

The above general scheme for costing should present no serious difficulty in a small or medium-sized factory. Some trouble and expense would be involved in starting up and running it, but once it is organised it should be a valuable asset. Where such a scheme is too involved or where the production, filling and dispatch departments are intermixed, it should be an easy matter to pick on the essentials of use and to operate a simpler scheme covering these points only.

## ON PURCHASING ESSENTIAL OILS

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**With the widening appeal of odours and flavours many not previously interested in Essential Oils have now to purchase them. Guidance is given to the accepted works of reference for the chemical analysis of samples and practical suggestions are made for their olfactory and/or gustatory evaluation. The attitude of the industry towards variation within deliveries is explained.**

THE BUYING and evaluation of essential oils is the concern of nearly all who have to impart aroma and flavour to a product. The ramifications of the essential oil industry are large, and it often falls to the lot of a buyer or a chemist in another branch of chemistry quite different from that of essential oils to have to buy and pass judgment on various samples of essential oils from different sources. The offers from different sources vary tremendously in price, and this has to be taken into account in conjunction with the quality when the final decision has to be made.

It cannot be too strongly stressed that a chemical examination to see if the essential oil fulfils certain standards set out in the literature is in reality only part of the evaluation procedure.

Another point to be noted is that essential oils are natural products and as such vary from season to season and from locality to locality. In some respects they may be likened to wine for vintage years and localities. The one salient point that must be borne in mind by the buyer and by the chemist analysing the oil is that it is bought in order to perfume or flavour a finished product, and it is the odour or flavour of the finished product which is the deciding issue since these are the selling factors of the product. So one test which *must* be carried out before any final decision can be made is to make a small batch of the finished product and to compare this with a standard one to see how the flavour or the odour of the essential oil comes through.

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A chemical examination is, of course, a necessity, but it should be looked upon rather as a diagnosis rather than a final verdict. To a chemist unaccustomed to evaluating these products there are special peculiarities he will find that are a little removed from ordinary routine analysis. There are several reference books which give details of the special methods employed in this field, and one may name amongst others Guenther, "The Essential Oils," Volume I; Simon-Thomas, "Laboratoriumsbuch für die Industrie der Riechstoffe, 4-5 Auflage"; British Standard No. 2073: 1953, "Methods of Testing Essential Oils,"; "Méthodes et Constantes Analytiques des Huiles Essentielles," issued by the Syndicat National des Fabricants et Importateurs d'Huiles Essentielles of Grasse; the methods of the Scientific Section of the Essential Oil Association of the United States of America; the various pharmacopœias such as the B.P. 1953, the B.P. Codex 1954, and the U.S.P. XIV.

Having determined the various physical and chemical characters, the literature will have to be consulted to see if the values found for the sample of essential oil falls within the usually accepted limits as given by Gildemeister and Hoffmann, "Die Ätherische Öle," 3rd edition; Guenther, "The Essential Oils," Volumes 1-6; Parry, "The Essential Oils"; "The Handbook of Standards" issued from Grasse, and the Standards issued by the Essential Oil Association of U.S.A. (both mentioned previously); while a very concise and authoritative summary of all aspects of essential oils is given in the section on Huiles Essentielles, by Y. R. Naves, in "Traite de Chimie Organique," Tome XVI, by Grignard, Dupont et Locquin. Tests for possible additions and adulterations can also be carried out.

While the results of the analysis may lead to some samples being rejected, there will be several samples that will pass this first stage of the examination, and here again it must be stressed that the deciding test will be an olfactory or taste test. This test is adapted to the use to which the oil is intended. With oil intended for the beverage trade, the sample should be made into a soluble essence by shaking one volume with four volumes of 70 per cent ethyl alcohol and using the resulting lower layer at the rate of 1 to 2 ounces to a gallon of mineral water syrup (6 lb. of sugar in a gallon of syrup acidified with 2 ounces of citric acid per gallon) and diluting the resulting syrup with water at the rate of 1½ ounces of syrup up to half-pint with plain or aerated water.

If the oil is intended for the confectionery trade it can be tested in fondant at a rate of 1 in 10,000, or if the oil is intended for high boilings a small batch of boiled sweets should be made in the laboratory to see that the oil reacts favourably to heat treatment. Similarly for the flour confectionery trade a small cake or some biscuits should be made, baking to the same temperature at which the oil is eventually intended to be used.

Where the odour of the oil is of critical importance as in the perfumery and cosmetic trades it should be tested on smelling strips at intervals, taking particular care to examine the residual odour carefully. A good way of also testing the odour is to place 50 ml. of water in a 250 ml. conical flask, add a drop or two of the oil and then well swirl the flask. The odour of the oil should then be observed in a similar manner to a brandy connoisseur evaluating the aroma of his favourite beverage.

The chemical analysis can reveal many interesting points if careful scrutiny be made of it and the various characteristics taken in conjunction with one another. Such points as a high non-volatile residue, a particularly low or high specific gravity, an especially high optical rotation, an abnormal peroxide value can all indicate certain facts regarding the origin and age of the oil, and in some cases may allow a further grading to be carried out.

Having by the procedure given above reduced the choice of samples to those from which the final choice will be made, it will probably be found that there are one, two or maybe three samples left for the final decision. The deciding factor will now rest on the price and the behaviour in the finished product. A small batch of the final product in which it is intended to incorporate the essential oil is made under identically the same conditions and using the same constituents as standard works batches, and compared with the standard product for aroma or flavour. Having carried out all of these tests it is then that the price factor has to be taken into account.

It is a fatal mistake to buy the cheapest essential oil unless critical tests have proved that it has the covering power and tenacity of the others. Price should be the last sorting out factor instead of, as in many cases, the first one. Another point to which attention should be drawn is that in any case the B.P. and B.P.C. are the minimum standards that an oil has to comply with, and also that they are standards for oils which are intended to be used for medicinal products and that the quality that would satisfy these requirements need not necessarily be the quality that is suitable for other purposes.

Having made the final judgment and having decided to buy one of the samples submitted, and having forwarded the order to the merchant or essential oil house, one will then have to check the delivery against the sample. Here a few general words regarding sampling will not be out of place, as sometimes arguments arise on this point. It sometimes happens that the original sample submitted is a type sample and that on buying the bulk there may be very slight differences in the delivery. There are reasons for this. It may happen that at the docks only one or two of the original containers have been opened, as many buyers of essential oils lay great stress on having the oil in original containers, with an unbroken seal carrying a well-known producer's name on it. As the oil is the result of several different distillations and these have to be blended, the lack of a very large capacity

tank may cause these slight variations. If possible, the number of broken seals and opened containers should be kept to a minimum.

In conclusion, one may say that although general hints such as have been given above can be of service in the buying of essential oils, there is a lot to be said for the good will and the good name of the seller, and the old adage that the high standing of the firm and high reputation on the label is as good a guarantee of quality as one can obtain from chemical tests.

## THE EFFECT UPON EMULSIONS OF THE HYDROXY COMPOUNDS IN BEESWAX

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**Work is described in which the role of the hydroxy compounds in beeswax is demonstrated. It is found that these play an important part in the emulsification behaviour of the wax and attention is drawn to the resultant value of the acetyl value as a beeswax constant.**

A STUDY of the literature does not produce a very lucrative yield of information on the composition of beeswax. The following information has been gleaned from various sources.

1. "Chemically, beeswax is composed of myricyl palmitate, cerotic and homologous acids with small amounts of hydrocarbons, cholesterol esters and ceryl alcohols, pollen and resins. The presence of resins in undue amounts renders bleaching difficult. The free fatty acid content is an important factor in emulsifiability.

### *Properties :*

Melting point	145–158° F.
Specific gravity	0.952–0.975
Acid number	16.6–20.7
Saponification number	90–96
Unsaponifiable matter	52–56%
Iodine number	4–12
Acetyl number	15.1
Ester number	72–78
Ester-acid ratio	3.6–4.2
Colour	white, yellow, brown
Refractive index (75° C.)	1.4398–1.4451
Odour	honey
Dielectric constant	3.1–3.3
Effective A.C. conductivity	70–86
Volume resistivity	0.9–1.5

\*Polak and Schwarz (England) Ltd., Enfield, Middlesex.