



DESCRIPTION

This module will give you a working knowledge of basic organic chemistry, focusing on the study of essential oil constituents, including the nature and properties of various functional groups which are found in essential oil molecules, as well as the absorption, metabolism and therapeutic/toxic effect of essential oils in humans.

NB: Students who have completed Chemistry and Herbal Medicine 2B (Pharmacognosy), do not have to do Chemistry and Pharmacology of Essential Oils).

DURATION

24 hours

LEARNING OUTCOMES

By the conclusion of this module, students should be able to:

1. Distinguish between matter and energy.
 Recognise atoms as the most basic descriptive unit of matter.
 State the characteristics of protons, neutrons and electrons (charge and position in the atom).
 Explain the structure and uniqueness of types of atoms in terms of numbers of protons, neutrons and electrons.
 Explain the difference between a compound and an element in terms of types of atoms.
 List the atomic characteristics of hydrogen, carbon and oxygen atoms.
 Explain the concept of charge balance within the atom, and the Law of Atomic Harmony.
 Explain the bonding capabilities of each type of atom.
 Understand that formation of bonds involves energy transfer and localisation of electrons.
 Explain covalent bonding (sharing of at least one pair of electrons)
 Predict the various possible structures of compounds if given the number and types of atoms involved.
 Use stick diagrams, electron dot diagrams and formulae to depict atoms, covalent bonding and molecules.
 Explain why energy is needed for bond breaking and reformation during chemical reactions.
 Write a word equation for a chemical reaction using "+" and "-"
2. Demonstrate how isoprene units are the building blocks of terpenoid compounds.
 List the types of non-terpenoid constituents also found in essential oils, e.g. phenolic compounds, sulfur and nitrogen containing compounds and short chain aliphatic compounds.
 State the structures of the functional groups found in essential oil compounds, and their therapeutic properties.
3. Draw the general pathway of essential oil production in most plants, starting from photosynthesis through to manufacture of secondary metabolites.

4. Explain polarisation of molecules due to electro negativity and unbonded electron pairs.
Draw a diagram illustrating "hydrogen bonding" of water.
Explain the concepts hydrophilic and lipophilic.
Explain why essential oils do not dissolve in water, but will dissolve in other solvents such as ethanol and vegetable oils.
Explain how emulsifiers and dispersing agents aid in the forming of an emulsion between oil and water.
5. Identify the routes by which essential oils can enter the human body.
List the rate limiting factors of the absorption of essential oils by the skin.
Identify the skin as the first site of essential oil metabolism during a massage session.
List the types of metabolic changes which the liver performs on essential oils: oxidation, reduction, addition of sulfate and glucuronate groups.
State the metabolic fate of essential oils in the body.
Give examples of pharmacological effects of essential oils in humans.
Research the chemistry of a given essential oil, and make suggestions as to its probable properties based on its chemical constituents.
6. List the various types of distillation method, and to state the variations in essential oil quality produced by each method.
Explain the optical activity of essential oil compounds and its use in quality control.
Explain refractive index and its value in quality control.
Explain specific gravity and its value in quality control.

TEACHING METHOD	Lectures Discussion of homework	
ASSESSMENT	Written Exam Weekly take-home tests Assignment	50% 20% 30%
	Pass mark Both components must be passed at 60% in order to pass this subject satisfactorily.	60%
	NOTE: To facilitate the return of your assignment you will need to provide a stamped addressed envelope. If no envelope is provided assignments will be destroyed after results are recorded. Please also make a copy of your assignment before submission for your own records.	
ATTENDANCE	80% minimum.	
PRE-REQUISITES	Aromatherapy Studies – An Introduction, Anatomy & Physiology 1A.	
CO-REQUISITES	Anatomy & Physiology 1B.	
MATERIALS REQUIRED	Notebook, pen.	

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TEXTBOOKS**Compulsory:**

Clarke, S. 2002. *Essential Chemistry for Safe Aromatherapy*. Churchill Livingstone.

Battaglia S. 2004 *The Complete Guide to Aromatherapy* 2nd ed. The Perfect Potion.

Recommended Reading / References:

Caddy R. 1997. *Essential Oils In Colour*. Amberwood Publishing.

Jay Bowles, E. 2003. *The A-Z of Essential Oils*. New Burlington Books.

Jay Bowles, E. 2003. *The Chemistry of Essential Oils*, 3rd ed. Allen & Unwin.

Lawless J, 1995. *The Illustrated Encyclopedia of Essential Oils: the complete guide to the use of oils in aromatherapy and herbalism*. Element Books L td.

Lis-Balchin, Dr M. 1995. *Aroma Science: the chemistry and bioactivity of essential oils*. Amberwood Publishing Limited.

Schnaubelt K. 1998. *Advanced Aromatherapy: The Science of Essential Oil Therapy*. Healing Art Press.

Tisserand R, 1995. *Essential Oil Safety: a guide for healthcare professionals*. Churchill Livingstone.

WEEK-BY-WEEK OUTLINE

WEEK 1	Housekeeping; dates; aims of the course; assessment tasks. Introduction to Chemistry. Productions of chemicals by plants.
WEEK 2	Chemical reactions. Solubility; electronegativity – emulsions. Productions of chemicals by plants.
WEEK 3 & 4	General Background Organic Chemistry. Terpenoids. Isomers.
WEEK 5	Alcohols. Optical isomers.
WEEK 6	Phenols. Introduction to pharmacology.
WEEK 7	Aldehydes. Deterioration of essential oils.
WEEK 8	Ketones. Metabolism of essential oils.
WEEK 9	Acids and Esters. Quality control.
WEEK 10	Ethers and oxides. Toxicity.
WEEK 11	Lactones and Coumarins. Revision.
WEEK 12	Exam

Assignment due

Please be respectful of your fellow students and arrive on time for classes. Please ensure all mobile phones are turned off prior to the commencement of class.