OC P 566: ORGANIC CHEMISTRY PRACTICALS-V

(Any twelve experiments are to be carried out)

Course Outcome

- Enable the students to gain the knowledge about the isolation, purification and characterization of various kinds of natural products.
- Learn the extraction of groundnut oil and coconut oil from their natural sources.
- Understand the characterization of natural products through derivatization and quantitative determination.
- Understand and learn the quantitative determinations of natural products, dyes, drugs, amino acids and sugars.
- Demonstrate the separation of components from mixture of organic compounds by fractional crystallization, fractional distillation, steam distillation, paper, thin layer and column chromatography.
- Study the determination of order of reactions, salt effect and effect of acidity on reaction rates.
- Understand the recording of various spectra of the organic compounds.
- Enable the students to identify the importance of reagents used in the synthesis of drugs, dyes and polymers.
- Comprehend the applications of different reactions in the preparation of drugs, dyes and polymers.
- Demonstrate skills in the preparation of drugs, dyes and polymers.

Extraction of Organic Compounds from Natural Sources

1. Isolation of Caffeine from Tea Leaves
2. Isolation of casein from milk (the students are required to try some typical colour reactions of proteins).
3. Isolation of Nicotine dipicrate from tobacco
4. Isolation of piperine from black pepper Isolation of piperine from pepper.
5. Isolation of Lycopene from tomatoes
6. Isolation of β-carotene from carrots
7. Isolation of hesperidiene from orange peal.
8. Isolation of glutamine from red beet.
9. Isolation of oleic acid from olive oil (involving the preparation of complex with urea and separation of linoleic acid).
10. Isolation of limonene from lemon peel (Citrus rinds).
11. Isolation of Eugenol from cloves.
12. Isolation of cinchonine from cinchona bark.
13. Isolation of azeleic acid from castor oil.
14. Isolation of cincole from eucalyptus leaves.
15. Extraction of DNA from onion peels.

16. Isolation of essential oils from cumin and rose petals.
17. Isolation of curcuminoids from turmeric powder.
18. Isolation and separation of pigments chlorophyll and B-carotene from spinach.
19. Isolation of cysteine from hair
20. Separation of caffeine from tannins by sublimation.
21. Isolation of lactose from milk (purity of sugar should be checked by LC and PC and Rf values reported).
22. Isolation of lipids from egg yolks
23. Isolation of enzymes-Lipase and Sucrase.
24. Extraction of groundnut and coconut oils.

Methods of Separation

1. Separation of mixture of cyclohexane and toluene and mixture of benzene and toluene by fractional distillation.
2. Preparation of o- and p-nitro-phenols and their separation by steam distillation/column chromatography/fractional crystallization.
3. Preparation of 6- and 8-nitro-7-hydroxy-4-methyl coumarins from 7-hydroxy-4-methyl-coumarins and their separation by fractional crystallization.
4. Separation and identification of the sugars present in the given mixture of glucose, fructose and sucrose by paper chromatography and determination of Rf values.
5. Separation and identification of amino acids/sugars by paper chromatography and determination of Rf values.
6. Separation and identification of amino acids/sugar/dyes by thin layer chromatography and determination of Rf values.
7. Separation of a mixture of ortho and para nitroanilines by thin layer chromatography using chloroform as the eluent.
8. Separation and identification of analgesic drugs-acetaminophen, aspirin, caffeine, ibuprofen and salicylamide by thin layer chromatography.
9. Separation of plant pigments of spinach extract using thin layer chromatography.
10. Separation of spinach leaf pigments/dyes by column chromatography.
11. Separation of o- and p-nitro-anilines by column chromatography using alumina column.

Quantitative Determinations

1. Determination of iodine value of an oil and fat by chloramine-T and by other methods.
2. Determination of saponification value of an oil or fat.
3. Determination of acid value of an oil or fat.
4. Preparation of carboxylic acid derivatives of natural products containing alkyl side chain in their aromatic rings and determination of their equivalent weight.

5. Preparation of aryloxy acetic acid derivatives of phenolic natural products and determination of their equivalent weight.
6. Preparation of anilinoacetic acid derivatives of natural products containing amino group and determination of their molecular weight.
7. Determination of equivalent weight of carboxylic acid by silver salt method
8. Determination of enol content by Meyer's method.
9. Determination of sucrose by Fehling's method.
10. Quantitative determination of urea by hypobromite method.
11. Quantitative determination of Vitamin C by iodometric titration.
12. Verification of the Beer-Lambert's Law and determination of the concentration of given dye solution colorimetrically.
13. Quantitative determination of uric acid and creatinine in urine.
14. Quantitative determination of pharmaceutical tablet ascorbic acid / aspirin / ibuprofen / paracetamol lbruprofen / analgin.
15. UV/VIS spectrophotometric determinations of amino acids / proteins / carbohydrates / aspirin / cholesterol / ascorbic acid / caffeine.
16. Determination of COD of water sample.
17. Determination of order of reactions-S_N1 and S_N2 reactions, salt effect and effect of acidity on reaction rates by using n-butyl bromide and *t*-butylchloride.

Preparation of Drugs

1. Preparation of sulfanilamide from acetanilide through p-acetamidobenzenesulfonyl chloride and p-acetamidobenzenesulfonamide.
2. Preparation of paracetamol from p-nitrophenol*via* reduction and acetylation.
3. Preparation of benzoccaine(p-amino ethyl benzoate) from p-nitrotoluene via oxidation, reduction and esterification reactions.
4. Preparation of phenacetin from p-nitro phenol via reduction, acetylation and ethylation.
5. Preparation of aspirin from methyl salicylate/salicylic acid.
6. Preparation of phenazone (*1,5-dimethyl-2-phenyl-1,2-dihydro-3H-pyrazol-3-one)*from phenyl hydrazine and ethyl acetoacetate using condensation and methylation reactions.
7. Preparation of phenytoin (5,5-diphenylhydantoin) and thiophenytoin (5,5-thiohydantoin) from benzoin *via*benzil using urea/thiourea.

Preparation of Dyes

1. Preparation of benzeneazo-2-naphthol from aniline *via* diazotisation and coupling.
2. Preparations of para red, methyl red, methyl orange and orange-IIthrough diazotisation and coupling reactions.
3. Preparations of phenolphthalein, fluorescein and eosin.
4. Preparation of malachite green from N,N-dimethyl aniline and benzaldehyde.
5. Preparation of indigo from anthranilic acid/o-nitrobenzaldehyde and acetone.

Preparation of Polymers

1. Preparation of caprolactam from cyclohexanone and conversion to Nylon-6.
2. Preparation of Nylon-6,6 from hexamethylenediamine and adipic acid.
3. Preparation of urea-formaldehyde resin (bakelite) from urea and formaldehyde.
4. Preparation of phenol-formaldehyde resin (novolac and resole) from phenol and formaldehyde.
5. Preparations of polystyrene and polyacrylamide from styrene and acrylamide.

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