Applied Chemistry Technologies B

Finalità
The aim of the course is the study of engineering non metallic materials such as polymeric materials, reinforced plastics composite materials and engineering ceramics used in technology. Moreover it deals with several phenomena involved in thermochemical processes aimed at energy production and the main treatments of industrial processes water.

Programma
-Polymeric materials: summary of polymerization reactions. Industrial polymerization methods. Processing of plastic materials: injection molding, extrusion, compression molding, transfer molding, calendering. Some important aspects of the structure, properties and applications of engineering thermoplastics and thermosetting plastics. Elastomers.
-Reinforced plastics composite materials. Fibers and matrix materials for reinforcing plastic resins. Elastic modulus for isostrain and isostress conditions.
-Fuels: calorific value; theoretical combustion air; particulate volume and composition; theoretical combustion temperature; chimney loss; flammability limits. Calculations on combustion reaction. Characteristics of solid, liquid and gas fuels. Liquid and solid lubricant; viscosity and viscosity index.
-Engineering ceramics. Mechanical properties of ceramics. Toughness of ceramic materials.
-Water: hardness and related calculations; water softening; water demineralizing (multi-flash evaporation, ion exchange, electrodialysis, reverse osmosis). Flocculation and sedimentation, filtration. Water for industrial processes. Potability tests and sterilization methods. Water pollution factors and main waste water treatments.

Attività d'esercitazione
Problem solution on elasticity modulus of fiber-plastic matrix composite materials. Calculations on combustion reactions and exercises on water treatments plants.

Modalità d'esame
oral examination

Propedeuticità
General and Inorganic Chemistry, fundamentals of Organic Chemistry, Applied Chemistry Technologies A.

Testi consigliati
C. BRISI: " Chimica Applicata", Levrotto e Bella, Torino, 1991.
W.F. SMITH: "Principles of materials science and engineering" McGraw-Hill, 1995.