PART II
THE MANUFACTURE OF PERFUMED PRODUCTS

CHAPTER III
THE PREPARATION OF AROMATIC WATERS, EXTRACTS, INFUSIONS, AND TINCTURES

Having shortly reviewed in the preceding chapters the principal raw materials employed by the perfumer, we may now proceed to examine the methods by which the various articles of the perfume industry are prepared.

But, in the first instance, it is necessary to devote a short space to certain intermediate products which are commonly employed. These products are the liquids known as "aromatic waters," "flower infusions," "flower extracts," etc.

A large number of perfume materials occur in the solid forms, such as ambergris and musk. One is therefore compelled to make extracts of such bodies in order that they may be usefully employed to fulfil the part designed for them. Flower pomades, such as are sold by the perfumery houses at Grasse or Nice, can be used as such in certain preparations, but they have other methods of employment, thanks to the fine odour of the perfume they contain, and, in order to take advantage of this, the perfumer is obliged to extract the perfume before he can use it in many of his compositions.

Aromatic Waters

The employment of aromatic waters in perfumery is more common than is usually believed. They serve to diminish the "rawness" of the alcohol in certain cases, or to reduce the cost price, so as to render them accessible to a wider clientele. They also serve as a vehicle for a certain number of essences used for the purpose of modifying or "rounding off" the principal perfume of a given composition. These aromatic waters can be prepared either by distillation or by simple admixture. In fact,
when speaking of the use of pure water in perfumery, one may often consider the employment of the distillation waters of certain essential oils, which are suitable for use in certain cases. But such waters, especially rose-water, have not always the constant composition required for regular employment. At one time it has been made from one species of rose, at other times from another species; sometimes the flowers have been distilled in one method, sometimes in another.

On account of these drawbacks, many perfumers prefer to prepare their aromatic waters by dissolving a constant small quantity of essential oil in distilled water. The great advantage of this is that they can prepare a uniform product in just sufficient quantity to use at the time, and so avoid deterioration by prolonged keeping. But the preparation of aromatic waters from essential oils is not free from difficulties. For example, most essential oils are almost insoluble in water, and even when dissolved in small quantity may separate, even after filtration, on slight change in temperature. It is best to use terpenless oils and to dissolve them in warm distilled water. The liquids are not so turbid as with ordinary essential oils, and are easier to filter. The oil is dissolved in a little alcohol, the water heated to boiling point, and the alcoholic solution added and the mixture again heated to boiling point with constant stirring, the vessel closed and the contents allowed to cool. The liquid is allowed to stand for three weeks, and then filtered. These waters can also be made in the cold, but they require to stand for a certain time to become properly saturated. The oils are dissolved in a little alcohol, diluted with cold water, well shaken and allowed to stand. It is, however, advisable to add a little filtering powder after the first agitation, and then to shake several times, allow to stand for three weeks and then filter. In order to ensure the keeping properties of aromatic waters, it is useful to add a little boric acid to the water used.

Rose-water may be prepared by dissolving 30 grams of Otto of Rose in 250 grams of alcohol warmed to 60°. This is poured into a vessel—such as a carboy—holding about 45 litres, and 938 litres of distilled water are added. The vessel is well shaken from time to time, until the solution of the oil is complete. The rose-water so prepared is sometimes liable to deteriorate through the carboy being kept tightly corked for too long a period. This is remedied by pouring the aromatic water into vessels in contact with a large air surface some time before use.
Orange-flower water is subject to the same trouble, and can be restored to condition in like manner. It may be prepared by mixing 32 drops of oil of neroli with 4 grams of filtering powder, such as magnesia, in a litre of water. The finished product will naturally depend entirely for its quality on that of the oil of neroli employed, which should be of the best.

If, instead of preparing orange-flower water in the manner described, the perfumer prefers to purchase it from the distillers of the flowers, it is absolutely necessary that he should obtain a clear, transparent liquid, at most with a faint opalescence, almost colourless, of agreeable odour of the orange-flower, and of slightly bitter taste. It should not darken with sulphuretted hydrogen. If it darkens it should be redistilled before use. Only pure distilled water should be used in the preparation of these substances. Instead of using carboys and shaking them by hand, one can use a mechanical agitator carrying up to ten vessels of 15 litres each. A small agitator of this type is here illustrated.

This type of apparatus is largely employed for the maceration and rapid exhaustion of substances for infusions in alcohol, or emulsions made in ether, etc. They are found to a considerable extent in the large perfume factories in Paris, and their value is fully established by a considerable saying of time, labour, and capital, a good deal of the latter being necessarily locked up in the stocks of infusions of musk, ambergris, civet, orris, benzoin,
...ROMATIC WATERS, EXTRACTS, INFUSIONS, ETC. 91

etc., which it is necessary to keep when made by the old methods. In many cases, such machines render unnecessary transference from vessel to vessel, and so save the loss consequent upon such transference. They are noiseless and require very little attention. Their action is very efficacious, the contents of each vessel receiving up to 150,000 movements in every direction per day. In this way, powdered orris is completely exhausted in four days and musk in ten days. The expense for motive power is very low, the vessels revolving on pivots, so that a state of practical equilibrium is always maintained.

PERFUMED SPIRITS

Perfumed spirits are more indispensable adjuncts to the perfumer than aromatic waters. They may be obtained by distillation, when they are known as distilled spirits, or, to adopt the French name, as “alcoholates”; or by simple maceration, when they are known as infusions, or alcoholic solutions or extracts.

For example, an alcoholic extract of linaloe wood, free from astringent and resinous matter, and having only a faint yellow colour, can advantageously replace ordinary alcohol in the preparation of perfumes of the rose type, thanks to its odour of the rose, and it gives not only a finer perfume, but a more lasting one than plain alcohol. The extract is obtained by a more or less prolonged maceration of the aromatic substance in the appropriate solvent. In the case of most oils, solution takes place at once, but with solid substances fairly long maceration is necessary.

The terms infusion, maceration, and digestion are practically identical, but with this distinction, that they are usually applied to the same operation carried out under varying conditions. If, for example, it is desired to extract from a given substance a non-volatile body soluble in water, the substance will be treated with boiling water. This process is known as infusion. The infusing vessel should be carefully closed, and the substance left in contact with the water for a period varying according to the greater or less solubility of the body to be extracted, in the solvent. In the infusion of dried leaves or flowers, it is best first to moisten them with a little hot water so as to cause them to open or unroll and then add the remainder of the water. This
is the rational method of making tea and medicinal infusions. Better results are obtained thus than by at once adding the whole of the water necessary for the infusion.

Maceration differs from infusion only in the temperature of the liquid, which is always cold. The process, naturally, is longer and often runs into weeks or even months. Substances extracted by this process are those which will not bear a high temperature, and contain very soluble extractives. In certain cases, maceration serves the purpose of softening and disintegrating raw materials before they are distilled. The cells and vessels containing the essential oil are broken open and so more readily yield up the oil. In the manufacture of toilet vinegars, a number of extracts obtained by maceration are employed. Some of the substances employed are so unstable that all other methods would injure them.

Digestion is merely a prolonged infusion in a warm liquid which is not allowed to attain boiling temperature. One usually submits to digestion only those substances which are very slow to yield their perfume to cold alcohol, and for which the employment of heat is indispensable.

Whether extracts are prepared by infusion, maceration, or digestion, they should be kept in vessels which are not attacked by the liquid contained therein, and closely corked in order to prevent evaporation of the perfume. Copper and tin are most suitable for this class of preparation. Stoneware, glass, or enamelled ware, heated on a water- or sand-bath, are also suitable. Whatever the character of the vessels, the operator should always take care that they are not too full, especially when they have to be heated. In this case, it is necessary to have an opening through which the vapour formed can escape. This precaution is necessary, since by a rise in temperature alcohol increases in volume, and if the lid completely closes the vessel, a vacuum may be formed on cooling, which might cause the vessel to burst. Apart from this, the operation proceeds more satisfactorily when the vessels are not too full.

The substances treated should always be crushed and in such a condition that they present the greatest possible surface to the solvent. Further, they should be repeatedly stirred so as to be in the closest contact with the solvent throughout.

The time of maceration depends upon the nature of the substance to be treated, and the greater or less solubility of its constituents. Perfumes dissolving easily in alcohol may be treated
AROMATIC WATERS, EXTRACTS, INFUSIONS, ETC. 93

with an excess of the solvent, so as to shorten the process. An extract so obtained is of fine and sweet odour, whereas those obtained by a digestion or maceration which has been too prolonged are usually sharper and of thicker consistency. In fact, it is generally true that, other things being equal, the shorter the time of the extraction, the better is the extract.

When it is considered that the infusion has been standing sufficiently long, the aromatic liquid is separated from the residue, either by means of a fine sieve or a filter, and the latter is pressed in order to obtain the remainder of the liquid. The mixed liquids, not being quite clear, should be again filtered.

In most cases, the most highly aromatic extracts are obtained by the use of 80 per cent. alcohol, but this, of course, is by no means a fixed rule. Maceration with this solvent is complete in a week at a temperature of 15-20°. If a perfumer is pressed for time, and wishes to shorten the process, he must raise the temperature to 30-35°, and constantly stir the mixture. But in this case, he must allow the mixture to stand some hours, and cool down, before filtering or pressing the residue.

Most extracts improve on keeping, so long as they have been kept in closely scaled vessels, in a place not too warm, and not exposed to the direct action of sunlight, which causes decomposition of the extract. These extracts always show a less percentage content in alcohol than that of the alcohol employed, on account of the amount of the substance added to the alcohol by the extraction, which, of course, increases its bulk.

Tinctures,* as employed in French perfumery, imply the same thing as digestions or infusions, but with the advantage of retaining their odour for a more lengthy period. They also allow an odour which would not stand distillation to be fixed, and they have not the “odour of the still,” nor the empyreumatic odour so common in distilled products; and their preparation is economical.

But against these advantages, the colour—often very intense—is a disadvantage which is against the universal use of these extracts, especially as no means of decoloration is known which does not also attack the constituents which have an odour value.

* The term “infusion” is used in this work to include extracts from flower pomades, natural musk, aromatic gum-resins, and similar substances; “solutions” are solutions of natural essential oils and other natural perfumes, whilst “tinctures” are solutions of artificial perfumes. Thus infusion of musk is an extract of natural musk, whilst tincture of musk means a solution of artificial musk.
In some isolated cases, the extracts can be redistilled, either to recover part of the alcohol employed, or to obtain by fractionation more concentrated extracts, or even to give to the distillate a finer aroma, deprived of the disagreeable constituents contained in the original extract.

In conclusion, it may be said that in order to prepare these extracts of the best quality, it is indispensable that the following conditions should be maintained:

1. Only use well-dried substances, or, where this is not possible, increase the strength of the alcohol used.
2. Use the material in the most finely divided state possible.
3. Do not exceed a temperature of 30-35° in an alcoholic extract.
4. Keep the vessels well closed.
5. Prolong the contact of the material with the solvent according to the nature of the substance, and agitate the mixture very frequently.

Some substances naturally contain much water, which diminishes the alcohol strength of the extract, unless they are previously dried. At the same time, it should be remembered that, with certain exceptions, extracts obtained with plants which have been too much dried have not the delicacy of those prepared from the fresh plant.

If the manufacturer desires to prepare distilled alcoholic solutions from these extracts, it is best to distil from a water-bath, as direct fire or a sand-bath usually causes the distillate to have a well-marked empyreumatic odour.

THE PREPARATION OF RAW MATERIALS

The machinery used for crushing the raw materials varies according to the nature of the latter. Seeds are ground in mills; small, woody materials and barks are crushed; and twigs and fine roots cut up by a machine resembling a chaff-cutter; wood is cut into thin shavings. It is not necessary to give detailed descriptions of all these machines, but attention may be drawn to a few typical ones.

Crushing Machines (Broyeurs).—A machine suitable for grinding seeds and other small dry material is shown in Fig. 3.
AROMATIC WATERS, EXTRACTS, INFUSIONS, ETC. 96

It is a centrifugal crusher with automatic feed, with a closed chamber to receive the powder and a ventilator to assist in avoiding the escape of dust.

Fig. 4 represents a crushing, granulating, and grading mill, with two steel discs, so toothed that progressive grading is possible.

Fig. 5 is a small crusher with three granite cylinders, with a differential movement, for pasty material.

![Centrifugal Mill for Powdering Dry Material.](image)

Herbs are cut by a machine resembling a chaff-cutter, or by a hand tool consisting of one or more parallel knives screwed on a metallic plate, which is fixed to an iron handle weighted with lead or sand.

To treat wood or heavy roots, a cutter is used when small pieces are desired, or a machine in the nature of a mechanical plane when shavings are wanted.

The cutter has a revolving plate armed with sharp steel
blades, which cut the wood into small pieces. The wood is pushed into position and maintained so, by hand, on an appropriate approach.

For shavings, the apparatus is similar, but the wood is brought into position by a platform driven by a pedal (somewhat resembling a bacon-cutting machine), and the shavings are cut off by the revolving wheel, holding the knives, with which the moving platform is usually parallel.

Mechanical pestles and mortars, illustrated in Figs. 6, 7 and 8, are specially useful in perfumery for powdering hard material.

Worked by hand, this powdering is long and tedious. The illustrations represent mechanical devices constructed by Messrs. Savy, Jeanjean, & Co., either simple or in groups, which overcome the objections to hand pulverisation. They are mounted on a metal framework and are very suitable for perfumers.

Fig. 7 shows a single pestle, driven by ordinary engaging gear by a belt, occupying but little space, and giving, without any trouble to the workmen, four times the amount that can be obtained by hand work in the same time.
Fig. 8 shows a double pestle and mortar, the pestles armed with sharp knives. It is mounted on a wooden frame, and is worked direct from a belt from the motor, with the usual free wheel for disengaging the machinery. The gear teeth working the pestles are protected with circular metal plates in order to render them safe. The revolving knives of the pestle are of steel. The pestles are subjected to a double movement, rising and falling, and at the same time revolving on their axis, by means of teeth suitably arranged, and so work with great energy on the material to be crushed, and without overheating it. Each of the pestles can be stopped independently and kept up by a small fork inserted into the framework and a groove on the pestle in a corresponding
position. This allows the removal of any material or the emptying of the mortar without the necessity of cutting off the power.

Fig. 9.—Mechanical Sieving Machine.

Fig. 10.—Mechanical Sieve with Sieve Chamber.

Indiarubber shields cover the mortars closely, so that powdered material, etc., is not ejected.

*Mechanical Sieving.*—Sieving, a common manual operation,
is also effected by machinery. Fig. 9 shows a sieving machine made by Messrs. Savvy, Jeanjean, & Co., both simple and ingenious, which imitates the movement, so comparatively slow and troublesome, of hand sieving. The machines are made with two, four, or eight sieves to accommodate operations of different magnitudes.

The sieves are constantly agitated, and are subject to a triple movement, which makes them turn in their cages. These are fixed obliquely and set in motion by connecting rods worked by crank shafts on which are mounted fixed and loose pulleys. A metal fork disengages the belt in the usual manner. The sieve drums, with double or triple compartments, can be closely covered by indiarubber covers, kept in place by means of strings and hooks.

These sieves can be replaced by a helicoidal sieve chamber (see Fig. 10), consisting of a cylinder against the surface of which a strip with brushes attached works, so that the material is forced through the sieve. This enables a very high yield to be obtained.

FORMULE FOR SIMPLE EXTRACTS

The exact quantities of aromatic material to be used in the preparation of simple or alcoholic extracts may now be given. It should be noted that these formulæ are not to be taken as hard and fast rules, but as good indications of the best starting points for manufacturing purposes.

* Infusion of Ambergris

Ambergris .................. 200 grams
95 % alcohol .................. 9 litres

Put the ambergris, mix with the alcohol, and shake the mixture as frequently as possible, keeping the vessel well closed to prevent loss by evaporation. The time of infusion should be three months, or more, if possible.

* Infusion of Ambrette

This infusion may, in certain cases, replace the above-described infusion of ambergris.

Ambrette seeds .................. 200 grams
95 % alcohol .................. 2 litres

Crush the seeds to a fine powder, mix with the alcohol, and leave for three months at least, with frequent shaking.
Infusion of Balsam of Peru

Balsam of Peru ............... 1 kilo.
95 % alcohol .................. 10 litres

Operate as in the preceding case.

Infusion of Storax

Storax .............. 2.5 kilos.
95 % alcohol ............... 8 litres

Operate as in the preceding cases.

Infusion of Balsam of Tolu

Balsam of Tolu ............... 2 kilos.
95 % alcohol .................. 8 litres

Operate as in the preceding cases.

Infusion of Benzoin

Siam benzoin in white tears .... 500 grams
95 % alcohol .................. 3.5 litres

The whiter the benzoin, the better the extract will be.
An alternative formula is

Benzoin (coloured) ............. 600 grams
95 % alcohol .................. 3.5 litres

Powder the resin finely, and allow it to stand with the alcohol, with frequent agitation, for three months.

Infusions of gum resins can scarcely be dispensed with in perfumery. In the manufacture of perfumes for the handkerchief, their chief value lies in their fixative power.

Infusion of Cinnamon

Ceylon cinnamon bark .......... 1 kilo.
95 % alcohol .................. 10 litres

Crush the bark in a mortar, add the alcohol, and shake frequently for a month.

Infusion of Castor

Castor ......................... 1 kilo.
95 % alcohol .................. 20 litres

Operate as in the preceding case.

Infusion of Cloves

Cloves ......................... 1.5 kilos.
95 % alcohol .................. 7.5 litres

The cloves are crushed or powdered coarsely, and are allowed to stand with the alcohol at a low temperature for five to six
AROMATIC WATERS, EXTRACTS, INFUSIONS, ETC. 101

days. This time is sufficient for a good quality infusion. Longer infusion makes the extracts darker and more sharp in odour.

**Infusion of Orris**

Florentine orris root .................. 3 kilo.
95 % alcohol .......................... 4 litres

Three months, at most, for infusion, with frequent shaking. Temperature 35°C.

**Infusion of Lavender**

Lavender flowers ....................... 4 kilos.
95 % alcohol .......................... 16 litres

Time for infusion, one month at most.

**Infusion of Civet**

Civet .................................... 200 grams
95 % alcohol .......................... 4 litres

To prepare infusion of civet, one may proceed in the same manner as for infusion of musk, but this is really not necessary, as the odorous constituents of civet are very soluble in warm alcohol, and advantage may be taken of this fact. For this purpose, a tinned iron vessel is used, which is surrounded by an outside metal jacket with a tap at the bottom to run off the liquid used for condensing purposes. This outer jacket should only surround the top portion of the vessel, and is filled with iced water to prevent the evaporation of alcohol from the lower part of the vessel. The civet is spread on small pieces of filter-paper or small glass plates and placed in the vessel with the alcohol. The vessel is placed on the water-bath so that its contents are heated to 60°C, and the mixture is frequently stirred with a wooden spatula. The vessel is removed from the water-bath closed, and allowed to stand for several days with frequent shaking, after which the liquid is filtered.

**Infusion of Coriander**

Coriander seed (well crushed) ....... 5 kilos.
95 % alcohol .......................... 22.5 litres

One month’s infusion is sufficient.

**Infusion of Frankincense**

Frankincense .......................... 250 grams
95 % alcohol .......................... 2 litres

Proceed as in the last case.
Infusion of Mousse de Chêne (Oak-moss)

Mousse de Chêne .................. 150-250 grams
95 % alcohol ..................... 10 litres

Reduce the oak-moss to powder and keep the mixture of this and the alcohol well shaken for at least two days (in a mechanical shaker, for preference). The infusion is then filtered, and is most useful in modifying the perfume of other extracts. It gives to many perfumes a "cachet" much appreciated by users of perfumes. At the same time, it acts as a powerful fixer and brings out the virtues of other perfumes. Concrete or semi-concrete essences of oak-moss are commercial articles, as are also artificial mixtures claiming to resemble the natural substance.

Infusion of Patchouli

Patchouli leaves ................... .5 kilos.
95 % alcohol ..................... 50 litres

Moisten the leaves with 5 litres of the warm alcohol, then add the remaining 45 litres of cold alcohol, and allow the mixture to digest for two to three months with frequent shaking.

Infusion of Cinchona

Cinchona bark ...................... 5 kilos.
95 % alcohol ..................... 20 litres

Whatever variety of cinchona bark is used, the method of preparation is the same. The bark is finely crushed, and allowed to stand in contact with the alcohol for ten to fifteen days at most.

Infusion of Sambul

Sambul root (crushed) .......... 1 kilo.
95 % alcohol ..................... 2 litres

Proceed as in the previous case.

Infusion of Sandalwood

Sandalwood (in shavings) ....... 2.5 kilos.
95 % alcohol ..................... 15 litres

Allow to stand for two months.

Infusion of Musk (Grain)

Grain musk ....................... 33 grams
95 % alcohol ..................... 7 litres

The musk is finely powdered with an equal quantity of sugar of milk in a slightly warmed mortar. Two hundred grams of a solution of potassium carbonate and 300 grams of alcohol are
then added and the mixture rubbed into a cream. The remainder of the alcohol is then added, the whole well stirred, and allowed to settle. The particles which have not been sufficiently powdered settle quickly to the bottom; the liquid is decanted and the coarser particles are subjected to a second trituration until they are completely powdered, and the extract is made up to 7 litres if any alcohol has been lost by evaporation. A few drops of ammonia are added, and the mixture is allowed to stand, with periodical shaking, for at least three months.

Better results, however, can be obtained if a percolator be used and the first percolate returned to the percolator four or five times. A product of great delicacy is obtained in this manner. One litre of alcohol is used for 35 to 40 grams of musk, so that the extract is a stronger one than that described above. After the first litre has been obtained by 5 percolations, a second quality extract is yielded by repeating the treatment, and after this a third quality, but the last named is generally used as if it were alcohol, to start operations again on a fresh portion of musk.

Infusion of Musk (Pod)

<table>
<thead>
<tr>
<th>Musk, in pods</th>
<th>350 grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>95 % alcohol</td>
<td>17 litres</td>
</tr>
</tbody>
</table>

Operate as above described, remembering that the pods are difficult to soften and cannot be reduced to powder in a mortar. It is best to cut them into as small pieces as possible and soften them by a prolonged treatment in a little alcohol with the addition of a little caustic potash solution at 40–45° in a closed vessel.

Infusion of Myrrh

<table>
<thead>
<tr>
<th>Myrrh in tears</th>
<th>500 grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>95 % alcohol</td>
<td>6 litres</td>
</tr>
</tbody>
</table>

Proceed as in the case of benzoin.

Infusion of Opopanax

<table>
<thead>
<tr>
<th>Opopanax</th>
<th>500 grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>95 % alcohol</td>
<td>8 litres</td>
</tr>
</tbody>
</table>

Proceed as in the preceding case.

Infusion of Vanilla

<table>
<thead>
<tr>
<th>Mexican vanillas</th>
<th>600 grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>95 % alcohol</td>
<td>2 litres</td>
</tr>
</tbody>
</table>

The vanilla is split and cut in as small pieces as possible. It is then mixed with its own weight of sugar of milk and triturated
until a homogeneous paste is obtained. It is then added to the alcohol and allowed to digest for a month or more. This extract cannot always be used in perfumery on account of its more or less intense colour. It may to some extent be replaced by a solution of vanillin or by the following extract, which has little colour, but which is not often used in perfumery.

*Infusion of Tonquin Beans*

Tonquin beans ................. 1 kilo.
95% alcohol .................... 5 litres

The beans should not be too old, the fatty matter present in the older beans being very liable to turn rancid. The beans are crushed and macerated for from fifteen days to three weeks. This infusion is, in any event, somewhat liable to acquire a rancid odour, and is not often used.

*Infusion of Vanillons*

Vanillons ...................... 5 kilos.
95% alcohol .................... 21 litres

Proceed exactly as with vanilla.

*Infusion of Vetivert*

Vetivert root .................... 1 kilo.
95% alcohol .................... 10 litres

Reduce the vetivert to as fine a powder as possible, moisten it with a little warm alcohol, and then add the remainder cold. Shake frequently and leave for at least a month.

*Infusions of Pepper or Pimento*

White pepper, or pimento ...... 1 kilo.
95% alcohol .................... 5 litres

Break the berries as finely as possible in a mill, moisten with a little warm alcohol, add the remainder of the alcohol, and leave for at least a month.

*Infusion of Bois de Rose*

Bois de Rose .................... 1 kilo.
95% alcohol .................... 5 litres

Cut the wood as finely as possible and allow to digest in the alcohol for a month.
AROMATIC WATERS, EXTRACTS, INFUSIONS, ETC. 105

FORMULE FOR PERFUMED SPIRITS

Under this name are understood preparations obtained by infusion, maceration or digestion with alcohol, with later additions of water, and finally, by distillation, in which process only the fractions with the finest and most delicate odour, are collected.

The addition of water facilitates the recovery of the whole of the alcohol and assists the inert or objectionable resinous and extractive matters to remain as precipitates in the residue in the still.

In these distillations, the first runnings and the tailings are collected separately and used for such purposes as the perfumer may find possible. The alcoholic extracts, the main portion of the distillates, are the most valued products, and are, of course, very expensive. They are prepared, for example, as follows:—

- Spirit of Benzoin

Benzoin .................................. 1.5 kilos.
95% alcohol ....................... 25 litres
Water ................................. 10 "

After digestion with the alcohol, the water is added and the mixture distilled and the fractions collected are:—

First runnings ...................... 1 litre
Spirit of benzoin ................. 20 "
Tailings ............................. 4 "

The aqueous residue left in the still can be used for the preparation of cheap perfumed waters.

In the same manner, the spirits of myrrh, balsam of Tolu, rosewood, sandalwood, and sassafras can be prepared.

Spirit of Cinnamon

After maceration of 750 grams of cinnamon bark in 25 litres of 95 per cent. alcohol, and the addition of 10 litres of water, the distillation should give 1 litre of first runnings, 20 litres of spirit of cinnamon, and 4 litres of tailings.

Spirit of Lemon

The peels of 150 lemons are macerated in 25 litres of 95 per cent. alcohol and 10 litres of water added. Distillation gives 1 litre of first runnings, 20 litres of spirit of lemon, and 4 litres
of tailings. The spirits of orange and citron are prepared in
the same manner.

To prepare a stronger spirit double the number of the peels
in question may be used.

**Spirit of Orange-flowers**

Macerate 6·5 kilograms of orange-flowers in 25 litres of 95 per
cent. alcohol, add 15 litres of water, and distil. One litre of
first runnings, 20 litres of spirit, and 4 litres of tailings are
obtained.

Spirits of hyssop, lavender, balm and cloves may be similarly
prepared. For spirit of roses, double the weight of flowers,
namely, 13 kilograms, should be employed.

**Spirit of Roses, from Otto**

Otto of rose .......................... 250 grams
95 % alcohol .......................... 50 litres

**Spirit of Portugal from Oil**

Oil of sweet orange ................... 1225 grams
95 % alcohol .......................... 15 litres

**Pomade Infusions**

A certain number of infusions in common use are made from
pomades and enfluerage oils, such as jasmine, jonquil, tuberose,
acacia, rose, carnation, lilac, and orange-flower.

The pomades used for this purpose ought to be those known
in commerce as “flower pomades Nos. 12, 24, 36, or 72.” Pomade
No. 72 indicates that most highly saturated with the perfume.

Ten kilos of the pomade are melted on the water-bath,
and when semi-fluid are transferred in small quantities to a
suitable receptacle in which has been placed 10 litres of 95 per
cent. alcohol. The mixture is well stirred until it is completely
cold. Care must be taken to close the receptacle thoroughly
to avoid loss by evaporation. The mixture is well stirred every
day so as to enable the alcohol to dissolve out the perfume from
the pomade. At the end of a month, the liquid is poured off
and filtered. This is known as the “infusion première.” The
residue is treated again with 1 litre of fresh alcohol and the
“infusion seconde” obtained, and, in the same manner, a litre of
“infusion troisième” is yielded. The second and third
infusions, although weak, can still be employed in certain cheaper
AROMATIC WATERS, EXTRACTS, INFUSIONS, ETC. 107

products. On the manufacturing scale, these extracts are prepared more rapidly with special apparatus which need not be here described.

The extracts of flower pomades or oils have the disadvantage of containing a small quantity of the fat, which is deposited in cold weather and renders the liquid turbid. To avoid this inconvenience, they are filtered when cold, then kept in a freezing mixture for twenty-four hours, and again filtered. In spite of this, they retain a trace of fatty acids which slightly interferes with the perfume and does not improve the keeping quality of the extract.

The following are examples of these extracts:

*Infusion of Orange flowers*

Orange-flower pomade ............. 1 kilo.
95 % alcohol ..................... 1 litre

Proceed as above described. The extract so prepared has a very beautiful perfume indistinguishable from that made from the fresh flowers.

*Infusion of Jasmine*

Jasmine pomade ................... 1 kilo.
95 % alcohol ..................... 1 litre

Proceed as described above.

*Infusion of Jonquil*

Jonquil pomade ..................... 1 kilo.
95 % alcohol ..................... 1:25 litres

Proceed as above described.

*Infusion of Mignonette*

Reseda pomade ..................... 900 grams
95 % alcohol ..................... 1 litre

Proceed as described above.

When the oil is employed instead of the pomade, it is necessary to stir the mixture for two hours before allowing the oil to separate.

*Infusion of Tuberose*

Tuberose pomade ................... 1 kilo.
95 % alcohol ..................... 1:25 litres

Proceed as described above. To the filtered extract add 20 grams of infusion (tincture) of storax as a fixer.
Infusion of Violets

Violet pomade ....................... 1 kilo.
95% alcohol ......................... 1.5 litres

Proceed as described above. To the filtered extract add 50 grams of infusion (tincture) of orris root and 80 grams of spirit of cassie flowers.

Infusion of Nasturtium

Nasturtium pomade (pommeade de capucines) is an interesting novelty, and is useful in the preparation of extracts of lily of the valley and lilac.

![Mechanical Agitator](image)

Fig. 11.—Mechanical Agitator.

It has been mentioned that on the manufacturing scale specially constructed apparatus is employed for the above operations, which allow the working up of large quantities at a time with much saving of hand labour.

Mechanical Agitator for Extracts.—This apparatus is so constructed that the matter treated is subjected to very energetic agitation, which assures the closest contact of the substance and the solvent, resulting in a perfect extraction. A rotatory movement of the blades of the vertical shaft in the vat is combined with an up-and-down movement by means of teeth fixed on the main shaft. The vats or cylinders are of copper, holding about 60 to 100 litres each, with well-fitting stoppers. A grating perforated with small holes forms a false bottom and serves to
filter the extract roughly, which is run off through the emptying tap.

To charge the apparatus, the pomade is run into the vessel from a small press containing it, so that in working the screw of the press the pomade is forced through in pipes like vermicelli into the alcohol in the container. Fig. 11 shows two shaking machines coupled and fixed on one pedestal. Each table carries five copper receptacles, tinned inside, each holding 50 litres. These receptacles are mounted on pivot tables, and swing over for filling and emptying. They are closed by tightly fitting stoppers.

It is easy to understand the working of this apparatus. The horizontal shaft carries the main pulley, and the fly-wheel works by means of crank plates on its edge, connecting rods with socket heads which impart a movement to the table so that it describes a portion of a circle. The return stroke brings the table back sharply into its original position, and so produces energetic shaking, thanks to the rapidity of the movement. This movement is kept regular by means of a governor attached to the fly-wheel.

The fatty residues from the extracts always contain a little perfume, however well they are exhausted. These are used either in soap perfumery or for a further preparation of pomades.

**ABSOlute Concretes and Liquid Essences for Preparing INFusions By Solution in Alcohol**

In order to avoid the inconveniences inherent to the preparation of infusions from pomades, the use of the so-called "concretes" and "absolutes" has become more common. These perfumery materials are extracted from flowers, etc., and have the true odour of the fresh material. As they are freed from the wax, etc., existing in the raw material, it is possible to dissolve them almost entirely in alcohol. Examples of such wax-free concretes are those of rose, violet, acacia, orange-flowers, tuberose, jonquil, mimosa, and Mousse de chêne. Three

infusions or extracts can be prepared from them, exactly as in the case of flower pomades:—

\[
\begin{align*}
\text{Wax per concrete} & \quad 1 \text{ kilo.} \\
95 \% \text{ alcohol} & \quad 70 \text{ litres}
\end{align*}
\]

The concrete is triturated with 3 litres of the alcohol in a mortar until a homogeneous mass is obtained, when the remaining
67 litres of alcohol are added. The mixture is then treated in the same way as in the case of flower pomades. It is filtered, submitted to the temperature of a freezing mixture and again filtered. Such infusions or extracts are of exceedingly fine odour. They are entirely free from the fatty odour often noticeable in pomade infusions. A second and a third extract are prepared from the residue in the same way as in the case of pomade extract.

Solutions of natural liquid perfumes are prepared by simply dissolving them in 95 per cent. alcohol, filtering, if necessary. For example:—

**Solution of Otto of Roses**
- Otto of rose .................................. 20 grams
- 95 % alcohol .................................. 1000 c.c.

**Solution of Oil of Vetivert**
- Oil of vetivert ................................ 60 grams
- 95 % alcohol .................................. 1000 c.c.

**Solution of Liquid Oil of Orris**
- Liquid oil of orris ............................ 80 grams
- 95 % alcohol .................................. 1000 c.c.

In the same way solutions of semifluid or concrete oils are prepared, and also those of essential oils which are so expensive that only minute quantities are used, and which would be difficult to weigh exactly.

For example, it is much easier to measure 25 c.c. of a solution of Otto of Rose, than to weigh out 0.5 gram.

**Solution of Concrete Oil of Orris**
- Concrete oil of orris .......................... 30 grams
- 95 % alcohol .................................. 1000 c.c.

**Solution of Orris Resinoid**
- Orris resinoid .................................. 100 grams
- 95 % alcohol .................................. 1000 c.c.

**Solution of Carnation Resinoid**
- Carnation resinoid ............................. 140 grams
- 95 % alcohol .................................. 1000 c.c.

**Solution of Patchouli Resinoid**
- Patchouli resinoid ............................. 100 grams
- 95 % alcohol .................................. 1000 c.c.

**Solution of Sandalwood Resinoid**
- Sandalwood resinoid ........................... 90 grams
- 95 % alcohol .................................. 1000 c.c.
AROMATIC WATERS, EXTRACTS, INFUSIONS, ETC. 111

Solution of Vetiver Resinoid

Vetiver resinoid ............... 100 grams
95 % alcohol ..................... 1000 c.c.

These resinoids are residues of extracts from the raw material, which contain the essential oil and resins, from which most of the essential oil has been distilled. They contain the resins, with some of the essential oil, and are excellent fixatives. They are employed in soap perfumery, dissolved in the essential oils used as the principal perfume.

The infusions (first, second, and third), obtained as described, from enfleurage pomades are not so largely employed to-day as they used to be. They are, however, almost indispensable for the preparation of the majority of the finest triple and quadruple extracts; for the simple and double extracts they are generally replaced by solutions of the absolute oils or essences.

Solution of Broom (Gendé)

95 % alcohol ..................... 1000 c.c.
Semi-solid essence of broom ... 10 grams

The absolute essences are known under numerous names, one of which is the aromanthemes. They are pure natural products, without any addition of synthetics, and are composed of the odorous principles of the flower in a pure and highly concentrated form. They are very useful and faithfully reproduce the flower odor. Alcoholic solutions remain clear and do not precipitate, even when exposed to low temperatures. Concrete essences of all substances generally used for the preparation of perfume infusions are manufactured, but the absolute natural oils of the aromantheme type are restricted to a small number of perfumes, such as acacia, orange-flower, jasmine, jasminol, and hyacinth. They are dissolved in various proportions according to individual taste. For example, 34 grams of the essence in 20 litres of pure 90% per cent. alcohol is a fair average strength.

TINCTURES OF SYNTHETIC PERFUMES

The method of using synthetic perfumes is very simple. It is sufficient merely to dissolve them in a given quantity of alcohol (or rarely some other solvent). The vendors will always supply details as to solubility, for, in the case of synthetic mixtures, the solubility of different perfumes under practically the same name
PERFUMES AND COSMETICS

will vary, which, of course, is not the case when dealing with individual substances. In general, it is best to prepare such solutions and leave them for some days at a low temperature, before use, so as to allow them to mellow. Tinctures prepared from artificial perfumes ought to have a strength corresponding with the previously described "infusions premières." They can then be diluted with alcohol as required for various finished articles. Artificial essences of jasmine, acacia, gardenia, orange-flowers, reseda, tuberose, and violet are usually dissolved in the proportion of 10 grams per litre of 95 per cent. alcohol, whilst in those of hyacinth, heliotrope, and lily of the valley, the quantity varies from 30 to 40 grams per litre. For artificial musk, the quantity is 1.5 grams per litre, and for artificial civet 50 grams. These figures may, of course, be varied. Artificial civet is obtainable in a solid and in a liquid form. When liquid, it can be added direct to perfume products, without making it into an alcoholic solution.

There scarcely exists any natural perfume which has not, to a greater or less extent, its synthetic counterpart. It would therefore appear easy to prepare any perfume whatsoever by simply mixing synthetic perfumes and diluting them to the proper concentration. This, however, cannot be done in so simple a manner. Artificial perfumes obviously present great resources to the manufacturers of cheap extracts, but in the manufacture of fine perfumes they can only serve as adjuncts to natural perfumes, either to vary the "shade" or "note" of the odours, or to increase its intensity.

Take, for example, the violet perfume, which has been so fully investigated. A violet perfume is obtained by merely dissolving ionone in alcohol. But such a tincture of ionone does not possess the fine odour of an extract made from a natural violet pomade. It has a crudity and pungency which at once betray its origin. It is therefore always necessary to use the pomade extract of violets when manufacturing a fine violet perfume, and tincture of ionone should only be added to strengthen the natural odour of the flower, an addition which produces excellent results.

But ionone should be employed with care and discretion. Used in too large a quantity, it may "paralyse" the olfactory nerves. It has been said that the Germans have become so accustomed to the powerful ionone odour that they can no longer detect the natural perfume of the violet flower. This is doubtless an exaggeration. But the case of workmen engaged in the manufacture of ionone is characteristic; at the end of a certain time
they lose completely the sense of smell, and only regain it after remaining in the open air for a while. Attention should be drawn to certain other artificial perfumes, such as jasmine, acacia, hyacinth, heliotrope, etc. These are usually of very good quality and can be employed for the manufacture of products which must have the particular flower perfume more or less accentuated. But they can only serve as adjuncts to, and not substitutes for, the natural perfume. As mentioned previously, it is usually sufficient to dissolve 10 grams in a litre of 95 per cent. alcohol to obtain tinctures comparable in strength with the first infusions obtained from the corresponding flower pomade. In regard to artificial essence of hyacinth, care should be taken not to use too much, or the olfactory nerves may be deadened. The more dilute this perfume is, the more delicate it becomes. The tinctures corresponding to the first infusion, then, are obtained by dissolving 15 to 20 grams of absolute liquid or concrete essence in 1 litre of 95 per cent. alcohol. Those corresponding to the second infusion are made by dissolving 6 to 8 grams in the same quantity of alcohol; and those corresponding to this third infusion by using 3 grams per litre. In using the concrete essences, attention has already been drawn to the method adopted. For liquid essences, the oil is simply dissolved in the alcohol. The vessel in which the essence is weighed should be rinsed with alcohol, which is added to the main solution, and the whole is filtered.

One usually only prepares a single tincture of artificial perfumes, equal in strength to the first infusion of a pomade, and this is dissolved in more alcohol as required in the manufacture of various bouquets, etc.

The following concentrations of artificial flower perfumes are of useful standard strength. The figures are in grams per litre:

- Acacia, gardenia, wallflower, jasmine, roses, orange-flower, tuberose, rose: 10 grams
- Violet: 12 grams
- Carnation: 15 grams
- Heliotrope: 32 grams
- Hyacinth: 40 grams
- Lily of the valley: 30 grams
- Syringa: 60 grams

Other tinctures of artificial products are prepared similarly.

**Tincture of Musk (Artificial)**

Artificial musk: 15 grams
95% alcohol: 1 litre
As there are several distinct artificial musks of varying solubility, it is not easy to prepare a tincture equal in strength to that of the infusion of natural musk. The solubility varies from about 6 to 15 per 1000, according to the artificial musk used. It is therefore of importance to know which musk one is using, and to make experiments as to its solubility.

Among other solvents for artificial musk is benzoyl cinnamate or cinnamene. This body is also sometimes known as essence of Peru balsam, in which it exists to the extent of about 45 per cent., and from which it can be separated by means of petroleum ether, benzene or ether. It is an oily liquid having an odour of Peru balsam. Its use is indicated when the odour is required without the colour of Peru balsam. Cinnamene is of considerable interest to the perfumer on account of its high solvent power on artificial musk, without allowing it to be redeposited, as is the case with many essential oils. Benzyl benzoate, which has but a slight odour, is also an excellent solvent for artificial musk.

When artificial musk is used for soap perfumery, it is usually dissolved in the other perfumes, preferably slightly warmed. But if more than small quantities are dissolved, the musk will separate out on cooling and sink to the bottom of the liquid, and if the container is not transparent, may escape the notice of the operator. Besides, warming delicate perfumes is not to be recommended where avoidable, as it injures the odour and promotes evaporation.

Experience has shown that cinnamene can hold a large amount of artificial musk in solution, and it can be employed in most soap perfumes without any inconvenience. Its odour is practically covered by the musk. The stability of solution of artificial musk in cinnamene allows unlimited quantities to be prepared and kept in stock. The cinnamene is heated to 40-50°, and as much artificial musk as will dissolve is added. If any separates on cooling, it can be filtered off and used for a further quantity of solution. The musk will now remain in solution and does not separate by the addition of most essential oils. The solution is useful for perfuming toilet soaps.

When dealing with other substances than toilet soap, the perfumer should use benzyl benzoate, instead of the cinnamate, as the solvent for artificial musk. It is colourless, almost odourless, and soluble in all proportions in alcohol. One kilo. of benzyl benzoate, preferably warmed, can dissolve about 200 grams
of artificial musk and keep it in solution when cold, even after the addition of flower essences, alcohols, etc.

The solubility of artificial musk obviously varies according to the particular musk employed. In dissolving 200 grams of artificial musk in 1 kilo. of benzyl benzoate, a saturated solution is obtained which mixes with alcohol in any proportion without depositing crystals of musk. This solution can be used in perfuming most extracts, toilet-waters, etc.

To dissolve artificial musk in benzyl benzoate, the solvent should be heated to 40° and the musk added and well shaken, the temperature being maintained at 40°. The musk soon dissolves to a clear solution. Higher concentrations can be obtained, but they will precipitate when mixed with alcoholic solutions, but they can be used for soap perfumery. Mixtures of 500 grams per kilogram of the solvent solidify, and are useless except for immediate use in particular cases. A temperature of 40° does not affect the qualities of either the musk or the solvent, although at this temperature natural perfumes are affected and alcohol is evaporated.

**Tincture of Civet**

<table>
<thead>
<tr>
<th>Artificial civet</th>
<th>40 grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>95 % alcohol</td>
<td>1 litre</td>
</tr>
</tbody>
</table>

This tincture corresponds in strength with an infusion of natural civet of 35 per cent. strength. It has a reddish colour, but, considering the quantity in which it is used, this is no disadvantage. Artificial civet is supplied in the solid and in the liquid forms. As previously mentioned, in the liquid form it may be added directly to the perfume mixture.

Artificial musk is not identical in odour with natural musk, although it closely resembles it. But artificial civet is so close to the natural perfume in odour that the only difference to be noticed is the stronger odour of the artificial perfume as compared with natural civet.

To perfume toilet soaps, the tincture of civet is added to the other essential oils. In the same way, tincture of civet is added to floral extracts, etc. To obtain a perfume of equal intensity, it is necessary to employ about 150 grams of artificial civet in place of 100 grams of natural civet.

**Tincture of Ambergris.**

<table>
<thead>
<tr>
<th>Artificial ambergris</th>
<th>50 grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>95 % alcohol</td>
<td>1 litre</td>
</tr>
</tbody>
</table>
Tincture of Ambrehol
Ambrehol .......................... 15 grams
95 % alcohol ........................ 1 litre

This solution is saturated. It is not of great value, and may be well replaced by an infusion of the natural perfume.

Tincture of Mousse de Chêne
Concrete essence of oak-moss (artificial) ............. 5 grams
95 % alcohol ........................ 1 litre

This solution is employed in the manufacture of perfumes for the handkerchief.

Tincture of Vanillin
Vanillin .............................. 20 grams
95 % alcohol ........................ 1 litre

Tincture of Bourbonal
Bourbonal (vanilla odour) ........... 15 grams
95 % alcohol ........................ 1 litre

Tincture of Coumarin
Coumarin ............................ 15 grams
95 % alcohol ........................ 1 litre

Tincture of Heliotropin
Heliotropin ......................... 20 grams
95 % alcohol ........................ 1 litre

Tincture of Turanol
Turanol (mixture with flower odour) 30 grams
95 % alcohol ........................ 1 litre

The following tinctures of artificial perfumes are, when values are normal, about equivalent in cost to the corresponding first infusions of pomades.

Tincture of Jasmine
Artificial jasmine oil ................. 20 grams
95 % alcohol ........................ 1 litre

Tincture of Acacia
Artificial acacia oil .................. 15 grams
95 % alcohol ........................ 1 litre

Tincture of Rose
Artificial otto of rose ............... 18 grams
95 % alcohol ........................ 1 litre
AROMATIC WATERS, EXTRACTS, INFUSIONS, ETC. 117

* Tincture of Neroli *

Artificial oil of neroli .................. 40 grams
95% alcohol ............................. 1 litre

* Tincture of Violets *

Ionoce ................................. 10 grams
95% alcohol ......................... 1 litre

* Tincture of Violet Leaves *

Artificial oil of violet leaves ....... 12 grams
95% alcohol ............................. 1 litre

The oils are dissolved in the alcohol, and filtered, if necessary, before use. Irisolette, a fancy name for one of the 100 per cent. violet ketones or mixtures of ketones, in the proportion of 40 grams to the litre of alcohol, gives a fine result, and is of very high strength.

* Tincture of Yara-yara *

Yara-yara ............................ 50 grams
95% alcohol ......................... 3 litres

Yara-yara and bromelia are, as has been mentioned previously, ethers of β-naphthol, and are both artificial neroli perfumes. They are largely employed in soap perfumery, when they are often dissolved in amyl acetate or a mixture of that body with terpineol, which dissolves a considerable amount of either ether. The liquid is warmed and the crystals of yara-yara are added, and when dissolved the perfume is added before it cools, as otherwise crystals may separate. The solution is, therefore, only made when required for use.

Before concluding this chapter a few observations on filtration, an operation of constant employment in perfumery, will be of interest.

**Filtration**

Filtration consists in freeing a liquid from the solid bodies it holds in suspension. This operation is of the greatest importance in perfumery, since the products have usually to be clear and perfectly transparent, and it is unusual to arrive at this result without filtration. To remove the turbidity from liquids, they are passed through a filter, usually made of paper. Oils and substances difficult to filter, such as aromatic waters, are often filtered through felt or other tissues.

The filter paper is placed in a funnel, which should be reserved
for its own purpose entirely; the best types for perfumery purposes are made of glass, the inside being ridged and grooved so that the filtered liquid can easily drain away. Zinc funnels are also used, and instead of the interior being grooved, a basket of iron wire fits inside, and allows the liquid to drain away by the space between the filter paper and the funnel wall.

The only practical shape of this type of filtering funnel is that of an inverted cone, the inclination of the sides being about 60°. It is held in position by specially made stands in order to facilitate manipulation and guard against loss by spilling. Various substances are used as filtering material, principally filter paper, white by preference. Special paper is obtainable for filtering resinous liquids, such as solutions of gum resins used in perfumery. This paper is rather thinner than that used for ordinary liquids and requires more delicate manipulation. The liquid should not be poured right into the filter, as may be done with ordinary paper, but should be poured down the side.

Filtering "thimbles" or "pockets" are also made in paper and are very useful for filtering fatty oils, as they have no seams and can be fitted into any funnel of the right size and shape for filtering at a temperature of 60°.

In some laboratories, where one has to deal with light coloured precipitates, black filter paper is used, as the least traces of white matter are visible thereon, and it is easier to see that the precipitate is completely eliminated from the liquid.

For filtering liquids low in alcohol content, "a linen strainer is sometimes employed, as it will frequently hold the impurities better than paper.

For liquids very difficult to filter a felt strainer exactly fitting the funnel is often used.

There are, however, a large number of perfumery products which cannot be clarified by a simple filtration, and one is obliged to use some substance to assist the process. In the simplest cases one uses magnesium carbonate, tæl, kaolin, kieselguhr, or even a filtering block of asbestos. In very difficult cases albumen is used, but only when all other means fail. The best way to use these filtering powders is to rub a little into a thin cream with the liquid to be filtered, and pour it all over the interior of the filter paper, etc., and return the liquid passing through the paper to the filter until it runs bright. In certain cases this method (or shaking the powder with a little liquid in a bottle) is inapplicable, as occasionally the powder, once mixed so intimately with the
liquid, will not separate again completely. It is then better to
dust the surface of the paper with the powder and then pour the liquid on.

If one dissolves essential oils and synthetic perfumes in 95 per
cent. alcohol, the solutions are usually clear and transparent.
But there are exceptions, as certain oils give turbid solutions.
Simple filtration through paper usually suffices to clarify such
turbid solutions, without the use of filter powder, especially if
the paper be first moistened with pure alcohol. If these solutions
are strongly diluted with water, they deposit oily or resinous
matter and become opalescent and cloudy. Terpenes and
sesquiterpenes contained in essential oils are also thrown out of
solution when much water is added, and give an opalescence to the
solution. It is for this reason that terpene oils are advantageous
when dealing with solutions weak in alcohol.

To clarify opalescent solutions, it is necessary to use a little
filtering powder such as carbonate of magnesia on the filter. But
when such an opalescent solution is diluted by further addition
of water, the filtration becomes more and more difficult to filter
with each degree of dilution, and either talc or kaolin must be
used on the filter. For perfumes weak in alcohol, it is preferable
to use a felt filter in which a little asbestos is used to assist
clarification.

Filtration with animal charcoal in order to decolorise a solution
is not recommended for perfumery, as alterations are often pro-
duced in the filtrate by oxidation. It is better, when it is impossible
to replace a badly coloured liquid (obtained, for example, by
carelessness), to use oxalic acid as a decolouriser, especially when
the liquid is poor in alcohol. It often suffices to add a few drops
of a concentrated solution of this acid to effect decolorisation;
this addition is so slight that it does not affect the perfume of the
liquid, to any observable degree. But with very delicate perfumes,
it is best never to resort to this plan.

It is sometimes necessary to separate fatty oils from alcohols,
as, for example, in the manufacture of brilliantines. Here one
uses a separating funnel, that is, a funnel furnished with a tap at
its lower end, allowing any desired portion of the liquid to be run
off. The mixture of alcohol and fatty oil is poured into the
funnel and allowed to stand for some hours, until the oil, having
the higher specific gravity, separates into a lower layer, leaving
the lighter alcohol floating on the surface in a sharply defined
layer. The tap is then carefully opened and the oily liquid run
off. There are always a few drops of oil left in the alcoholic layer, and in order to eliminate these the liquid is filtered through paper. For this purpose, a wad of cotton wool is placed at the top of the neck of the funnel and the folded paper put in its place and the liquid poured on to it. Any oil drops passing through the paper will be retained by the cotton wool. If one has to separate volatile liquids, a stoppered glass separator should be used. The method of fitting the filter into the funnel is of some importance. Felt filters are supplied shaped for this particular purpose, whilst paper filters are found in commerce in circular or rectangular sheets. The folded filter paper should be as nearly circular as possible, and all angles should be cut off, as they are useless and also absorb and waste some of the liquid, which is often of considerable value, and so cause a heavy loss due to evaporation.

Filter papers may be used either in the flat or in the pleated condition. The flat paper is merely a folded piece, with any angles it may have cut off, and fitted to the funnel, so that it is in a single fold on one side of the funnel and in a triple fold on the other. This has the disadvantage of preventing the easy flow of the liquid between the outside surface of the paper and the smooth wall of the funnel. This can be remedied to some extent by placing a glass rod between the paper and the funnel wall. By folding the filter several times so that folded ridges hold the rest of the paper away from the funnel wall, this disadvantage is obviated to a considerable extent.

Filtration is a very simple operation. But it should be remembered that it is best at first only to pour on to the filter sufficient liquid to moisten the whole of the paper, and then fill up the paper without causing it to split, which may happen if the liquid is poured on too rapidly.

The filtration of very resinous infusions sometimes presents difficulties. This is especially the case with infusion of benzoin, which is often prepared in different concentrations: for example, for toilet soaps, infusions containing much resin are used, which are not used for the preparation of extracts. In the filtration of this type of infusion, a metallic cloth with sixty-four meshes per square centimetre is used, followed by a fine tissue through which the liquid passes in the clear condition. If it is still cloudy, it is placed in a warm place and allowed to stand for several days and the clear liquid carefully poured off.

Utilisation of Old Filter Papers and Filtration Residues.—As in other industries, there are waste substances in perfumery
which ought to be profitably employed. Used filter papers are amongst these. But generally, in busy times, these are thrown into a receptacle with other waste and finally burned in the furnace. Profit, however, can be made from them, by storing them in a closed vessel containing 95 per cent. alcohol, which dissolves the perfumes and oils contained in them. When the papers contain filtering powder, this is scraped off with a knife and preserved for use in the manufacture of sachets. The papers are then thrown into the alcohol with the others.

The alcohol is stirred from time to time so as to ensure complete extraction of the perfume. At the end of a certain time, the alcohol is poured off, and can be used for the preparation of cheap toilet waters. The papers are pressed and the remainder of the perfumed alcohol is extracted and the pressed papers are either burned or, better, air-dried and then reduced to powder, which is still sufficiently perfumed to be used for sachets.

Filters which have been used for musk deserve special attention. When filtration is finished, they are cut into small fragments and put into fresh alcohol for a new, second-quality infusion.