

CHAPTER II

ALCHEMY IN INDIA

Alchemy flourished in India in the medieval period. It had, like in other areas of civilization, two characteristic features, viz. gold-making and elixir-syntheses. The two faces of alchemical practice, the metallurgical and the physio-religious, were superimposed providing a single picture where mercury and its elixirs were used in transmutation of base metals into noble ones as well as for internal administration, for purifying the body, rejuvenating it and taking it to an imperishable and immortal state.

The ideas of rejuvenation, longevity and immortality which became the basis of physiological alchemy can be traced to earlier historical sources in Vedic literature. We come across the belief that the liquid extract of the "Soma" plant was potent and was drunk by Gods for achieving immortality. Other alchemical notions, such as that of gold being the purest and the noblest of all metals and that it can confer its imperishability upon others by mere contact, are also very ancient. This notion explains the use of gold and

its compounds in medicinal recipes. Buddhist literature¹ of the fifth/sixth century AD also gives recipes for synthesizing medicines from substances of plant and mineral origin which would give strength, long life and immortality.

In the area of metallurgical alchemy, one finds references to brass-making and making other kinds of gold-like alloys in Kautilya's Arthasāstra.² (A text of the second/third century B.C.) The name for brass was Ārakuta. The same text tells us how to make alloys from metals like gold, silver, lead, iron, copper, etc., of a desirable colour. Use of mercury in making gold-coloured amalgams was also known in Kautilya's time, as seen in the following³ verse.

¹See "Long-Shu Wu-ming lun", i.e., Nāgārjuna's Pañcavidyā in Tripitaka in Chinese, edited by Takakusu, J. and Watanabe, K., Tokyo, 1968, p. 962.

²Kautiliya Artasāstram - see the list of Primary Sources, p. 91.

³Kautiliya Arthasāstram - p. 96.

जम्बूनदं, शतकुम्भम्, हारकम्, वैनवम्, शृंगीशुक्तिजम्,
जातरूपम्, रसविद्धम्, आकरोद्गतम् च सुवर्गम् ।

Jambūnadam - Gold from the sands of Jambu river.

Śatakumbham - Gold from the sands of Śatakumbhā river.

The different kinds of golds are Jāmbūnadam, Śātakumbham, Hātakam, Vainavam, Śrīngīsūktijam, Jātarūpam, Rasavidddham, Ākarotgatam and Suvarṇam.

Here "rasavidddham", i.e., "the one obtained from the treatment with mercury" is also included as a "kind of gold". The inclusion of "Hātakam" in the above list also provides evidence of alchemical practice, since "Hatakas" are the elixirs made from mercury and other ingredients and they could transmute other metals into gold (i.e., gold-like metals).

The Philosophy of Mercury

We come across evidence of alchemical practice, in the true sense of the word, in texts written in the medieval period. These texts in fact look upon success in

FN. 3 continued

Hātakam	- Gold made using Hataka or mercury elixir.
Vainavam	- Gold from the river Veena.
Śrīngīsūktijam	- A kind of gold used for ornaments of God (probably with a high copper percentage).
Jātarūpam	- Probably naturally occurring pure gold.
Rasavidddham	- Made by the action of mercury, i.e., gold-coloured amalgams of other metals.
Ākarotgatam	- Synthesized gold (probably gold extracted from its ores).

gold-making as a pre-requisite to the one of the elixir for internal administration.

The alchemist looked upon the process of transmutation as a process of purifying metals, as bringing them to an imperishable state, that of gold. This process was looked upon as identical to that of culturing human body and making it indestructible. That these two processes were supposed to be parallel is evident from the following verse⁴ of Rasaratnākara of Nāgārjuna.

I shall certainly tell you whatever is asked by you, i.e. remedies of warding off wrinkles and grey hair, and also of stopping the process of ageing. These preparations can act with equal efficacy on the metals as well as on human body.

Various names were given to mercury, e.g., Mahārāsa - chief of all rasas, i.e., substances or chemicals; Rasendra - Indra (or king of Gods) of the rasas. Other names for mercury were Pārada (the one which leads us to cross the ocean of life), Suta (born - in the sense originating from God), Haribija (essence of God Śiva), Svarnakāraka (gold-maker), the last one suggesting its

⁴Rasaratnākara of Nāgārjuna (see Primary Sources), p. 317.

कथयामि न सन्देहः तत्त्वया परिपृच्छताम् ॥
 वृत्तीपलितं नागच्छ तथा कालस्य ध्वंसनम् ।
 यथा लोहे तथा देहे क्षमेत नात्र संग्रहः ॥

alchemical applications. The potions containing mercury were supposed to induce longevity and immortality, thus making it the chief ingredient of the powders used in transmutations and as elixirs.

A philosophic base was given to mercury-based alchemy in India. Mercury was thought to be the essence of the God Śiva and sulphur as that of Goddess Pārvati. Sometimes mica was also named after Goddess Pārvati, viz. Gauri, since Gauri is another name of the same Goddess and means "a fair one". A number of texts like Rasārṇava were written as a dialogue between Śiva and Pārvati where Śiva confers the alchemical knowledge upon Pārvati. A combination of male and female principles, i.e., mercury and sulphur (forming cinnabar or mercuric sulphide) or mercury and mica, was supposed to be potent and was thereby consumed as "Rasāyana" or a medicine for increasing body fluids or vitality.

In Buddhist alchemical texts⁵ too we find a parallel concept of a dialogue. Prajnāpārmīta (one with countless or boundless intelligence or wisdom), a name for Buddha, confers alchemical knowledge to his disciples. This description of Buddha as a conferrer of knowledge

⁵See "Rasaratnākara of Nāgārjuna in Primary Sources, p. 316.

of making elixirs which have healing and rejuvenating properties, fits well his popular humanitarian image.

Āyurveda and Rasāyana

The earliest mention of Rasāyana was in Āyurveda which was probably composed by eighth to ninth century B.C., since it is a part of Atharvaveda, the last of the four Vedas, which were supposed to be written between the fifteenth to the eighth century B.C. The Āyurvedic system is a very ancient tradition of Indian medicine.⁶ Ćaraka, the renowned medical practitioner of the third/ fourth century B.C., tells us that original Āyurveda consisted of eight parts and "Rasāyana" was one of them. The eight parts were:

1. Kāyācikitsā - Therapeutics.
2. Śālakya - The science of special diseases of the eyes, nose, ears, mouth, throat, etc.
3. Śalyapahartrka - Surgery.
4. Viśagara vairodhikaprasamana - Toxicology.
5. Bhūtavidyā - Psychiatric knowledge.
6. Rasāyana - Rejuvenation.
7. Kumārbhrtya - Pediatrics.
8. Vājīkarana - Knowledge for increasing virility.

⁶See Ćaraka Saṃhita in Primary Sources, p. 4.

We find in the earlier Āyurvedic Treatises such as Çaraka-Saṃhita, an extensive use of plants and plant products in the synthesis of medicines. Metals like gold, silver, lead, copper, iron and tin were used in medicinal preparations. Minerals like iron pyrite, copper pyrite, bitumen; salts such as common salt, rock salt, alkaline salts, black salt, fossil salt, etc. were known to have medicinal properties. Certain compounds like orpiment, realgar, iron and copper sulphates, antimony sulphide, etc. were usually used in external applications. A combination of metals, such as sarvaloha (which includes tin, lead, iron, copper and silver), as a finely divided powder in myrobalan juice was known as a tonic. Sulphur was used in medicines applied externally for skin diseases and also for internal administration in the form of a suspension in plant juices, for asthama, cough and chronic skin diseases. Bronze was used in making apparatus. Various salts, earths, alum, sulphur, quartz, etc. had internal as well as external applications.

It is interesting to note that mercury is not mentioned in Çaraka Saṃhita, nor cinnabar which is mercuric sulphide. Though "Siṅdura", i.e., mercuric sulphide or sometimes lead oxide, was known from ancient times, its use in elixir preparations was not known. Thus, it appears that mercurial medicine is a later development in the

history of Indian medicine. Mercury was included in texts such as Dhanvaṅtari Nigāṅthu or Rājnigāṅthu. Rasāyana in earlier texts probably did not include mercury. Rasāyana in the sense of "medicines derived from mercury" appeared in the medieval period during which a large number of alchemical texts were written.

We have discussed earlier in the Introduction that Hindu Philosophy cultivates transcendental tendencies which influenced Indians for over two millennia. Yet, every now and then, we find the advocates of materialism coming up in the form of Vṛātyas as they were called. After the decline of Buddhism and before Śaṅkarāchārya reinforced Hindu Philosophy, materialistic tendencies came to the fore in the form of Tantrism. Hence the period between 800 AD and 1300 AD is sometimes called the Tantrik period in Indian history.⁷ Tantras offered to lead humans towards the divine experience in this very life. It advocated that preservation of the body or Kāyā-Sādhanā was the essential part in attaining this goal. Here mercurial preparations assumed great importance, and alchemy was at its peak during this period. A number of

⁷Subbarayappa, B. V. - in "Concise History of Sciences of India", p. 316.

Tantrik texts such as Kujjikātantra,⁸ Rasaratnākara were written in which characteristic features of Tantrism were entwined with alchemy.

Tantrism developed as a counter-philosophy to the idealistic "Vedānta" philosophy, just like Taoism developed as a counter-philosophy to Confucianism in China.

Parallels between Tantrism and Taoism, and the relation of Tantrism to science, are discussed by Chattopaddhyaya⁹ in his work "Lokāyata", where he aptly writes,

The concept of physical immortality and its connection with the alchemy of Tantrikas is, again, strongly reminiscent of ancient Taoism. The Taoist, as Needham showed, were emphasizing the importance of certain techniques like the respiratory technique (Prānāyāma), the gymnastic technique (āsana), the sexual technique (Rasāyana) - and all these for the purpose of attaining a state of material immortality. This conception of material immortality, he added, was of incalculable importance to science because it stimulated the development of the technique of alchemy. We have seen that precisely the same thing was said of Tantrism by our Tantrikas themselves, unlike the followers of the idealistic system of Indian philosophy who belittle the importance of the body and dream of the liberation of the soul. The Tantrikas with their supreme emphasis on the material human body (Dehavāda) conceived liberation only in terms of the development and the culture of the body (kāyā-sādhanā). It is no wonder, therefore, that they should have been so much concerned with concrete material measures that

⁸Ray, P. (1), see Secondary Sources, p. 115.

⁹Chattopaddhyaya, D. P., see Secondary Sources, p. 357.

could ensure the development and the preservation of the body itself. This explains their contribution to alchemy and medicine. In short, the proto-materialism of the Tantrikas was the clue to their proto-scientific tendencies.

Alchemical Texts of the Medieval Period

Numerous alchemical texts were written between the ninth and the fourteenth century. They contain a combination of metallurgical, proto-chemical as well as iatro-chemical knowledge. The chief texts are the Rasasāstra texts in Sanskrit such as Rasaratnākara of Nāgārjuna, Rasahr̥daya of Govind Bhāgwat, Rasaratnākara of Siddha Nityanātha, Rasārṇava by an unknown author, Rasendraçudāmani by Somadeva, Rasaratnasamuççaya by Vāgbhat, etc. A number of alchemical texts were also written in the Tamil language. They are known as Muppu texts. These texts were written by the practitioners of the Siddha system of medicine. The more prominent Siddhas were Agastyār, Bogār, Rāmdevār, Karuvurār, etc. Both the characteristics of alchemy, metallurgical and physiological, are clearly reflected in these texts. The text "Bogar Karpam", written by Bogar, exhibits profound Chinese influence. This is discussed in a later chapter on Transmission of alchemical and chemical ideas between India and China.

There were alchemical texts written in other Indian languages as well, e.g., Hindi, Telugu, Kannada, Marathi, Bengali, Oriya, etc. Some such texts found in Western India, are written by members of the Jaina sect. They are essentially similar to the other texts in their alchemical content. Thus it may be concluded that alchemy was much in vogue in India during the medieval period and people of many languages and sects participated in its practice.

Endeavours of the Medieval Alchemist

As we read the alchemical texts written in the medieval period we come to realise the colossal nature of the alchemist's enterprise. He used the earlier knowledge of metals, minerals and that of the plant kingdom to design his methods, and also developed upon it from his experience. Since, in his methods the purity of the ingredients was of utmost importance, the alchemists adopted various methods of purification. The substances frequently used in the alchemical operations were metals like gold, silver, iron, lead, copper, zinc, tin and mercury. Arsenic and sulphur were also used. Orpiment-arsenous sulphide (As_2S_2), realgar-arsenic sulphide (As_2S_3) and cinnabar-mercuric sulphide (HgS) were of great

importance. Other compounds which largely occur in such operations are:

Iron or copper sulphate	$\text{FeSO}_4 \quad 7\text{H}_2\text{O}$
	$\text{CuSO}_4 \quad 5\text{H}_2\text{O}$
Iron, silver or copper pyrites	metallic sulphides
Sodium carbonate and chloride	$\text{Na}_2\text{CO}_3, \text{NaCl}$
Ammonium chloride or sal ammoniac	NH_4Cl
Potassium nitrate or salt petre	KNO_3
Borax	$\text{Na}_2\text{B}_4\text{O}_7 \quad 10\text{H}_2\text{O}$
Calamine or zinc carbonate	ZnCO_3
Lead oxide - minium, red lead	$\text{Pb}_3\text{O}_4, \text{PbO}$

Different kinds of gems, as well as mica, occur in a number of recipes. Animal derivatives such as milk, ghee (clarified butter), honey, meat, urine and blood also found their use in alchemical methods.

The transmutation processes designed by the alchemists were based on a few principal chemical operations such as making gold or silver-coloured alloys of metals which were sometimes amalgams, formation of yellow sulphide film on the metal surface or consisted of dyeing the metal to a desirable colour with plants having dyeing properties. The technique of tinging or colouring the metal using a number of combinations of inorganic salts

and plant juices (giving various organic substances), were also known and practised by the medieval alchemist. The chemical operations which are involved in the transmutation processes, described in the Sanskrit alchemical text Rasārṇavakalpa, are analysed in a later chapter.

No doubt the alchemist must have tried several combinations of metals, salts and plant products, before he could finally reach the correct method. Also for determining the right proportion of ingredients, adequate supply of heat and, for that matter, the selection of the right kind of fuel and reaction-period as well; several repetitions of the process must have been carried out. These activities acquainted the alchemist with physical and chemical properties of the above-mentioned substances.

Plants were extensively used in various syntheses. As a matter of fact, extensive use of plants and plant-products is the characteristic feature of Indian alchemy. They served a number of purposes such as obtaining acids and bases of different strengths; as solvents and as a source of carbon for reduction processes. The appropriate selection of plants in a particular process shows the thorough knowledge of the alchemist, of the plant kingdom. In the text Rasārṇavakalpa about forty plants are mentioned which are applied in different

methods. Contents of a few of the alchemical texts are discussed here, e.g., Rasaratnākara of Nāgārjuna, Rasārṇava, Rasārṇavakalpa and Rasaratnasamuṣṣaya. They clearly represent landmarks in the development of Indian alchemy.

Nāgārjuna and Rasaratnākara

The earliest available alchemical text in Sanskrit is "Rasaratnākara" written by Nāgārjuna. He was the most prominent personality in the field of Indian alchemy. He was also the author of other texts like "Ārogyamañjari, Kākasāputa Tantra, Yogasāra, Yogasataka, and Rasendramāṅgala". There exists a great controversy over the question of whether this alchemist was the same person as the Buddhist Patriarch by the same name, who was a second century figure and also was the founder of the Mādhyamaka system of philosophy. P. C. Ray has discussed this problem, in some detail, in the introduction of his book, "The History of Hindu Chemistry", along with a thorough discussion of Mahāyānism and its relation to Tantrism and alchemy. Tārānātha wrote a biography of Nāgārjuna in Tibetan in the seventeenth century AD, in which he writes that Nāgārjuna was born and brought up in a Brahmin family of South India and was afterwards

converted to Buddhism; also that he was a celebrated alchemist.

Kumārjiva, a Central Asian monk, translated "Life of Bodhisattva Nāgārjuna" into Chinese as early as 401 to 409 AD, which is included in the Chinese Version of Buddhist Tripitaka. The Sui Shu (i.e., the bibliography of the Sui dynasty) and also Song Shi (581-618 AD) give names of several books written by Nāgārjuna. They contain treatises such as:

1. long-shu¹⁰ Pu-sa Yo-fang
- Pharmaceutics of Bodhisattva Nāgārjuna.
2. long-shu¹¹ pu-sa he-xiang-fa
- Methods of the Bodhisattva Nāgārjuna for compounding perfumes and incense.
3. long-shu¹² Pu-sa Yang-sheng fang
-Macrobiotic prescriptions of the Bodhisattva Nāgārjuna.

¹⁰ 龍樹菩薩藥方

¹¹ 龍樹菩薩和香法

¹² 龍樹菩薩養生方

4. long-shu¹³ yan lun

- Discourse of Nāgārjuna on eye diseases.

Only the last one in the above list is extant.

Also a reconstruction of the one by the name Yan-ke long-mu lun¹⁴ (Nāgārjuna's discussions on ophthalmology) written in the tenth century is found.¹⁵

This clearly indicates that Nāgārjuna was regarded in post-Song China as one of the founding fathers on the treatment of eye diseases.

Rasaratnākara of Nāgārjuna is a smaller text than the later alchemical texts. A large part of this text is devoted to metallurgical operations such as extraction and purification of ores and metals. It is interesting to note that calamine, i.e., zinc carbonate, which is the chief ore of the metal zinc, was known in Nāgārjuna's time and it was used for the extraction of

¹³ 龍樹眼論

¹⁴ 眼科龍木論

¹⁵ Needham, Joseph (1), Vol. V, Pt. 3, p. 163.

zinc and also in brass-making. This is seen in the following verses¹⁶ of Rasaratnākara.

Rasaka or calamine is digested repeatedly with fermented paddy-water, natron, clarified butter and mixed with wool, lac, Terminalia Chebula and borax, and roasted in a covered crucible yields an essence of the appearance of tin.

What wonder is that calamine . . . roasted thrice with copper converts the latter into gold?

Brass was not, however, recognized as an alloy but was termed as "kāñcana" or gold. It should be noted that zinc was not known in Europe until the thirteenth to

¹⁶"Rasaratnākara" of Nāgārjuna, see Primary Sources, p. 314.

क्षारस्नेहैश्च धान्याम्लै रसकं भावितं बहु ।
 उर्णा त्राक्षा तथा पद्या भूलताधूमसंयुतम् ॥ 31 ॥
 मूकमूषागतं ध्मातं तद्वैद्यैः समान्वितम् ।
 सत्त्वं कुरित्सड्काशां पतते ज्ञान संग्रहः ॥ 32 ॥

Also brass-making is observed in the following verse, p. 311.

विमत्र चित्रं रसको रसेन
 x x x x
 क्रमेण कृत्वाभ्युद्येण राज्ञेनः
 क्रौति शुद्धं त्रिपुटेन काञ्चनम् ॥ ३ ॥

fourteenth century AD. Portuguese¹⁷ merchants who visited India reported having seen a metal resembling tin in appearance, and which was called cālin and that Indians made a lot of money by selling it.

Zinc was exported to Europe from China in the seventeenth century and at that time the Europeans¹⁸ did not know what it was. Zinc was separated for the first time in England in the year AD 1680.

Nāgārjuna termed zinc as "kūtilasaṃkāsaṃ", i.e., the metal resembling tin. This means that he knew that it was not tin but a different metal. In later centuries,¹⁹ zinc adopted new names such as Jasada, Jasadāyaka or Yasada, perhaps indicating to its application in brass-making. (Yasada = conferer of success probably in alchemical operations.)

The alchemical texts, Dhātukriyā or Dhātumanjari, written in fourteenth/fifteenth centuries give synonyms of zinc as Jasada, Yasadāyaka, Rupyabhrātru (brother of silver), Charmaka, Kharpara, raska, etc. Nāgārjuna's

¹⁷Partington, J. R., see Secondary Sources, Vol. 2, p. 109.

¹⁸Needham, Joseph (1), Vol. 5, Pt. II, p. 212.

¹⁹See Dhātukriyā or Dhātumanjari in Primary Sources, p. 420.

name for calamine was Rasaka but he gave no separate name for its essence, i.e., zinc. This fact indicates to the antiquity of zinc in India and also supports the belief that Rasaratnākara was written before zinc was recognised as a different metal and separate names were given to it.

Rasaratnākara of Nagarjuna is obviously a Buddhist text. A certain verse in it tells us how alchemical knowledge was conferred upon Nāgārjuna by Prajnāpāramita (Perfection of wisdom), i.e., Buddha himself. Further in one more verse, Nāgārjuna confers this knowledge upon his disciples Ratnaghosa and king Śālivāhana.

This text deals largely with metallurgical alchemy. Only one method for synthesizing an elixir from gold and mercury is given in it. It is²⁰ as follows:

Mercury is to be rubbed with equal weight of gold and then the amalgam is further admixed with sulphur, borax etc. The mixture is to be transferred to a crucible and its lid put on, and then submitted to gentle roasting. By partaking this elixir i.e. the sublimate, the devotee acquired an indistructible body.

²⁰"Rasaratnākara" - see Primary Sources, p. 316.

रसं हेमसमं मर्द्यं पीठिकागिरिजन्धकम् ।
 द्विपदीरजनीरम्भां मर्दयेत् तड्कणान्वितम् ॥ ३० ॥
 नष्टपिष्टञ्च मुष्कञ्च अन्यमूष्यां निधापयेत् ।
 तुणाल्लघुपुटं दत्त्वा यावद्भस्मत्वमागतः ॥ ३१ ॥
 भक्षणान्साधकेन्द्रवन्तु दिव्यदेहमवाप्नुयात् ॥ ३१ ॥

The above verse, in which an amalgam of mercury and gold is used for making an elixir, marks the shift of Indian alchemy from elixirs of plant origin to that of mercury. The above method is similar to the one adopted by Chinese alchemists in the second century AD. It is also similar to the method of preparing elixirs or "Senthuram" in Tamil alchemical texts. (The influence of Chinese alchemy on Tamil alchemy is described in a later chapter, on "Transmission of alchemical and chemical ideas between India and China".)

In the final few verses the author of Rasaratnākara gives names of twenty-six yantra or the apparatus used in alchemical processes such as "Śilāyaṅtraṃ, pāsāṅyaṅtraṃ, Bhūḍharayaṅtraṃ", etc. He also quotes the names of earlier alchemists such as Śākaṅda, Māṅḍavya, Vasīṣṭa, etc., indicating the fact that alchemy was in an advanced state in Nāgārjuna's time.

The list of the apparatus, the author writes, is quoted from a text, "Rasendramaṅgala", which was probably an earlier text.

Rasārṇava

After Rasaratnākara of Nāgārjuna, there appeared a number of alchemical treatises in the eleventh to twelfth century, viz. Rasahrdaya, Rasārṇava,

Rasārṇavakalpa, Rasapṛakāśasudhākara, Rasendraçintāmaṇi, etc. Among them Rasārṇava is the largest consisting of 436 verses. The author appears to be a Hindu of "Saiva" cult. This text is written more systematically than Rasaratnākara of Nāgārjuna. It is subdivided into eighteen chapters.

The first chapter introduces the philosophy of mercury and gives various rituals to be performed by the practitioner. The second chapter deals with the selection and initiation of disciples. The third and the fourth chapters describe apparatus as well as the characteristic flames of various substances. The author also gives the particulars of various kinds of fires (sources of heat) to be employed in the numerous chemical operations.

The fifth chapter introduces the reader to medicinal plants, salts, acids, bases, etc. From the sixth to the ninth chapter an account of all the metals, minerals along with their methods of extraction, purification and dissolution in respective solvents is given. The next (tenth) chapter is devoted to mercury, its fixation, physical states and operations performed on mercury. The particular operation by virtue of which mercury loses its volatile nature and becomes more reactive is termed as fixation or "killing".

The author gives a detailed description of methods of fixing mercury, using other metals, salts and plant products in the chapters from eleventh to fifteenth. Rasārṇava's chapters sixteenth, seventeenth and eighteenth are important from the point of view of alchemy. Transmutation of metals is described in the sixteenth and seventeenth chapters whereas the eighteenth deals with physiological alchemy or elixir-making.

"Rasārṇava" is the first text of its kind in Indian alchemy, in which alchemy is discussed fully and exhaustively. The later texts which used this format were by no means as exhaustive. Other authors were in the habit of quoting from Rasārṇava, either a verse or two or several verses as seen in Rasārṇavakalpa text.

Considering the above facts it seems that Rasārṇava was the most prominent and widely read text on alchemy in the centuries after the twelfth.

Rasārṇavakalpa

Very few of the Rasāyana texts have been translated into English. B. V. Subbarayappa and Meera Roy have edited and translated the text "Rasārṇavakalpa". It is part of a Tantrik text Rūdrayamala. Rasārṇavakalpa was probably compiled around the eleventh century AD from earlier texts. A part of this text is also found in

"Rasārṇava" (verses 78 to 207 of Rasārṇavakalpa are found in Rasārṇava). Some other sections are also common to both, e.g., Viśodakakalpa, Çandrodakakalpa and Sailodakakalpa (i.e., sections on the poisonous water, moon-water and mountain-water, resp.) with slight changes in their content. Some forty plants are mentioned in this text.

Fundamentally, Rasārṇavakalpa is a text on transmutation of base metals into gold and silver. A few methods of elixir-syntheses are also given in this text. This text is arranged in a number of sections, and named after the particular plant which is used in the methods given in that section, rather than the metallurgical operation involved in it. For example,

1. "Aparājitakalpa" is a section on "Clitorea Ternatoa".
2. "Brahmadāṅdikalpa" is a section on "Lamprachaenium Microcephalum".
3. "Asvagaṅdhākalpa" is a section on "Withania Somnifera".

We find that the number of plants mentioned in the text Rasārṇavakalpa is less than that of Rasārṇava text. Certain substances of animal origin such as goat's blood, pig's fat, earthworm excreta are not seen in Rasārṇavakalpa which are found in the other text. Transmutation as well as elixir syntheses of Rasārṇavakalpa are simpler with

fewer ingredients, as compared to Rasārṇava. Certain poisonous substances such as copper sulphate, ammonium chloride, borax are excluded from the edible-elixirs of Rasārṇavakalpa. Transmutation processes of Rasārṇavakalpa are described at length in a later chapter.

Rasaratnasamuççaya of Vāgbhata

"Rasaratnasamuççaya, written by Vāgbhat in the fourteenth century AD, marks the beginning of the iatrochemical period of Indian chemistry. This is a Buddhist text since the prayers are addressed to the principal of physicians (Bhaisajyaguru), i.e., Buddha, in the opening chapter. As in the other alchemical treatises like Rasārṇava, the substances are first divided into various categories, forming chapters two to eight. The succeeding chapters contain the details of apparatus, chemicals such as acids, bases, oils, earths (ores), poisons and solvents.

The eleventh chapter of Rasaratnasamuççaya is devoted to purification, fixation, incineration of mercury. The rest of the text is devoted to numerous medicinal preparations which are prescribed in the treatment of diseases and also for rejuvenation. A remarkable fact noticed is that elixirs of longevity and

immortality as well as transmutation of metals is totally absent in this text.

We thus see that a large number of treatises completely devoted to medicine were written in the later centuries. Ancient works by Çaraka, Susrta and Vāgbhat (e.g., Astāṅghrdaya, Astāṅgahrdaya saṁgraha) were still in vogue. A number of compendia containing extracts from different texts were compiled together, were written in the centuries between the fifteenth to the seventeenth, e.g., Rasēndrasārasaṁgraha.

Thus with the decline of "Rasaśāstra" school (of alchemy) there appeared a school of "Rasaçikitsā" in which a fruitful combination of Āyurvedic and Rasāyana medicines is seen.

From the aforesaid account of Indian alchemy it is clear that it was fundamentally similar to alchemy practised all over the medieval world, with its idea of gold-making and elixir of life, originating from the philosophy of mercury. Still it had its own characteristics. The philosophy of Śiva and Gauri being the originators of alchemy, mercury and sulphur being their essences, extensive use of plants inherited from Āyurvedic practice and finally a fruitful union of Āyurvedic medicines with that of mercury are the chief characteristics of Indian alchemy and iatrochemistry of the medieval period.

For the lack of a literary tradition it is not possible to exactly pin-point the origin of alchemy or to fix the factors responsible for the transition of medicines prepared from plants to the mercurial ones. The Buddhists played a key role in this transition. They probably developed mercury-based alchemy due to their²¹ love for medicine and relief of the poor and sick. If not, then they were responsible for the introduction of mercurial medicines into India from China, during their long intercourse with it between the second and tenth century AD.

In India the three practices of metallurgy, alchemy and medicine were interlinked and inter-dependent. Alchemy developed considerably in the medieval period, when it borrowed from the former metallurgical, botanical and medical knowledge. Also in its turn it contributed to the expansion of boundaries of knowledge in the above areas.

²¹The love of Buddhists for medicines and wealth, in order to give relief to the poor and sick, is depicted in several Buddhist texts. We have discussed this point further in a later chapter when we study the references to alchemy in the Buddhist text "Gaṇḍa Vyūha Sūtra".

Further see the first paragraph of the article No. 1420, p. 956 in Vol. 21 of Chinese Buddhist Tripitaka.