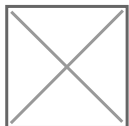


30 ibn Sīnā (Avicenna)

Abu Ali ibn [Sīnā](#), 'Avicenna' in Europe, was the greatest of the Golden Age of Islam intellectuals. He wrote, probably, 450 books, of which 250 survive, most on philosophy and medicine. He worked from about 1000 to 1037 A.D.



His pharmacology was extensive, listing 760 drugs, including aromatherapy and most natural narcotics.

In alchemy he stood out for his disbelief in transmutation. His statement is clear:

“Those of the chemical craft know well that no change can be effected in the different species of substances, though they can produce the appearance of such change.

ibn Sina, *Book of the Remedy*

This statement will be moved to the bottom of Aristotle's *Meteorology* it was thought to be so important, but the impact of the confidence will be undone by medieval alchemists.

Below is a (very) poor version of two alchemical texts by ibn Sina from Stapleton, *et al.*, *Ambix*, 1962, p. 41

“THE TREATISE OF THE MOST EXCELLENT OF THE MODERNS, AL-SHAYKHAL-RA'IS
ABU 'ALI AL-I:USAYN IBN 'ABDULLAH IBN SINA AL-BUKHARI-GOD GIVE PEACE
TO HIS TOMB AND SANCTIFY HIS SOUL FOR THE IMAM ABU 'ABDALLAH ALBARAQI-
GOD'S MERCY ON HIM!-ON THE SUBLIME ART.

IN the name of God, the Merciful, the Compassionate! Vouchsafe Thine aid,
o Gracious One!

May Allah incline you to pious deeds, bestow on you the Elixir of His

approval, and protect you from being led astray by evil spirits, both in affairs of the world, and in matters of religion!

You have asked-May you never cease to investigate the truth of things!

-that I should explain to you the truth regarding the Elixir! made from

Yellow Sulphur.· I have therefore answered as one who has your pleasure at heart, and who is ever zealous to comply with your desires.

I say then that the chief aim of the process is to extract the Red Tincture from the YellowSulphur by a ctStrongWater". After separating it from that water, you treat the Tincture in such a way that it shall not becomecorrupt and burnt. The Residue in a similar manner should be whitened to the highest degree, so that it may melt without combustion.

Next, you calcine the Gold or the Copper-but preferably Gold-and (separately) dissolve Reddened Mercury and the Whitened Sulphur.

(Finally) the Tincture will be compoundedwith the dissolved Mercury, and, after all these dissolved substances are mixed together, coagulation will be brought about. The product willbe an Elixir, which will impart the properties of Gold, colouring and conferring density, and which is recovered (unchanged) \when the work is accomplished.

The preliminaries are as follows:-

I

THE PREPARATIOK OF A CERTAIN WATER WHICH IS EMPLOYED IN
THIS ART

You pour on to two parts of Alkali Soda (*al-Qily*) and one part of unslaked

Lime, ten parts of hot water. After being left to settle for a day and a night, it (the mixture) is heated until one-third of it has disappeared. After it (the liquor) has been strained off, *al-Qily* and Lime in exactly the same proportion (as before) are thrown into it. This is repeated nine times. Then the water is thoroughly strained and placed on one side (for future use)².

II

THE PREPARATION OF A WATER CALLED *Zid al-Raghwa*

Two parts of unslaked Lime and one part of Yellow Sulphur are digested with four times their weight of pure water, until the water turns red. This (water) is (then) poured off and preserved. A fresh supply of water is poured on to it (i.e. the undissolved residue) and the process repeated until the water that you add does not become red. Finally, you mix all these waters and apply heat until one half (of their volume) has disappeared. The fire must not be too intense³.

III

THE METHOD OF COAGULATING MERCURY FOR THE RED

It (the Mercury) is placed in a pit in the ground and its surface rubbed with a piece of wool saturated with oil. Then there is sprinkled over it Yellow Sulphur and Golden *Marqashitha* (Pyrites). Next, Tin (*raṣaṣ*) or Lead (*anuk*) is melted, and after being put aside until it has almost resolidified, it is poured on to the surface of the Mercury. Notice if the latter has solidified; if not, the process is repeated as many times as is necessary, until it (the mixture) coagulates into a Stone⁴•

IV

THE METHOD (OF CARRYING OUT THE PROCESS) OF *Takhniq* (CONSTRUCTION) WITH

THE COAGULATED MERCURY THAT IS EMPLOYED IN MAKING THE RED

After having been coagulated as explained above, it is well pounded with an equal quantity of Vitriol (*Zilj*), and moistened (from time to time) with some . *Zild al-Raghwa* until it is tckilled". Then it is sublimed in the Aludel (*uthiil*).

The sublimate is put back on to the dregs, moistened (again) with *Ziid al-Raghw.'a*, and gently heated. It is sublimed (in this way) 6 times and the 7th (time) it is subjected to (the process of) *Takhniq* in a short-necked phial (*qinnina*) by means of which it coagulates like BerylS.

v

THE CALCINATION OF GOLD AND COPPER

Having fused whichever of the two it may be, add Sulphur until calcination is complete. Then it (the resulting compound) is ground up and moistened with a solution of *Zaj6*.

VI

THE DISSOLUTION OF VITRIOL (*Ziij*) AND OTHER SALTS

The salt having been placed in a jar (*kuz*), the mouth is closed, and the jar plunged in a tub (*dann*) filled with vinegar.

An alternative method is to place it (the salt) in the bladder or intestines of an ox, and, the end (of this) having been tied, it is thrown into a cauldron (*mirjal*) containing boiling water for then the salt will dissolve. A similar' result follows if it be thrown into vinegar 7•

VII

EXTRACTION OF THE TINCTURE OF SULPHUR

Finely powdered YellowSulphur is placed in a loose rag and hung from the cover of a large lamp-bowl. It is then covered to a depth of four fingers with the water first mentioned, after which it (i.e. the closed vessel)is exposed to the sun, or (buried) in dung.

Another method is to place under it a lamp with a small flame so that the liquid may not boil and the Sulphur bum. With either method the red colour passes out into the water; but it (the mixture) should be shaken several times each day. After the red water is drained off, fresh water is poured on to the Sulphur (and the process repeated), until it no longer turns red. Then all these waters are mixed together and distilled in a narrow alembic, when the Tincture will (finally)remain in the cucurbit (*qar'a*) close to the *anbiq*⁸. If any trace of redness remains in the water (that passes over), the distillation is repeated until the tincture has been completely separated.

VIII

THE MANIPULATION OF THE TINCTURE

It is repeatedly digested as slowly as possible with cooling water⁹, such as the juice of unripe grapes or the Water of Sorrel (*tz.ummad*), or Barley Water, until, if the Tincture be thrown on to Silver, it turns yellow or slightly black¹⁰, and it will slough away, leaving the Silver white.

IX

THE TREATMENT OF THE DREGS

The Sulphur is whitened by digestion first in the above-mentioned Water, viz the Sharp Water. There is poured over it seven times its quantity in the fire of a lamp, and it is shaken over it for three hours till the water turns black.

The water is then thrown away and the process repeated until it (the residue) has become exceedingly white. Next you digest it in the cooling waters⁹, shaking it every three hours until it becomes white without any admixture of blackness. It will then be non-combustible and will melt (to a) white (liquid when placed) on a (metal) sheet which is heated by fire. Each time that its coction is renewed, the residue must first be dried and pounded.

x

THE PROCESS OF DISSOLUTION

..~ tub (*dann*) is taken of the capacity of 30 *dawraqsll*, and two-thirds of it filled with strong Vinegar. The calx, or whatever has to be dissolved, is placed in a linen bag suspended from the iron cover of the tub above a lamp bowl, which is also suspended from the cover, with a hand's breadth between the bag and the bowl and about two fingers' breadth between the bowl and the Vinegar. The joint is then luted and the tub is buried in a mixture of animal dung and pigeons' excrement kneaded together with the Water of Carrots. Hot water is poured over it twice a day until the substance is dissolved and falls in drops from the bag into the lamp-bow¹¹².

XI

DESCRIPTION OF THE PROCESS OF COAGULATION

The substance (in Solution) that has to be coagulated is placed in a phial (*qinnina*) which is closed with Clay of Wisdom¹³ and buried in a hole of suitable dimensions that has been dug for it. After the earth has been levelled by stamping it down with the foot, about two basketfuls of dry dung are thrown on top of the earth and stamped level. Then a moderate fire is lit in the dung so that

the contents of the phial are subjected to coction. This is continued until Coagulation occurs.

Alternatively, the substance is placed in a lamp-bowl and suspended over a lighted lamp until coagulation is complete¹⁴. Care should be taken that the heat of the lamp does not become so intense that ebullition occurs.

XII

How THE WORK IS FINISHED

The calx is dissolved, after having been cerated with the Water of Sal-Ammoniac. Similarly, the Mercury which was sublimed by Constriction¹⁵ is also dissolved, as well as the whitened dregs, each separately.

Next the Tincture is mixed with the dissolved Mercury and buried in dung for a month and a half. Then it is removed, and, after being mixed with equal amounts of the other solutions, it is again buried in dung for some time, until union is complete.

Finally the mixture is coagulated. If these dissolved substances are filtered before being combined, the greater will be the potency of the Elixir for the Work. This is the Elixir prepared from Sulphur.

* * *

IN THE NAME OF GOD, THE MERCIFUL, THE COMPASSIONATE! THIS IS A
TREATISE ON THE OCCULT WISDOM, WRITTEN BY THE SHAYKH ABU 'ALI SINAI
-GOD'S MERCY ON HIM!-FOR THE SHAYKH A.BU L-IJASAN SAHL IBN MUI:fAMMAD
AL-SAHLI

He (Ibn Sina) said: A discussion having taken place between the Shaykh and myself on a certain subject which he knows, he asked me to record my

views in a treatise which might keep them fresh in his memory, and to guide him to the Art by the path which I myself had reached after deep study and meditation.

I

ON THE GENERAL SUBJECT OF THIS ART

It was my wont-May God preserve"the Shaykh!-to make a careful study of Natural Philosophy; and one of the things that I investigated was the hypothesis of the alchemists. The majority of learned and erudite men being opposed to the views of these people and declaring their hypotheses to be without foundation, as a philosopher I had no alternative but to investigate the arguments of both parties, so I examined the writings of most of those who lay claim to this art. I found these writings devoid of the logical reasoning that is the basis of every science, while the greater part of their contents was most like to nonsense²•

On the other hand, when I consulted the works of their opponents, I found nothing but a feeble refutation, supported by such puerile reasoning that no science could be disproved thereby.

After thinking the matter over for a long time by myself, I said "If this thing is possible, what makes it so? And if it is a thing that cannot be, why is this the case?" Now I knew that if it were possible for us to impart the colour of Gold to Silver, and of Silver to Copper we should require a red Tincture, capable of imparting redness, and a white Tincture, capable of imparting whiteness. We also know that the mingling of Tinctures with hard stone-like bodies is out of the question unless the latter be first softened and converted

into the fluid state. This softening and conversion into the fluid state is manifestly

impossible so long as they do not melt, while, if they do melt, not every red or white Tincture will enable us to attain our object.

In any of the following cases the Tincture will be useless:-

(a) If it undergoes combustion on fire and is thus spoilt: or

(b) If, although it does not burn, it volatilizes and escapes, owing to its inability to remain on fire: or

(c) If, though it neither burns nor escapes, it possesses no power of penetration or admixture: or

(d) If, though it possesses powers of penetration and admixture, it does not remain in permanent union, but in some way or other separates out: or

(e) If, though it does not separate, it fails to prevent Silver from being affected by these substances-like Sulphur and the other things by which Gold is purified from Silver:—which leave Gold unaffected, but burn Silver.

Similarly, if it does not make Copper unaffected by those substances, such as Lead, Tin and other things, which leave Silver unaffected but alter Copper.

Under these circumstances we require some Tincture

(a) which is capable of imparting either a yellow or white colour;

(b) which can mix with metals (*ajساد*)⁵ in a state of fusion;

(c). which shall not be consumed when it comes into contact with sharp burning things;

(d) which does not (afterwards) separate out and depart, even though substances

that induce combustion separate the (constituent) parts of the bodies (*ajsam*)⁶.

I therefore considered whether among simple medicines there is any medicine which possesses a combination of all these virtues, but found no single one having these effects among the drugs and medicines that have come down to us, except indeed for the stories of the existence of a plant? with these characteristics

and of a Red Sulphur⁸-other than that found in Farghana-and a

White Arsenic (*zarnikh*), both possessing these properties. I incline to the opinion that all these are mere descriptions, and that nothing corresponding to them has ever fallen into the hands of any man of understanding.

We have, therefore, to discover some means of making this medicine for ourselves.

The objects of our quest are:

- (a) a tincture that will not be damaged by fire;
- (b) a substance (*jawhar*) that will enter into combination with fused (metals);
- (c) a substance that will give rise to homogeneity;
- (d) a substance that will both facilitate coagulation⁹ and remain stable over fire.

We must also discover the method of mixing these things in such a way that a single essence is produced which cannot be decomposed by fire. Then it (i.e. this complex medicine) will colour by virtue of the tincture that is in it; it will

combine by virtue of that essence in it which possesses the power of combination;

it will induce homogeneity by virtue of that essence in it which possesses

this property; and it will remain stable by virtue of the essence of stability that

is in it.

If we could accomplish these four things our object would be attained.

II

ON THE QUEST FOR THIS TINCTURE

As regards the White Tincture, we see that Mercury whitens, while in addition to its whitening power we see that it clings to metals and penetrates into them. For example when Copper is made into thin plates and Mercury is vigorously rubbed on it for some time, after digestion with the Mercury in Vinegar and other medicines, whiteness will soon penetrate to such an extent into the interior of the Copper that both its exterior and interior, its visible and its inward part, will become as white as Silver. One can thus imagine that if it were to undergo still further treatment with Mercury, the effect and action of the latter would be even greater. However, we find that Mercury flees from fire, and refuses to enter into combination, nor will it ever be conjoined with all the things with which we may desire to mix it. It possesses, however, one virtue, viz that it does not suffer the least damage from fire, but simply passes off in the state of vapour. Hence we are spared the trouble of removing any combustible property from it. We are furthermore aware that if Mercury be treated in such a way as to bring about its combination with fused substances, it will remain in them with its natural whiteness unaffected. We therefore see that the first process that is necessary is to desiccate it and remove its watery property, thus reducing it to the state of ashes or fragments. It is then pounded, so that when we wish to pound it with any substance, or mix it with any substance, it will no longer be alive¹¹ and will be capable of absorbing liquids

that are added to it; for we may have occasion to use these (processes) when conducting the necessary operations for combination and admixture.

The method of drying it is to digest it over fire in such a way that its fluid particles are separated from it, and its dry particles remain. It is not, however, possible for the fluid portion to evaporate and the dry to be precipitated, seeing that the nature of the whole, or of the greater part of it¹², is to fly, especially as we are required to mix it with medicines which we are not able to separate from it and which, in the event of its volatilizing, will volatilize with it. The (correct) method is therefore to sublime both the moist and the dry portions, until the moist part volatilizes and the dry is confined in a (suitable) receptacle.¹³ We repeat this several times until there is no possibility of the Mercury's coming to life again¹⁴, and until, if there is any portion of it that is capable of being burnt (such as Lead or Tin), combustion will occur at the bottom of the instrument, while that portion of it that is devoid of the essence of aqueous humidity and that cannot be burnt, will be separated from it and will volatilize either as a dry white powder without the least power of combustion, or as a white mass similarly devoid of all power of being burnt.

We therefore stand in need of an instrument of volatilization. For this purpose we take a long pot (*qidr*) with a rounded bottom and place the lesser part of the pot in the fire so that the greater part projects above the brazier (*kanun*)¹⁵ that has been prepared for it. We fit on to its top a round disc (*#abaq*) from which sufficient of the centre has been removed for the top of the pot to pass into it, and over this disc we fit a rounded cover (*mikabba*)¹⁶ in order that the fumes of the Mercury that rise up may be retained therein. In

the centre of the? cover there is also a hole through which passes a properly fashioned stick, which can be taken out whenever we think that the fumes have ceased to be evolved. We can thus see whether they have really stopped or whether they are still rising up.

When therefore we wish to sublime Mercury, we first kill it with the aid of suitable substances¹⁸ so that it may be in fit state for trituration, and then bruise it with things that are absorbent¹⁹ and desiccating, such as Salt, Vitriol, Lime²⁰, and the like.

In the event of our desiring that the admixture with these things should be very intimate we heat it over a gentle fire. The Mercury (after being killed) is bruised ²¹. ²² and placed in an earthenware pot. After luting the pot with Clay of Wisdom²³, it is dried, and then placed in the furnace (*tannur*) ²⁴. When this roasting is complete, the mercury is bruised with the burning, absorbent, desiccating substances ²⁵, and thrown for sublimation into the pot which is called the *Uthiil*. We sublime it in this pot several times, remixing it after each sublimation or giving it back to the same residue. This is done several times until the Mercury dies and becomes white, a result which may be attained after seven sublimations, though under certain conditions we may have to wait until the twelfth, which is the limit²⁶• Sometimes, at the end, we place it in a phial (*qinnina*) ²⁷, carefully luted with Clay of Wisdom, and seal up the neck after the moisture has been withdrawn in the way that we shall afterwards describe²⁸. Then we sublime the medicine in such a way that it rises up and is confined in the neck²⁹, sometimes like Tin (*raṣṭiṣ*), sometimes like Crystal, and sometimes like Rock-salt, according to the substance from which it is being

sublimed³⁰.

These things have been tested both by experiments and by verified analogies in accordance with (our) previous knowledge. The object throughout is the drying up and desiccation of the Mercury. Having done this we obtain a tincturing and penetrating virtue, a Tincture indeed of unsurpassed power and penetration, so much so that its colour differs in no respect from that of pure Silver, nay more, its colour is deeper and its whiteness more vivid. This is a thing that was known to us even before experiment¹ by long, intense and subtle cogitation.

Thus we obtain the White Tincture, free from those things that are not required.

Passing on to deal with the Red Tincture¹ we do not find any natural substance which at once imparts a red colour; we actually find that all things which penetrate into Silver and other metals and impart a colour to them, have a tendency to turn them black. In the case of Sulphur¹ when a small quantity of it is passed over Silver³! we see that it turns it yellow, but if it remains in contact with the Silver, the Silver is blackened. The latter happens if the Sulphur be added in large quantity; while if it be thrown on to the Silver at the time of fusion¹ it burns and destroys it. We know from well-ascertained principles that in the case of anything that turns black on being burnt, the change (of colours) that it passes through from whiteness (to blackness) is not through greenness¹ but through yellowness and redness.³²

Thus smoke, when it is dissolved in water, which is turned, will render the water not green but red ³³. From this we conclude that it is possible for us to

extract by some subtle process from the things that turn Silver black a Tincture that can turn it yellow. We also know that when a thing that possesses combustible

power is heated, the first thing that separates from it is the fiery virtue that is in it, as this is lighter and more liable to evaporate and pass away than the virtues of the other constituent elements³⁴. Accordingly we strive by suitable means to separate the fiery virtue³⁵ from Sulphur and Arsenic Sulphide, or from any of the oils, or from anything that blackens Silver. Sulphur, however, is the best of the minerals for this purpose.

We find that the best method of effecting this is to cook the Sulphur in Sharp Water over a gentle fire in such a way that the fiery virtue in it is quickened and removed without any of the essence of the Sulphur being burnt, or any of its oiliness passing away. We do this in order that the tincture alone may be extracted for subsequent treatment in the proper way, and in order that the Sulphur itself may be purified by the method that we shall mention afterward³⁶. We cannot do this with the requisite gentleness³⁷ except by cooking it in a double vessel without the water's being allowed to boil, or in dung, or in the sun, or on hot ashes; and the greater the gentleness (of the process) the further will the Sulphur be from damage. Moreover, it is not every water that can quicken the Tincture and remove it, but the water should have some sharpness in it, although if one confines oneself to pure water it will suffice. The water, however, that has sharpness in it is preferable. We shall state subsequently how this water ought to be made according to the method that we have discovered by reasoning and experiment³⁸. We cook the Sulphur repeatedly with the water, and as the water becomes red we remove it and renew the water

until absolutely none of the Tincture remains. 'When this is the case we mix the waters together and distil them by kindling a fire under them until the Tincture that is in the water has all volatilized. If the product be red, then we have performed our task with gentleness and skill, but if it be black we have burnt it during the process of coction³⁹•

If the product be red, we take it and continue to cook it in cold waters, such as distilled vinegar and the whey made from skimmed milk that has turned sour -from which, mixed with barley flour, sour beer⁴⁰ is made-or in the acid extract of citron, and similar things⁴¹• We do this time after time, until its fieriness is conquered and its power weakened. In this way its blackening property is diminished to such an extent that only a power of conferring yellowness remains, inasmuch as it no longer possesses the power of combustion and only a little of the blackening virtue remains in it, namely that which turns things yellow. This coloration, however, is not fast and permanent, since it disappears when heat is applied.

By this method we obtain the Tincture; .but we further need to compound it ,with something humid in order to facilitate its commingling with whatever we wish to mix it with. For this we find reddened Mercury to be the most suitable thing, especially for the conferring of lustre and brilliancy, since it is capable of imparting a red colour like that of Mercury Sulphide (*zunjujr*)⁴², and can be so manipulated that it does not bum. For reddened Mercury, that is, *zunjujr*, if cerated and dissolved with what we shall afterwards mention⁴³, becomes a red liquid which will itself possess the property of colouring. How much more so, if we place in it a Tincture with which it naturally and intimately

associates as is the case with *zunjujr*, except that the former *zunjujr* is combustible

while the latter, which has been reddened, is incombustible. What has guided us to this is the preparation of (artificial) *zunjujr* and our knowledge of how intimately Sulphur and Mercury unite together and how both of them assume a red colour when conjoined. We therefore compound and bruise this Tincture with this (reddened) Mercury in equal quantities-or a lesser quantity of the Tincture may be used-and we bury them in dung until they are thoroughly commingled. The dissolved Mercury need not necessarily be reddened, since it becomes red when it is combined with the Tincture, as (happens) in the making of *zunjujr*, though it is better and preferable for it to be reddened, if possible. Thus we have both the Albifacient and Rubifacient Tinctures, and this is the most illustrious of the Five and of the Four Pillars (of the Art)⁴⁴.

III

ON THE ELEMENTS THAT ENTER INTO COMBINATION WITH FUSED SUBSTANCES

As for the Second Pillar, which is the element that combines with fused substances, it must necessarily be a white or red element which can itself fuse. After a searching investigation we have not found anything which, when cast on to a fused mass, clings to it, mixes with it, and permeates it, without in any way damaging it, except the mineral Sulphur, and also Arsenic Sulphide. ⁴⁵ .Both of these, however, flee from fire and refuse to remain on it except for the very short while that they take to evaporate, after which they at once disappear. We did indeed find in them the power to cling to bodies, but we did not find

a means to consolidate them, so that they might associate and yet their property

of combustion be destroyed.

We found that combustion was due to the conversion into fire of that which evaporates quickly, while we found the cause of clinging to be the affinity of minerals for that which in nature approximates to them.

We studied the principles of nature and found that the cause of fusion was the presence of a liquid humidity, mixed with the earthy dry particles in such a way that when fire resolved them, the humidity flowed amongst them. The intimacy of the union is so great that no actual separation can occur.

[We found the cause of evaporation to be the presence of a feeble humidity in a body] which may rise up from it and pass away. 46

In addition, we find that the cause of combustion is the existence of a matured humidity in a body, mixed with a dryness, which, by the accidental heat that it acquires, gives it the virtue of resembling fire, changing the particles of the body into the substance of fire either before or during evaporation. It will thus separate as pure fire, the residue being the ashes, which is the portion of the body that is burnt. This (phenomenon) occurs when the humidity has become vapour, and has undergone the change and thus it becomes a flaming mass.⁴⁷ The accidental and essential causes of this phenomenon lie outside the scope of this treatise, but experience bears witness to one thing, namely that humidity alone does not burn, for, as soon as heat comes in contact with it, it volatilizes without burning.

On the other hand, if the humidity be mingled with something, it is in its nature to evaporate, so as to leave the dry part in the state of ashes, whereby

the thing will burn. An example is the case of liquified bodies which neither burn nor turn into ashes.⁴⁸ If the humidity remains mingled, it will be matured in the dry, becoming viscous and turning into oil, after which it will blaze up and burn away. Combustion will also occur if it does not become oil but simply unites intimately with the dry. Even in this case, however, it will not be without a little oiliness, and we therefore need to remove from the body this combusive unctuous power and completely to annihilate its oiliness, in such a way that there will remain in it a humidity which can become fluid and which can cling to other bodies. The method (of doing this) we shall mention below.

"We have adopted as the most likely hypothesis that the humidity in such bodies must be intimately combined with some dryness, so that when fire excites it to evaporation, and the dryness and residue are predominant, the humidity will permeate the residue, fusing or becoming soft in the same way as Glass does. If, however, it is the humidity that is dominant, the dryness will be enriched and will itself be evaporated in such a way that the vapour will turn into smoke. By experimenting with volatilization in order to ascertain how the vapour changes into smoke, we came to know that the aqueous constituent⁴⁹

of bodies is intimately united with dryness, and in addition that it cannot be separated in a pure state inasmuch as the dryness also diminishes during volatilization⁵⁰. So we regard it as proved that a body will not be spoiled by evaporation, that it will not totally diminish and that its humidity is mixed with dryness. Moreover, if we make the fire gentle, we destroy the combusive property of a body while its power of clinging is not destroyed. When we considered how to destroy its property of combustion, we saw

that there were various methods of effecting this⁵¹. One is to roast the body with combustive and absorbant substances, and then to volatilize it, for at the time of volatilization that portion of it that is combustible will necessarily be burnt away while that which does not burn will pass off unaffected⁵². If, perchance, anything combustible remains in the body, we repeat the process of volatilization. The final product should be white, free from all trace of combustibility and, when thrown on to Silver, should not burn or damage it. It had further become known to us by natural analogies, which it would be tedious to mention, that this treatment (of a body) will not deprive its substance of the property of permeating and clinging; for this permeation and clinging are caused by a humidity which unites with substances⁵³. As for the humidity by which combustion is brought about, it burns and spoils the essential humidity of a substance when it comes in contact with it. This combustive humidity, however, we have already got rid of (i.e. by the process of volatilization). In addition, this process also sets free much of the superfluous combustible humidity, while the humidity that is combined with the dryness remains owing to its being a solid humidity. This is also why the product melts into an oil when placed over fire.

When we had realized this and put it to the test, we found (a) that the substance (when thus purified) possesses the power of clinging and (b) that it whitens whatever is not white, provided that it sinks into the fused mass and is not separated from it. This will be the case if the two unite together, or if we close the head of the crucible⁵⁴ so that the substance cannot find a way of escape. The fact that every white substance that mixes with others causes

whitening we knew, indeed, by analogy, and have proved by experiment.

Moreover, we have found that the white product above mentioned also possesses the power of clinging. Hence we have obtained the thing that we desired.

We may even dispense, with the volatilization of the substance, but in that case we must cook it in oil or water, in such a way that the fieriness is set free from it, and much of the foreign humidity that is in excess of the dryness is evaporated. Some portion, however, of the essential humidity in the dryness will remain, and cannot be separated from it. When this begins to move in the substance, it will cause it to fuse and quickly collect as a homogeneous mass in the oil or 'water in which we are cooking it.

Having become acquainted with this method, we found that Sulphur is suitable and applicable both for the Red and the White, although it is better for the Red; and we found by experiment that Arsenic Sulphide is particularly adapted for the production of the White, although each is suitable for either⁵⁵•

Furthermore, we may subject the substance that is for the Red to another process. This is to redden it by means of those things that are reddened by Fire, viz. the Waters of Vitriol⁵⁶ so that it may become a colouring agent for the Yellow.

The final result is that (the Tincture) for the White, having realized its allotted task, will give rise to Whiteness, while that for the Red having (similarly) realized its allotted task, will give rise to Redness.

IV

ON THE SUBSTANCE THAT PRODUCES HOMOGENEITY

This is a solid humidity which fire cannot dissociate. From this we obtain

a subtle oiliness which is sufficient.

V

ON THE FIXED SUBSTANCE

Having pondered over and searched for the fixed substance, we found that everything that does not flee from fire contains the fixed substance. These are either bodies that fuse or bodies that do not fuse, and all of them have been found of use to US⁵⁷, but those that fuse are more convenient and better.

However, so long as they remain as bodies, with their essences united, nothing can combine with them, while if their parts are made small⁵⁸ something can combine with them. We can burn and calcine them, but if it be possible to calcine them without burning them⁵⁹ we should do so, until they become reduced to such fine powder that it is almost impossible to divide them any further⁶⁰. A specific form⁶¹ is thus lost to them, for, as Aristotle has shown in his *al-Santit al-rabi'*⁶², subdivision destroys specific form⁶².

If, therefore, substances are thus subdivided, it will be possible for us to employ them in realizing our object⁶³•

For these reasons we decided that for Silver a calx that is made either from Silver or Tin⁶⁴ should be used, the former being preferable; and for Gold, a calx either from Gold-which is preferable-or from Copper (It is said that Lapis Lazuli produces a better calx than Copper.) We can also prepare a calx for Silver from white *Isjidaj* which thus becomes a whitening agent, and a calx for Gold from a red powder like *zunjujr*⁶⁵.

VI

ON THE METHOD OF COMPOUNDING

Now that we have obtained for the White a tincture, an oil, and a calx, all possessing the property of whitening, and for the Red a tincture, an oil, and a calx, all possessing the property of reddening, it is necessary for us (to consider how) to compound and solidify them into a single essential substance inasmuch as their combination and admixture are not readily accomplished. We have noticed in our experiments that when fluids, after combining and coming into intimate admixture with one another, are desiccated and solidified, they adhere to each other to such an extent that if that which flies prevails over the fixed, the latter will fly with it, while if it does not prevail it will remain fixed in company with the fixed. We have also seen that many things dissolve and then coagulate without their virtue's being affected, among these being Salammoniac

and Vitriol⁶⁹• In addition we learn from many principles of physical science that those things⁷⁰ of which the original substance is earth and water, can dissolve and flow, while we know from other laws that the dissolution of the Elixirs referred to will not at all prevent them from exercising their evident original functions, indeed they will retain intact as much of their virtue as we may require. ... analogy and experiment confirms us in these beliefs. 'Ve decided therefore (upon dissolution)⁷¹ and then coagulation, so that the essences

of the fundamental substances⁷² (from which the Elixir is formed) may unite and become a single substance, which will have the power of colouring, permeating,

and conferring homogeneity, and will be stable and permanent over fire. Moreover, we concluded that if we were to employ trituration, and the

constant addition of solvent waters that possess the power of commingling and combining, that process would serve as a substitute for solution. We tested this with several substances, and found that our experiments were sometimes

successful and sometimes not, the latter being either on account of the weakness of the instruments, or because we fell short of perfection in our work.

As for the essential causes, they are many, and some of them cannot be comprehended.

Hence we have relied on these two processes⁷³ (i.e. Dissolution and Coagulation),

whereby the making of the Elixir will be brought to completion by the praise and help of God, and the desired object will be attained. The fundamental constituents for the White are therefore sublimated Mercury, sublimated Sulphur⁷⁴, sublimated or whitened Arsenic Sulphide, and *l sftdaj*, or some other thing, all in combination with one another. This is the Perfect Elixir for the White. For the Yellow, Tincture of Sulphur, sublimated Sulphur, sublimated Mercury, and good Calx (are necessary). It is best that all of them should be reddening agents, compounded together, to form the Perfect Elixir for the Red.

VII

ON THE OBTAINING OF AN ELIXIR FROM THINGS OTHER THAN

MINERALS

Know that it is possible to prepare Elixir from Hair, Eggs, Blood, and many of the parts of animals, and this is the reason why we devised experiments to

see whether animal substances affect molten bodies in the same way (as inorganic

substances do) and whether they cling to them. We found that in

bulk they have no effect, but that their smoke clings to bodies in such a way that

it is able (for example) to impart a yellow colour to Silver. Similarly when

heated Silver is brought in contact with them it acquires a colour. We conclude

from this that animal substances possess the power of tingeing and clinging,

while we know that the waters of Hair, Blood, and all cooked salty substances

coagulate. We also know that if we wish to separate their tincture and power

of clinging, it is not possible except by fire and volatilization (as this is the only

method) by which nothing of the tincture is lost⁷⁵• Moreover, we are aware

that the first thing that distils from these animal substances is water, and then

oil⁷⁶ because the latter is more resistant to fire. We therefore distil them

over a gentle fire in a cucurbit and alembic. After the water had distilled, the

oil begins to pass over, and (the process of) distillation is carried on until both

have been removed, and nothing but the dregs remain. The latter are repeatedly

heated in the fire⁷⁶, until they are converted into a calx which is permanent over fire.

Furthermore, we know that the tincture is in the oil, so we coagulate⁷⁷ the

oil, and extract its tincture by subjecting it to gentle coction in nothing but its

own water, seeing that its water is sharp, and salty, and in addition coagulates

into Sal-ammoniac. Then we take the (coagulated) oil, and cook it in water of

moderate sharpness, until the water has purified and whitened it, and removed

its combustible property. ⁷⁸ In this way it acquires the property of fusing⁷⁹

while its power of combustion is destroyed. As for the calx, we have (already so) purified it that it has become a very fine white powder.

We find the water of these substances corresponds to Mercury among the minerals, their oil corresponds to Sulphur or Arsenic Sulphide among the minerals, and their calx to the calces among the minerals.⁸⁰ The Elixir that is formed from these (three) is equal to the Elixir made from the minerals-nay, it is even better, more noble and more powerful.

VIII

ON THE PROCESSES

In the case of Mercury, you take it and solidify it with the Vapour of Sulphur and Tin⁸¹, if it be for the \White, and with the \Tapour of Lead if it be for the Red⁸². The method of doing this is to place the Mercury in a pit⁸³ and sprinkle on it, for the White, ashes, or Silvery *Marqashithii*; while for the Red, Golden *Marqashithii*, or Sulphur, or White Ashes⁸⁴ must be used. You then pour on to its surface fused Tin or Lead⁸⁵ in such a way that no admixture occurs. This is done several times until the Mercury solidifies into a stone.

An alternative method is to place the Mercury in a piece of rag and after making a depression with the pestle of the mortar in the semi-solid Tin, to put the Mercury in this hole. We repeat this several times until the Mercury solidifies⁸⁶.

In the event of our not wishing to solidify it⁸⁷, we triturate the Mercury with mustard, previously triturated with water, until it dies in the mixture.

The Mercury after this treatment is mixed with Salt and Vitriol and volatilized from these substances several times. If it be for the Red, after subjecting

it seven times to the processes of assation (*tashwiya*) and volatilization (*ta\$'id*), we give it to drink of the Red Water of Sulphur⁸⁸, and finally volatilize it in such a \way that it coagulates in the neck of the phial⁸⁹ • Each sublimation (*t(l\$'id*), as well as the process of *Takhniq*⁹⁰, must be preceded by distillation (*taq/ir*). Mark this well.

ARSENIC SULPHIDE AND SULPHUR

Arsenic Sulphide and Sulphur must be well triturated with filings of iron, and after being subjected to coction in Vinegar they are left to dry. Then they are roasted and sublimed with Salt, Vitriol, *talq*, Quicklime⁹¹, and calx of bones⁹² • If the substance be (finally) subjected to the process of *Takhniq* with Vitriol⁹³ and Copper Oxide⁹⁴, either separately ⁰¹ together, it will coagulate like Salt or Crystal. Sublimation is repeated several times until they acquire (the power of) melting and becoming mobile.

OIL OF HAIR, ETC.

This is coagulated by a moderate heat applied continuously until it thickens. After the removal of its tincture the oil is heated in a solution of Mild Alkali⁹⁵ until its blackness is extracted and it becomes white.

THE CORRECT METHOD OF CALCINING "BODIES"

Sometimes the metal is burnt by means of burning substances such as Salt, Sal-ammoniac, and Sulphur, in order that it may become fit for trituration.

Sometimes it is turned into *Zinjiir* by means of Sal-ammoniac⁹⁶; while a third way is to amalgamate it⁹⁷ with Mercury, which is then volatilized from it several times until the metal remains in the form of a white powder.

[If it be for the White]⁹⁸ it is given to drink of the decanted water of salt,

and after trituration 99, the substance is placed in a furnace (*attun*). From this it is not removed, until it becomes a thing that cannot be further divided 100. In the case of a substance that is required for the Yellow, it is given to drink of a solution of the Vitriols, either separately or together, or the Redness of Sulphur 101 etc.; or the Oil of Eggs 102. It is then roasted continuously until it becomes red, and is converted into a powder that cannot be further divided.

DISSOLUTION

The easiest way of carrying out the process of Dissolution that we have observed is to change the nature of substances 103 (by converting them) into those things which are of themselves 104 capable of dissolving, such as the Salts and the Vitriols. We have also seen that the strongest of these is Sal-ammoniac. We therefore dissolve it, and proceed to water and triturate the substance (with the solution), afterwards subjecting it to the process of coction by means of heat, until the whole coagulates into Sal-ammoniac. The method of doing this is to pour over the substance sufficient of the dissolved Sal-ammoniac to moisten it, and then to place it in hot air, or in the sun, until it dries. Afterwards it is placed in a dish 105 and fused over a gentle fire. When it begins to emit fumes we remove it and after trituration (with a fresh quantity of the sal ammoniac solution) we repeat the fusion. We do this ten times; and then we repeat the addition of water and trituration from the very beginning until the substance is cerated, that is, it melts on a piece of heated iron, and dissolves in water without leaving any residue 106. This result is obtained after from 10 to 30 additions of water, the higher number being necessary only if we wish to effect the compounding by means of trituration and the addition of water

(alone).

It is best for the Elixir of the Red that the dissolved Sal-ammoniac should have been previously given to drink of the Water of Vitriol, sublimed until it is red, and then (again) liquefied¹⁰⁷•

In the case of animals, their efficacy resides in their oils, although their waters are also helpful as means whereby ceration is accomplished.¹⁰⁸

When ceration is complete they¹⁰⁹ are dissolved in whichever way we may desire, either by placing them in a phial, the mouth of which is closed, and carefully burying them in dung which is continuously renewed; or by suspending them in a jar of Vinegar¹¹⁰; or by any other means, such as burying in damp earth, or hanging them in wells, or they may be dissolved in the Blind Cucurbit by means of the vapour of Sharp Waters¹¹¹. The latter are waters in which *qily* and quicklime¹¹² have been repeatedly warmed until the liquid burns a feather immersed in it, or waters into which Sal-ammoniac has been thrown¹¹³.

If our desire is for the Red, Sulphur and the Vitriols are added. If we follow this path, dissolution is effected in from 40 days to 3 months.

When dissolution is complete, we mix (all) the waters and bury them in the ground until combination has occurred. Then we place them in a pot (*qidr*)¹¹⁴ and bury them continuously in hot cinders, until they are thickened,¹¹⁵ dried, and coagulated. This is the Elixir¹¹⁶.

An alternative method is to agitate them with Sharp Waters. Combination is thus brought about, each substance dissolving in the others. Then the mixture is heated to dryness!?! This process is repeated 30 times, .more or less, until either no evaporation at all occurs, or the "hole mixture evaporates

without leaving any ashes.

If the whole of the mixture evaporates, know that you have been right in the compounding, but wrong as regards the weight of the calx. In this case you should correct the proportion by the addition of a little more calx, which will prevent the whole from evaporating. This will also increase the tincturing and clinging power (of the Elixir), unless indeed too much has been added.

And God is our Guide!

IX

How THE WORK IS FINISHED

This Elixir colours by virtue of its Tincture, penetrates by virtue of its Oil, and remains fixed by virtue of its Calx. The Oil is the agent which unites the Tincture, which is very subtle, and the Calx, which is very gross. The Water of Mercury serves as the medium for the Tincture. When the Oil, which confers stability on the Calx that has been coloured by the Tincture, begins to penetrate, they both (i.e. the Tincture and Calx) will penetrate with it. And because the Calx remains in a state of fixity, they both (i.e. the Tincture and Oil) will remain fixed with it on account of the intimacy of the union (that exists between them).

Among the elements, the analogue of the Tincture is Fire, the analogue of the Oil is Air; the analogue of the Mercury is Water, and the analogue of the Calx is Earth. The White is formed from three (of these) things, fire being excluded! 8, the Yellow from all four. And God knows best what is right!