UNIVERSIDADE ESTADUAL DE CAMPINAS
INSTITUTO DE QUÍMICA

PROGRAMS AND BIBLIOGRAPHY

QG 104 - Chemistry	
Code	**Name**
QG104	Chemistry

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

Pre requirement	No requirements

Summary

The atom: form and energy of orbitals and electron distribution. The periodic table and its associated properties. Chemical bond, associated properties, simple minerals properties. Aqueous solutions: concentration, pH, equilibrium constants. Principles of physical-chemistry: energy, equilibrium, and kinetics of geological processes. Organic chemistry and relevant examples for geochemistry.

Program

01. Presentation of the objectives of the discipline – Chemistry and revolutionary discoveries
02. Atomic model development – Brief history of atomic models and their origins. Definitions of chemical element, isotopes, average molar mass, the mol concept and comparison with macroscopic matter.
03. Isotopes: geological dating (Radiocarbon dating (C-14)). Nuclear reactions and nucleosynthesis.
04. The atomic electronic structure.
05. Distribution of electrons in multielectronic atoms and the periodic table origin
06. The periodic properties: ionization energy and atomic radius
07. The chemical bond
08. Ionic radius ratio and its importance in geology and mineralogy. Elemental distribution of biosphere, presence of the elements in the minerals.
09. Crystal structure of oxyanions salts, silicates and zeolites
10. The chemical bond II
11. The chemical bond III
12. Comparison of the properties of molecular, ionic and metallic substances
13. Concentration in mass, ppm, ppb, ppt and mol/L. Chemical reactions. Introduction to acid-base concepts
14. Neutralization reactions.
15. Solubility of ionic compounds and precipitation reactions. Concept of saturation and solubility product.
16. Metallurgy methods and oxireduction reactions
17. Chemistry of Group I, II and III elements.
18. Chemistry of Group V, VI and VII elements.
19. Thermodynamics
20. Principles of chemical equilibrium. Lê Chatelier principle.

21. Solid-liquid equilibrium. Phase diagram and phase rule applied to solid-liquid systems.
22. Carbon chemistry.
23. Notions of petroleum chemistry
24. Sources of energy and energy transformation. Burning of fossil fuels and alternative sources of energy.
25. The Brazilian industry in figures.
26. Perspectives of the world chemical industry. Environmental pressure. Globalization of production of chemical inputs.

Bibliography

1.Atkins, P.; Jones, L.; "Chemical Principles – The quest for insight", 5th Edition, W.H.Freeman and Company, New York, 2010.
2.Gillespie, R. J.; Eaton, D. R.; Humphreys, D. A.; Robinson, E. A., "Atoms, Molecules and Reactions - An Introduction to Chemistry", Prentice Hall, New Jersey, 1994.
3.Chang, R., "Chemistry", McGraw-Hill, London, 1994.
4.Manahan, S. E., "Fundamentals of Environmental Chemistry", Lewis Publishers, London, 1993.
5.Brownlow, A. H., "Geochemistry", Prentice Hall, New Jersey, 1996.

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.