

**Savitribai Phule Pune University [SPPU]**



**B.Sc. (Chemistry)**  
(Three Years Integrated Degree Program)

**Choice Based Credit System [CBCS]**  
2019 Pattern

**Third Year Bachelors of Science**  
(T. Y. B. Sc. **CHEMISTRY**)

From  
Academic Year 2021-22

**Board of Studies in Chemistry**  
Savitribai Phule Pune University [SPPU]  
Pune-411007

## Structure of T. Y. B. Sc. Chemistry

(According to CBCS – 2019 Pattern of SPPU)

Semester	DSEC/SEC	Nature	Paper Code	Code and Title	Credits/Lectures
V	DSEC-I	Theory	CH-501	Physical Chemistry-I	Credit-2, 36 L
		Theory	CH-502	Analytical Chemistry-I	Credit-2, 36 L
		Practical	CH-503	Physical Chemistry Practical-I	Credit-2, 73 L
	DSEC-II	Theory	CH-504	Inorganic Chemistry-I	Credit-2, 36 L
		Theory	CH-505	Industrial Chemistry	Credit-2, 36 L
		Practical	CH-506	Inorganic Chemistry Practical-I	Credit-2, 73 L
	DSEC-III	Theory	CH-507	Organic Chemistry-I	Credit-2, 36 L
		Theory	CH-508	Chemistry of Biomolecules	Credit-2, 36 L
		Practical	CH-509	Organic Chemistry Practical-I	Credit-2, 73 L
	SEC-I	Theory	CH-510	(A) Introduction of Medicinal Chemistry OR (B) Polymer Chemistry	Credit-2, 36 L
SEC-II	Theory	CH-511	(A) Environmental Chemistry OR (B) Chemo informatics	Credit-2, 36 L	
VI	DSEC-IV	Theory	CH-601	Physical Chemistry-II	Credit-2, 36 L
		Theory	CH-602	Physical Chemistry -III	Credit-2, 36 L
		Practical	CH-603	Physical Chemistry Practical-II	Credit-2, 73 L
	DSEC-V	Theory	CH-604	Inorganic Chemistry-II	Credit-2, 36 L
		Theory	CH-605	Inorganic Chemistry-III	Credit-2, 36 L
		Practical	CH-606	Inorganic Chemistry Practical-II	Credit-2, 73 L
	DSEC-VI	Theory	CH-607	Organic Chemistry-II	Credit-2, 36 L
		Theory	CH-608	Organic Chemistry-III	Credit-2, 36 L
		Practical	CH-609	Organic Chemistry Practical-II	Credit-2, 73 L
	SEC III	Theory	CH-610	(A) Chemistry of Soil and Agrochemicals OR (B) Introduction of Forensic Chemistry	Credit-2, 36 L
SEC IV	Theory	CH-611	(A) Analytical Chemistry-II OR (B) Chemistry of Cosmetics and Perfumes	Credit-2, 36 L	



2. Chemistry of Zeolites and Related Porous Materials: Synthesis and Structure, Ruren Xu, Wenqin Pang, Jihong Yu, Qisheng Huo, Jiasheng Chen, John Wiley & Sons (Asia) Pvt. Ltd, 2007

[5L]

**4. Introduction to Nanochemistry**

Synthesis and Stabilization of Nanoparticles by Chemical Reduction, Reactions in Micelles, Emulsions, and Dendrimers. Photochemical and Radiation Chemical Reduction, Cryochemical Synthesis, Physical Methods. Particles of Various Shapes and Films, Properties and Application of Nanoparticles in Science and Technology (in brief), Applications of CNTs

**Reference:**

1. Nanochemistry, G.B.Sergeev, Elsevier, 2006, pp 7-36, 175-83, 199-201
2. The Chemistry of Nanomaterials C. N. R. Rao, A. Muller, A. K. Cheetham (Eds.) WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim, 2004. (Relevant pages)

**A student should:**

1. Various methods of nanoparticle synthesis
2. Stabilization of Nanoparticles in solution
3. Properties and Application of Nanoparticles
4. Know about carbon nanotube and its application

[5L]

**5. Chemical Toxicology**

Toxic chemicals in the environment, Impact of toxic chemistry on enzymes. Biochemical effect of Arsenic, Cadmium, Lead and Mercury. Biological methylation.

**A student should be able -**

- i) To know toxic chemical in the environment.
- ii) To know the impact of toxic chemicals on enzyme.
- iii) To know the biochemical effect of Arsenic, Cd, Pb, Hg.
- iv) To explain biological methylation.

**Reference:**

- i) Fundamental Chemistry by A. K. De (3<sup>rd</sup> Ed.)
- ii) Environmental chemistry by A.K.De Publisher- Wiley Eastern Limited New Age International Limited Page No. 75-100.

**DSEC-V: CH-606: Inorganic Chemistry Practical-II [Credit -2, 73 L]**

Total 12 Experiments to be performed.

**A. Volumetric Estimations (Any 3)**

1. Analysis of Phosphate ( $\text{PO}_4^{3-}$ ) from Fertilizer. (Ref-1)
2. Analysis of Iodine from Iodized salt. (Ref-2)

3. Strength of medicinal  $H_2O_2$ . (Ref-1)
4. Analysis of Calcium from milk powder. (Ref-1)
5. Analysis of Cu from Cu-Fungicide. (Ref-1)

**B. Flame Photometry (Any 3) (Ref-1)**

1. Estimation of Na by flame photometry by calibration curve method.
2. Estimation of Na by flame photometry by regression method.
3. Estimation of K by flame photometry by calibration curve method.
4. Estimation of K by flame photometry by regression method.

**C. Column Chromatography (any 1) (Ref-1)**

1. Purification of water using cation/anion exchange resin and analysis by qualitative analysis /conductometry.

**D. Nanomaterial synthesis (Any 1) (Ref-3, 4)**

1. Synthesis of Silver nanoparticles.
2. Synthesis of ZnO nanoparticles.

**E. Verification of periodic trends using solubility of alkaline earth metal hydroxides  $Ca(OH)_2$ ,  $Mg(OH)_2$ ,  $Cr(OH)_2$ ,  $Ba(OH)_2$ . (Ref-1)****F. Synthesis of amine complexes of Ni(II) and its ligand exchange reaction (bidentate ligands like acac, DMG, Glycine) by substitution method.**

OR

Determination of the Metal to ligand ratio (M : L) in complexes. (Ref-5)

**G. Solvent free microwave assisted one pot synthesis of phthalocynin copper (II) complex.**

OR

Fenton reaction: Degradation of  $H_2O_2$  using Fe catalyst. (Ref-6)

**H. Table work: Band gap calculation for the nanomaterial  $TiO_2$ /  $SnO_2$ /  $ZnO$  from its electronic spectra (UV-Visible). (Ref-3, 4)****References:**

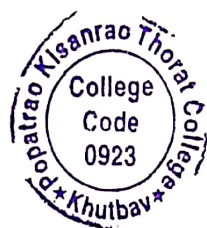
- 1: Vogel's textbook of Inorganic Quantitative Analysis, Jeffery, Basset, Mendham Dency, 5th Ed, Longman Scientific Technical, USA (copublished with John Wiley Sons)
- 2: General Chemistry Experiment – Anil J Elias (University press).
- 3: Nanotechnology: Principles and Practices by Dr.Sulbha Kulkarni. Third Edition, Springer
- 4: A laboratory course in nanoscience and nanotechnology, Dr. Gerrad Eddy Jai Poinem, CRC press
- 5: Experimental Inorganic Chemistry, Mounir A. Malati, Horwood Series in Chemical Science (Horword Publishing, Chichester) 1999.


6: Environmental Chemistry Microscale Laboratory Experiments, Jorge G.Ibanez Margarita  
Hernandez-Esparza Carmen Doria-Serrano Arturo Fregoso-Infante, Springer

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Structure of Practical Examination [35 Marks; Time: 3 hours]

Q1. Expt. A/ B/ C/ D/ E/ F/ G/ H .....30 M

Q2. Viva-Voce .....05 M  
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Principal  
Popatrao Kisanrao Thorat College  
Khutbav, Tal.-Daund, Dist.-Pune.