



Insights on ancient medical chemistry

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Abstract

There is evident from the concerned literature that since ancient period herbal, animal origin, mineral and herbo-mineral preparations were found to used for prolong period of life span and to maintain health. Nagarjuna, an indian alchemist (8th cent.A.D.) flourished alchemy in india. Most of the Ancient author's were recommended purified and processed metals, minerals and gems in the treatment, because of its fast acting, low dose, no self-life etc. Mercury (*Parada*) is the most important drug, has a special importance in Indian alchemy (*Rasashastra*) than other components. It has the ability and power to assimilate all the drugs (such as *Dhatu*, *Upadhatu*, etc). It works very effective and increases its potency when it processed and purified with special procedures (*Samskara*). The important minerals are classified into *maha* (superior) *rasa* and *Upa* (subsidiary) *rasa*, *Sadarana rasa* etc. Indian alchemy literature was given the processes and purification methods (*Sodhana*) of metals, minerals and gems, dose fixation, indication and adverse effects if it used in impure form, vehicle of specific drug etc.

Keywords: Indian alchemy, rasasastra, mercury, rasa, nagarjuna

Introduction

The word 'alchemy' as the article *Al* indicate, is Arabic (*Al-Kimiya*) is generally believed to have been derived from the Egyptian *kemi* (the black) or the Greek word *chyma* (black molten metal)^[1].

There is evident from the concerned literature that since ancient period herbal, animal origin, mineral and herbo-mineral preparations were found to used for prolong period of life span and to maintain health. Nagarjuna (indian alchemist 8th A.D.) flourished alchemy in india. P.C. Ray accepted the period of its maximum activity might lie between A.D. 800 and the middle of the seventeenth century^[2]. Mercury (*Parada*) is the most important drug (extolled as the king of *Rasas*), has a special importance in *Rasashastra* than other components. It has the ability and power to assimilate all the

drugs (such as *Dhatu*, *Upadhatu*, etc). It works very effective and increases its potency when it processed and purified with special procedures (*Samskara*). The important minerals are classified into *maha* (superior) *rasa* and *Upa* (subsidiary) *rasa*, *Sadarana rasa* etc. The metals and minerals are given in detailed in a separate branch in Ayurveda as *Rasasastra* (Indian alchemy). The *Rasasastra*, is composed of two words i.e. *Rasa* and *Sastra*, It is dealing with the knowledge of *Rasa* (is used to denote *Mercury* or metals or minerals) and its properties, purification methods and different ways of use etc. Not only alchemists but other *acharyas* i.e. *Yogaratanakara*, *Chakradatta* (11th A.D.) etc. also considered superiority of *rasa yoga*'s and included in there texts. Few texts are tabulated below.

Table 1: Few texts related to Indian alchemy (*Rasavidya*)

S. No	Name of the Book	Author	Period
1	<i>Kakachandeswara Mata Rasa Ratnakara Rasendra Mangalam Rasarnava</i>	Nagarjuna	7-8 AD
2	<i>Rasahridayatantra</i>	Govind Bhagwatpada	8-10AD
3	<i>Rasahridaya tantra</i>	Bikshu Govinda padacharya	10 AD
4	<i>Rasarnava</i>	Bhairavananda	10AD
5	<i>Chakradutta</i>	Chakrapani Dutta	11 AD
6	<i>Rasa prakasa sudhakara</i>	Yasodhara	12AD
7	<i>Rasendrachudamani</i>	Somadeva	12-13AD
8	<i>Rasaratna Samucchaya</i>	Vagbhata	13AD
9	<i>Rasendrasarasangraha</i>	Gopala batta	13 AD
10	<i>Rasa ratnakara</i>	Nityanatha Siddha	13 AD
11	<i>Rasendracintamani</i>	Dhundukanatha	15 AD
12	<i>Lohasarvasva</i>	Suresvara	15AD
13	<i>Rasapaddati</i>	Bindhu	15AD
14	<i>Rasamanjari</i>	Salinatha	15AD
15	<i>Rasachintamani</i>	Ananthadevasuri	15AD
16	<i>Rasakaumudi</i>	Jnacandra sarma	16AD
17	<i>Ayurveda prakasa</i>	Madhava Upadyaya	17AD
18	<i>Yogaratanakara</i>	Yogaratanakara/ Mayurapada	18 AD

Mahara

Table 2: List of Maharasa with Details

S. No	Chemical name	Ayurvedic name	Chemical formula
1	Mica	Abhraka	Krishna vajrabraka (Biotite) (HK) ₂ (Mg Fe) ₂ (Al Fe) ₂ (SiO ₄) ₂ (SiO ₄) ₃
2	Tourmaline	Vaikrantha	XY ₃ Z ₆ [Si ₁₆ O ₁₈] [BO ₃] V ₃ W (X=Na etc, Y=Al, Fe etc, Z=Al etc, V=OH etc, W= OH etc)
3	Copper Pyrite	Makshika	CuFeS ₂
4	Iron Pyrite	Vimala	Fe ₂ S ₃
5	Black Bitumen and Potassium Nitrate	Gomutra silajatu and Karpura silajatu	KNO ₃
6	Copper Sulphate	Sasyaka/Tutha	CuSO ₄ 5 H ₂ O
7	Bismuth Ore	Chapala	
8	Zinc Ore/ Calomine	Rasaka	ZnCO ₃

These eight drugs are called as *Maharasa* which is used for the potentiating the *Rasa* (Mercury) [3].

Uparasa

Table 3: List of Uparasa with Details

S. No	Chemical name	Ayurvedic name	Chemical formula
1	Sulphur	Gandhaka	S
2	Ochre/ Red oxide of iron	Gairika	Fe O ₃
3	Ferrous Sulphate	Kasisa	FeSO ₄ 7 H ₂ O
4	Potash Alum	Kankshi	K ₂ SO ₄ Al ₂ (SO ₄) ₃ 24H ₂ O
5	Orpiment	Hartala	As ₂ S ₃
6	Realgar	Manashila	As ₂ S ₂
7	Collyrium	Anjana	Sb ₂ S ₃

Along with above seven and one plant origin *Ruhbarb* (*Kankustha*) is called as *Uparasa*. Which are used in *Parada karma* [4].

Sadharana ra

Rasacharya have mentioned these eight drugs as the drugs, which are used in *Rasakarma*. They are used logically in formulations to get good result [5].

Table 4: List of Sadharanarasa with details [6]

S. No	Chemical name	Ayurvedic name	Chemical formula
1	Vitreous or Arsenic Oxide	Gauripaashaana	As ₂ O ₃
2	Ammonium Chloride	Navsaagara	NH ₄ Cl
3	Red Oxide of Mercury	Girisindura	-
4	Cinnabar or Red Sulphide of Mercury	Hingula	HgS
5	Lead Oxide	Mruardarshringa	PbO

Remaining are plant origin and animal origin which includes *Mallatus Phillipinensis/ Muell-Arg* (*Kampilla*), *Cowrie* (*Kaparda*) and *Ambaragris* (*Agnijaara*).

Metals (Dhatu)

Ancient chemists metals (*Dhatu*s) were also used in medicines. Which prevents the ageing, hair fall, greying of hair etc when it is consumed [7]. *Dathu*s are classified in to three groups i.e *Sudha loha* (Pure metals) (Gold, Silver, Copper, Iron), *Puti Loha* (Lead (*Naaga*), Tin (*Vanga*) and *Misra Loha* (Alloy)-(Kamsya, Pitala, Varta) [8]. Processed

Zinc (*Yasada*) also used in Ayurvedic medication for eye diseases (*Netra roga*), *Diabetis* (*Prameha*), *Anaemia* (*Pandu*), *Cough* (*Kasa*) etc [9].

Table 5: List of Metals used in Ayurveda [10]

S. No	Metal	Ayurvedic name	Chemical name	Chemical formula
1	Gold	Svarna	Aurum	Au
2	Silver	Rajata	Argentum	Ag
3	Copper	Tamra	Cuprum	Cu
4	Iron	Loha	Ferrum	Fe
5	Lead	Naaga	Plumbum	Pb
6	Tin	Vanga	Stannum	Sn

Upadhatu

In Indian alchemy, they mentioned how to extract the main component from the ores. *Swarna Makshika* (Pyrite), *Tutha* (Blue Vitriol), *Abhraka* (Mica), *Nilanjana* (Antimony), *Manashila* (Arsenic disulphide), *Haritala* (Orpiment), *Rasaka* (Zinc Ore or Calamine) these seven drugs are called as *Upadhatu* [11]. They all are the ores, from which the metals are extracted. Purified Iron oxide – Fe₂ O₃ (*Mandura*) is used as substitute of *Loha*, which is used in *Tuberculosis* (*Sosha/Rajayakshma*), *Oedema* (*Sotha*), *Splenomegaly* (*Pleha vrudhi*) [12]. Different processes and different equipments were used for this.

Table 6: List of Upadathu with details

S. No	Some ores	Extract
1	<i>Hingula</i> (HgS)	Mercury (<i>Parada</i>)
2	<i>Tutha</i> (CuSO ₄ 5 H ₂ O) <i>Makshika</i> (CuFeS ₂) <i>Abhraka</i> (Mica)	Copper (<i>Tamra</i>)
3	<i>Mandura</i> (Iron oxide – Fe ₂ O ₃) <i>Makshika</i> (Copper Pyrite - CuFeS ₂) <i>Vimala</i> (Iron Pyrite- Fe ₂ S ₃)	Iron (<i>Loha</i>)

Sikatavarga, Ratna, Uparatna and Other Group

Sikata varga group of drugs are the compound of Silica (Si₂), Magnesium (Mg₂) and Water (H₂O). *Dugdhaashana* (Magnesium Silicate), *Kausheyashma* (Silicate of Magnesium), *Naagapaashana* (Ophite / Serpentine) *Badarashma* (Silicate of Lime) are the drugs mentioned in *Sikatavarga* [13]. *Ratnavarga* group include Gems or precious stones and materials obtained from animals. These gems are used in medicines after process.

Table 7: List of Gems/ Precious stones (Ratna Varga) used in treatment ^[14]

S. No	Gems/ Precious stones	Ayurvedic Name	Chemical formula	Colour	Basma Colour
	Ruby	Manikya	Al ₂ O ₃	Lotus Red (<i>Kamala puspa</i>)	White (<i>Sweta</i>)
	Pearl	Mukta	CaCO ₃	White (<i>Sweta</i>)	White (<i>Sweta</i>)
	Coral	Pravala	CaCO ₃	Red (<i>Bimbi phala</i>)	White (<i>Sweta</i>)
	Emerald	Marakata	Be ₃ Al ₂ SiO ₂	Green with yellow (<i>Hardra</i>)	White (<i>Sweta</i>)
	Diamond	Vajra	C	Multi or white transparent colour (<i>Indradhanusi</i>)	White (<i>Sweta</i>)
	Sapphire	Nelam	Al ₂ O ₃	Thick blue (<i>Neela varna</i>)	White (<i>Sweta</i>)
	Topaz	Pusparaga	Al (F ₂ OH) ₂ SiO ₄	Yellow gray (<i>Swarna</i>)	White (<i>Sweta</i>)
	Zircon	Gomeda	Zr SiO ₄	Yellow (<i>Gojala chaya</i>)	Light yellow (<i>Peta</i>)
	Cats eye	Vaidurya	BeO Al ₂ O ₃	Greenish yellow (<i>Syama subraba</i>)	White (<i>Sweta</i>)

Tables 8: *Uparatna* and other group of drugs used in Ayurvedic medicines

S. No	English name	Ayurvedic name	Chemical formula
1.	Sunstone	<i>Suryakanta</i>	Na ₂ OAl ₂ O ₃ 6SiO ₂ +CaO Al ₂ O ₃ 2SiO ₂
2.	Moon stone	<i>Chandrakanta</i>	KAl Si ₃ O ₃
3.	Lapis Lazuli	<i>Rajavarta</i>	Na ₄ (S ₃ Al) Al ₂ (SiO ₄) ₃
4.	Turquoise	<i>Pairojaka</i>	H ₅ [Al(OH) ₂] ₆ Cu (OH) (PO ₄) ₄
5.	Borax	<i>Tankana</i>	Na ₂ B ₄ O ₇ H ₂ O
6.	Gypsum	<i>Godanti</i>	Ca SO ₄ 2H ₂ O
7.	Serpentine	<i>Jaharmohar</i>	H ₄ Mg ₃ Si ₂ O ₉
8.	Serpentine	<i>Nagapasana</i>	H ₄ Mg ₃ Si ₂ O ₉
9.	Amber	<i>Trunakanta</i>	Succinum
10.	Agate	<i>Akeka</i>	SiO ₂
11.	Gypsum	<i>Godanthi</i>	Ca SO ₄ 2H ₂ O
12.	Turquoise	<i>Phirosa</i>	(CuOH) Al(OH)Z 6H ₅ (PO ₄) ₄

Discussion

In Indian alchemy literature, the method of processes of metals and minerals are given as purification (*Sodhana*), conversion to non-toxic fine powder (*Marana*), preparation of intermediate mixture (*Mardana*), reactions at high temperature (*Putapaka*) etc. Some specific equipment (*Yantras*), Crucibles (*Musa*) etc. are used for purification from the metals and minerals. Crucibles are used to remove impurities, extraction of core metal content (*Satva*) from metals and minerals. Different type of Furnace- heating device (*Kosti*) used for extraction of metallic contents (*Satva*) from minerals and for the purification (*Shodana*). Heating schedules (*Putra*) expresses the different degree (quantum) of heat required for proper conversion of metal or mineral in to suitable *basma* form, so that it is made highly absorbable. Generally Cow dung cakes (*Vanotphala*) are used for generating and maintaining heat. The quantity and thickness of cow dung are vary depend on heating schedule and Particular drug. After doing some process with herbal drugs, Metal or mineral is kept in Combination of Mud plates (*Sarava samputa*) or Crucible (*Musa*) or Bottle (*Kupi*) and placed either in the fuel or furnace or heating schedule for applying heat from all sides. With this, metal or mineral particle convert in to fine powder of suitable chemical compound form.

Some processing techniques are greatly helped to change these metals and minerals in to non-toxic. After proper processing, these metals and minerals are become highly absorbable, therapeutically most effective, and most suitable to body. For example, Fine leaves of metals are made and burnt in fire. Hot metal leaves are dipped in each of the following materials - oil (*Taila*), Buttermilk (*takra*), Cow's

urine (*Go-mutra*), Processed sore liquid (*Aranala*), decoction of horse gram (*Kulutha*). After seven times of process in the above materials, the metal leaves are cut into small pieces and made into a ball with mercury (*Parada*). This ball is then put into a closed container along with Sulphur (*Gandaka*), the closed container is put into fire and the metal is burnt. This process is done again and again for fourteen times. Then ultimately a collected ash of metals is used as ingredient in medicine. Mercury (Hydrargirum (Hg)) had to undergo 18 processes such as Steaming (*Swedana*), Grinding (*mardana*), distillation (*Patana*) etc. before it could be used for transforming either metals or human body (*Lohavada or Dehavada*).

After proper process of purification and refined form alchemists had given different tests for examination of the final product. The qualities are changed in to light form (*Laghutva*), it float on water surface (*Apsumajjanatva*), after rub with finger it should enter in to the furrows of the fingertip (*Rekhapurnata*) etc. These could not reverses/ return to their original form (*Apunarbhava*). With this process it get converted in to fine powder form (*Churnatvapti*), enhance the properties (*Gunadikyata*), become more effective (*Tatogryata*) likely to spread quickly in to the whole body (*Seegravyapthi*) etc. Consumption of impure gold (*Swarna*) causes somany adverse effects i.e. Reduce the immunity (*Bala nasta*), increase the disease (*Roga varadaka*), causes the death (*Mruthyukara*) in same time purified gold is useful in Diabetis (*Pramehsa*), Bleeding (*Raktha pitta*), Psycosis (*Unmada*), Epilepsy (*Apasmara*), Pain (*Sula*), Fever (*Jwara*), Eye disease (*Netra roga*) etc ^[15]. So, Proper knowledge should be attained on the process of purification, dose fixation, vehicle selection etc.

Table 9: Colour of few items (before and after process)

S. No	Item	Colour of Item (Before process) ^[16]	Basma colour (After process) ^[17]
1	Mica	Black (Krishna)	Brick red (Istika varna)
2	Gold	Rakta petaka	Red (Champak)
3	Silver	White (Sitam)	Black (Krishna)
4	Copper	Red (Sonam)	Dull black (Dhusara varna)
5	Iron	Black (Krishna)	Thick black (Jambuphala)
6	Lead	Dull white (Dawala)	Ash colour (Paravata)
7	Tin	Black (Krushna)	White (Sweta)

The texts of Indian alchemy reveal that a wide variety of medicines were used to prepare with combination of this organic and inorganic substances and plants as well as animal products. These medicines are best among all types of medicines because of these medicines are works quick and fast, easily palatable, the dose required is too less as compared to herbal medicines, have long shelf life and potency of medicines is increases as it becomes old and also useful in long standing and incurable diseases.

Conclusion

The clinical utilities of the metals, minerals, gems are discussed in this article, including the classification, methods of purification etc. Most of the Ancient author's were recommended purified and processed metals, minerals and gems in the treatment, because of its fast acting, low dose, no self-life etc. These metals and minerals having poisonous effect, but that effect can be averted with the standard process of prior purification, hence providing us with an overall positive efficacy and acts like nectar. However, Proper knowledge should be attained on the process of purification, dose fixation, vehicle selection etc.

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