

GUJARAT TECHNOLOGICAL UNIVERSITY

CHEMICAL TECHNOLOGY (36) CHEMISTRY OF INTERMEDIATES & COLORANTS-II SUBJECT CODE: 2143604 B.E. 4th SEMESTER

Type of Course: Chemical Technology

Prerequisite: Studied subject DP-01 (Chemistry of Intermediates and Colorants-I). Basic knowledge of chemistry.

Rationale: The main objective of this subject is to study the basic chemistry applied in synthesis of various types of dyes in chemical industries. This subject provides fundamental knowledge of various types of dyes and how to carry out synthesis of these dyes in chemical industries.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks						Total Marks
L	T	P		Theory Marks			Practical Marks			
			ESE (E)	PA (M) PA ALA		PA (V) ESE OEP		PA (I)		
4	0	0	4	70	20	10	0	0	0	100

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	Color of organic compound: Color and Chemical constitution. Fluorescent brighteners & fluorescent colorants. Jablonski diagram.	06	15
2	Chemistry of azo dyes: Mechanism of diazotization & coupling reactions. Coupling position of various coupling components. Azoic dyes. Monoazo&Disazo acid dyes. Substituent for benzidine.	08	20
3	Basic dyes: Chemistry of diphenyl&triphenylmethine dyes& their heterocyclic analogues like oxazines, diazines&thiazenes. Cyanines, hemicyanine&diazahemicyanines.	06	15
4	Chemistry of Anthraquinone dyes: Anthraquinone mordant dyes, anthraquinone acid dyes, anthraquinone dyes for cellulose acetate.	05	10
5	Disperse dyes: Classification of disperse dyes. Chemistry of azo, anthraquinone and miscellaneous disperse dyes.	05	10
6	Reactive dyes: Based on cyuric chloride and vinyl sulphone. Bifunctional reactive dyes. Copper phthalocyanine-synthesis & conversion into other class of colorants.	08	20
7	Chemistry of Vat dyes: Chemistry of indigoid and anthraquinone vat dyes.	05	10

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
60	10	10	10	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table

Reference Books:

- 1) Industrial Organic Chemistry, Arpe H.J.VCH, Weinheim, Weissermal K.1993
- 2) Organic Synthesis, Smith M.B., Tata McGraw Hill, New York, 2nd Ed., 2004
- 3) Chemistry of Synthetic Dyes, LubsH.A.,Robert E Krieger Publishing Company New York, 1995
- 4) Organic Chemistry, Clayden, Greeves, Warren, Oxford Univ. Press, 2001
- 5) Chemistry of Synthetic Dyes, Lubs H.A., Robert E Krieger Publishing Company New York, 1st Ed.,1995
- 6) Chemistry of Synthetic Dyes – Vol I, Venkatraman K., Academic Press, New York, 2009
- 7) Chemistry of Synthetic Dyes – Vol II, Venkatraman K., Academic Press, New York, 2009
- 8) Chemistry of Synthetic Dyes – Vol III, Venkatraman K., Academic Press, New York, 2009
- 9) Chemistry of Synthetic Dyes – Vol IV, Venkatraman K., Academic Press, New York, 2009
- 10) Chemistry of Synthetic Dyes – Vol V, Venkatraman K., Academic Press, New York, 2009
- 11) Chemistry of Synthetic Dyes – Vol VI, Venkatraman K., Academic Press, New York, 2009
- 12) Color Chemistry: Syntheses, Properties and Applications of Organic Dyes and Pigments,HeinrichZollinger, Wiley-VCH,2nd Ed, 1991

Course Outcomes:

1. To express basic chemistry of dyes
2. To carry out organic synthesis of dyes
3. To be able to apply this knowledge during synthesis of dyes
4. To build a bridge between theoretical and practical concept used in industry

List of Open Source Software/learning website:

- 1) Chemical weekly
- 2) Dyes and pigment journal
- 3) Scifinder online
- 4) Sciencedirect
- 5) espacenet
- 6) Delnet

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.