovens and more related alchemical arts of the potter. Subsequent pieces in this series will compile data on Chinese and Arabic alchemical vessels as well as their related clay-ware furnaces and kilns. These, and a monograph on Hermetic and European pottery is forthcoming to www.chymicalphilosophers.org

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