UNIVERSIDADE ESTADUAL DE CAMPINAS
INSTITUTO DE QUÍMICA

PROGRAMS AND BIBLIOGRAPHY

Subject	
Code	**Name**
QG 191	Chemistry

Vector
OF:S-1 T:004 P:002 L:000 O:000 D:000 HS:006 SL:006 C:006 AV:N EX:S FM:75%

Pre requirement	

Summary

Formulas and chemical equations. Periodic classifications and properties of the elements. Principles of physicochemistry, thermochemistry, chemical equilibrium and electrochemical cells. Chemical bonding, structure and properties of substances. Minerals. Natural and synthetic polymers.

Program

1.International System of Units. 2. Definition of units commonly used in general chemistry for energy, mass, time, space, volume, pressure, temperature, density and speed. 3. Stoichiometry and Chemical Arithmetic The mol. Molecular weight and weight formula. Chemical formulas. Molecular formulas Balancing equations. Calculations based on chemical equations. Calculations with limiting reagents. 4. Structure Atomic and Periodic Table. Electrical nature of matter. The charge of the electron. The core of the atom. The Periodic Law and the Periodic Table. The electron spin and the exclusion principle of Pauli. The electronic configuration of the elements. The Periodic table and the settings electronics. The spatial distribution of electrons. 5. The chemical bond. Lewis symbols. The covalent bond. Polar molecules and electronegativity. Oxidation and reduction. Number of oxidation. Nomenclature and chemical compounds. Other binding forces. Crystalline Solids Types of crystals. The theory of the bands of solids. Defect in ionic crystals. Factors that influence the formation of ionic compounds. Molecular orbital theory. 6. Metals, not metals and metalloids. Trends in metallic behavior.Chemical properties and typical products. 7. Metalloids and Non-Metals. The free elements.Oxygen compounds of nonmetals. Oxo acids and oxoanions. Oxa acids and oxoanions polymer. 8. Chemical reactions in aqueous solution. Terminology in solutions. Rlectrolytes. Chemical balance. Ionic reactions. Acids and bases in aqueous solutions. Preparation of inorganic salts by double exchange reactions. Oxidation and reduction reactions.Balance of Oxidation and reduction reactions. Quantitative aspects of solutions:molarity. Equivalent weights and normality. 9. Properties of Solutions Types of solutions. Units of concentration. The process of dissolution. Heat dissolution.Solubility and Temperature. Fractional crystallization.10. Chemical Equilibrium Law of action of the masses. The equilibrium constant. Kinetics and balance. Thermodynamics and equilibrium. Relationship of Kp and Kc. Heterogeneous equilibrium. Principle of Le-Chatelier-Braun. Balance calculations. 11. Acid and Bases Definitions. Forces of acids and bases. Ionization of water and pH. Electrolyte dissociation. Acid and Water Bases Definitions. Forces of acids and bases. Ionization of water and pH. Electrolyte dissociation weak. Earplugs. Hydrolysis. Indicators. 12. Solubility - Solubility product. It is made of the common ion and solubility. 13. Thermo-chemistry delta H, specific value. First Law of Thermodynamics. Spontaneity of reactions, deltaG, deltaS, second law of Thermodynamics. 14. Reaction rate Catalysis 15. Relationship between properties and structure. 16. Oxidation and reduction. 17. Polymers.

Bibliography

1. P. Atkins & L. Jones, Chemical Principles: The quest for insight, 2ª ed., W.H. Freeman, 2002.
2. J.C. Kotz & P. Treichel Jr., Chemistry & Chemical Reactivity, Saunders College Publishing, 4ª ed., 1999.

Evaluation criteria

For grading policy, see: Regimento Geral de Graduação, Seção I – Normas Gerais, Capítulo V – Da Avaliação do Aluno na Disciplina. Students are required to attend 75 % of the lectures. For further details, see: Regimento Geral de Graduação, capítulo VI, seção X, artigo 72.