AMLT06 PRINCIPLES OF INORGANIC TANNAGE AND ORGANIC TANNAGE

UNIT-1 TANNING

1.1 Theory, chemistry, factors and objectives of following Inorganic Tanning operations:
1.2 (A) Chrome Tannage, (B) Aluminium Tannage, (C) Iron Tannage, (D) Zirconium Tannage, (E) Titanium Tannage, Ligands available in Collagen
1.3 Their suitability in practical conditions
1.4 Stability of Metal Ligand Bonds in Collagen

UNIT-2 CHARACTERISTICS OF A TANNING AGENT

2.1 Specificity of a metal Tanning agent in Tanning of leather- Cross linking and Tanning
2.2 Helix Coil transition- Shrinkage phenomenon
2.3 Degree of Tannage, the most important phenomena for leather properties

UNIT-3 BACKGROUND OF CHROME TANNING

3.1 Aqueous Chemistry and Ligand Substitution reactions of Transition and non-transition metal Complexes
3.2 Protolysis and Formation of Basic Chrome Complexes,
3.3 Tanning Processes & Principles
3.4 Effect of Neutral salts like sodium chloride and sodium sulfate on chrome liquor and on chrome tanning
3.5 Effect of Alkalies on the Basicity of chrome complexes
3.6 Effect of Complexing Agents on Tanning Faculty of Chromium.

UNIT-4 FACTORS GOVERNING TANNING EFFECT

4.1 Nature of anion- basicity of chromium salt- concentration of chromium salt-
4.2 Effect of pH – effect of temperature- influence of tan liquor volume-
4.3 Influence of Previous History of collagen viz.
4.4 Effect of lyotropic agents- effect of weak acids- effect of liming-
4.5 Effect of swelling pretreatments- effect of detergents.
4.6 Isoelectric point of chrome tanned leather.
4.7 Masking agents- their requirements for use in chrome tanning-
4.8 Effect of masking on chrome tanned leather & on chrome liquor
4.9 Evaluation of masking agent in practical tanning
4.10 Recycling of chrome tan liquor- detanning of chrome tanned leather.

UNIT-5 CLASSICAL THEORIES OF METAL

5.1 Ligand Complexes- Their Limitations
5.2 Crystal Field & Ligand field Theories of the Co-ordination Complexes
5.3 Magnetic Properties of complexes
5.4 Ligand Field Stabilization Energy& Stereochemistry of Complexes

5.5 Thermodynamic & Kinetic Effects on Stability of Complexes
5.6 Ligand Substitution Reaction of Octahedral Complexes & their Mechanisms of Substitution
5.7 Factors Affecting Rate of Reactions
5.8 Trans Effect Theories of Ligand substitution reactions-
5.9 Manufacturing Principles & Methods of Basic Chrome Sulfate for Leather Tanning.

UNIT-6 STABILITY OF COMPLEXES AND THEIR QUANTITATIVE EVALUATION
6.1 Stability correlations- Chelate effect
6.2 Theory of Hard and Soft Acids and Bases
6.3 Valence Shell Electron Pair Repulsion model for structural aspects of compound.
6.4 Ionization potential- Electron Affiniity
6.5 Electronegativity
6.6 Lattice Energy and Solvation Energy
6.7 Variable valency- structure of complex ionic crystals
6.8 Absorption spectra of complexes.

PRINCIPLES OF ORGANIC TANNAGE

UNIT-1 VEGETABLE TANNINS
1.1 Classification of Vegetable Tannins
1.2 Structural Aspects,
1.3 Analysis and Chemistry of Hydrolysable and Condensed Tannins
1.4 Manufacture of Vegetable Tannin Extract
1.5 Use of Additives for Product Modification
1.6 Reaction of Vegetable Tannins with Collagen.

UNIT-2 PRINCIPLES OF VEGETABLE TANNING
2.1 Factors affecting Tannin Diffusion and Factors affecting Tannin Fixation with Collagen
2.2 Principles of Rapid Tanning methods
2.3 Principles of Heavy Leather and Industrial Leather Manufacture
2.4 Vegetable Tanning Principles from Skins.

UNIT-3 SYNTHETIC TANNINS
3.1 Chemistry and Multifunctional Properties of Syntans
3.2 Non Tans in Synthetic Tannins
3.3 General Manufacturing Methods of Phenol- Formaldehyde, Naphthalene-
3.4 Formaldehyde and Naphthol- Formaldehyde Condensates
3.5 Supra Syntans- Use of Syntans for the Manufacture of Various Leathers and for Various Objectives.
3.6 Use of Lignosulfonic acids in Leather processing.

UNIT-4 RESIN SYNTANS
4.1 Urea- formaldehyde and Melamine

4.2 Formaldehyde condensates as Tanning Agents for Leather
4.3 Their Chemistry and structure, property, relationship
4.4 Polyacrylates and Polyurethanes as Resin Tanning Agent
4.5 Principles of their Use.
4.6 Aldehydes as tannins- Formaldehyde and other mono and dysfunctional aldehydes
4.7 Their chemistry, structure and general properties
4.8 Investigation of their tanning faculty. Reaction of aldehydes with different functional groups of protein. Tanning faculty at different pHs
4.9 Ewald reaction.

Reference Books:

1. Introduction to the Principles of Leather Manufacture- S.S. Dutta, 4`Th. Edn. I.L.T.A. Calcutta.
2. Chemistry & Technology of Leather-Roddy, O` Flahorty & Lollar, Vol.
3. Fundamentals of Leather Manufacture- Eckhart Hidemann
4. Chemistry of Vegetable Tannins- E. Haslam Academic Press.
5. Vegetable Tannage- Tanning Extract Producers Federation Limited, England.