

GUJARAT TECHNOLOGICAL UNIVERSITY

Diploma in Ceramic Technology

Semester: 3

Subject Code

Subject Name ADVANCED CHEMISTRY

Sr. No.	Course content
1.	STATE OF MATTER : 1.1 Introduction. 1.2 Details of different state of matter such as solid state, liquid state and gaseous state. 1.3 Characteristics of different state of matter. 1.4 Crystal structures of silicate and clays.
2.	COLLOIDS : 2.1 Introduction. 2.2 Know the crystalloids and the colloids, Classification of colloids 2.3 Comparison of the size of crystalloids and colloids. 2.4 Study dispersion media and dispersed phase. 2.5 Detail cause of stability of colloids. 2.6 Study of property of colloids such as optical property, kinetic property, coagulation of colloids, colour, heterogeneous nature, electro migration. 2.7 Details of preparing method of colloids by condensation method and by precipitation method. 2.8 Method of stabilization of colloids and need of electrolyte addition. 2.9 Details use of colloids in different fields, such as water treatment, sewage treatment Environmental engineering and in ceramic industries.
3.	ABSORPTION AND ADSORPTION : 3.1 Introduction about physical and chemical adsorption, Difference between adsorption and absorption. 3.2 Details of adsorption isotherm and application of isotherm. 3.3 Study the application of adsorption and absorption in various fields such as scientific application, chemical reduction and during manufacture process of ceramic product.
4.	PHASE RULE : 4.1 Introduction 4.2 Details of Gibb's phase rule, know the components, degree of freedom and desire phase rule. 4.3 Details understanding about phase rule, for any systems, the limitations of phase rule and calculation of degree of freedom for liquid water and vapors and especially of silicate systems. 4.4 Details of application of phase rule for one component system namely water system. Understanding of phase diagram for one component water system, nature of graph, triple point and area covered by phase & diagram. 4.5 Application of phase rule in different field of ceramic industries and method of study of phase rule diagram for two and three components systems.

5.	CATALYST. 5.1 Introduction. 5.2 Different types of catalysts. 5.3 Discussion of criteria of catalyst on chemical reaction, mechanism of catalyst, adsorption theory and formation of activated complex.
6.	CHEMICAL BONDING. 6.1 Details of different types of bond and Theory of valiancy. 6.2 Electronic configuration of atom like, SPdf, entry of electron. 6.3 Filling up of SPdf cells and stability of atom. 6.4 Discuss about inner gas configuration, exchange of valiancy, formation of ionic and electrovalent bond and ionization. 6.5 Discuss of conditions required for formation of ionic bond, mechanism of ionic bond, formation and characteristics of ionic compound. 6.6 Details regarding covalent bond, mechanism of formation of covalent bond, formation of co-ordinate covalent bond and the mechanism of formation of co-ordinate covalent bond. 6.7 Details of formulation of hydrogen bond and metallic bond. 6.8 Details about intermolecular and hydrogen bonding.
7.	CHEMICAL ANALYSIS OF CERAMIC MATERIALS. 7.1 Introduction. 7.2 Details of preparing representative sample of minerals, soils and cements. Scope of variation in quality of different sources of samples and average quality required for batch preparation. 7.3 Details of apparatus required for chemical analysis of ceramic materials and products. 7.4 Methods of preparing solutions for examination such as water solution, acid solution and insoluble solutions. 7.5 Details about the different types of soluble such as water soluble, acid soluble and insoluble. Method of calculating the amount of water soluble, water soluble radicals, knowing the method of filtration, determination of total dissolve solid by different methods such as gravimetric method and conductivity method.

LABORATORY EXPERIMENTS:

1. Study of ceramic chemistry's lab.
2. Adjustment of Analytical balance.
3. Preparation of stock solution.
4. Preparation of standard solution.
5. Preparation of representative samples.
6. Preparation of Acid solutions.
7. Understand and measure pH value.
8. Chemical analysis of
Clay, Quartz, potash feldspar, soda feldspar,
Soil, Cement, Lime, & Refractory.
9. Preparation of various batches for
ceramic manufacturing
stoneware body, Porcelain body, sanitary ware,
LT and HT insulator.

Reference Books:

1. Physical chemistry by S.M. Glass stone
2. Physical chemistry by Khosala
3. Engineering chemistry by Jain & Jain
4. Elements of ceramic by F.H.Norton
5. Glass technology by R.Charan
6. Technical methods of analysis by R.C.Grifting