

## Outline of Chemistry

**I. Scheduled Total Credits:** 3; Term: 1<sup>st</sup>

Teaching Method: Blackboard-Writing and PPT

Assessment method: Close Exam

**II. Compatible Major:** MBBS

**III. Prerequisite Course:** Chemistry

**IV. Objective:**

The main objectives are of making students complete basic foundations in chemical reagent, chemical reactions and the rules that govern chemical reactions, and become familiar with the scope, methodology and applications of modern chemistry. After study of this course, students will understand that all matters consist of atoms which form molecules via different chemical bonds; will become adept at problem solving by learning to interpret experimental data, to utilize suitable and efficient analytic methods, and to assess whether or not the results of calculations are reasonable; will understand the principles in atomic, as well as the formation of chemical bond in chemical reactions and the expression of different kinds of chemical bond; will understand the properties of solution together with the ways of expressing solution concentrations; will generalize the analytical and quantitative skills gained in this course and apply them in the advanced courses and throughout their careers.

**V. Content of the Syllabus and the Scheduled Study Hours:**

### Chapter 1 Introduction (4 hours)

1. The properties and changes of matter; physical and chemical changes
2. The object chemistry study with
3. Matter and classification of matter Element, Compound and Mixture
4. Separation Methods Filtration; Distillation and Chromatography

### Chapter 2 Atomic Structure (5 hours)

1. Atom The discovery of atomic structure;
2. Electrons, Protons and Neutrons
3. Isotopes
4. Mass Number; Average Relative Atomic Mass of an Element
5. Electron Configurations
6. The meaning and writing of electronic structure of element 1-18
7. Ions
8. Electronic structure of simple ions, hydroxyl ion and ammonium ion

### Chapter 3 Chemical Bond (5 hours)

1. Concept of chemical bond
2. Representative substance of ionic bond, covalent bond and metallic bond

3. Using electronic structure to describe the formation of ionic bond and covalent bond

#### **Chapter 4 Chemical Equation (5 hours)**

1. Law of Conservation of Mass
4. How to Write Chemical Equation
5. How to Balance Chemical Equation
6. Types of Chemical reaction

#### **Chapter 5 Energy Transformation (4 hours)**

1. Energy Changes in Solution
2. Dissolution equilibrium and crystallization process;
3. Transformation during the process of dissolution
4. Energy Changes During Chemical Reaction
5. Exothermic and Endothermic reaction; Neutralization Reaction is Exothermic Reaction

#### **Chapter 6 Solution (4 hours)**

1. Formation of Solution, Solute and Solvent
2. Types of Solutions
3. Unsaturated; Saturated and Supersaturated
4. Factors Affecting Solubility
5. Ways of Expressing Concentrations of Solutions
6. Mass Percentage; Parts per Million (ppm) and Parts per Billion (ppb)

#### **Chapter 7 Acid and Base (5 hours)**

1. Definitions of Acid-Base
2. Arrhenius and Brønsted–Lowry Theory
3. Acid and Base Strength
4. Strong Acid and Base, Weak Acid and Base
5. Neutralization Reactions

#### **Chapter 8 Periodic Table (4 hours)**

1. Periodic Law
2. Rule of Properties Changing of Main Group Elements; Rule of Properties Changing of Short Period Cycle
3. Structure of Periodic Table
4. The Relationship between Periodic Table and Atomic Structure
5. Application of Periodic Table

### Chapter 9 Alkali Metals (4 hours)

1. Physical Properties Color, State, density
2. Chemical Properties Reactions of Na and K with oxygen, water, halogens
3. Preparation and Properties of  $\text{Na}_2\text{CO}_3$ , NaCl, NaOH and  $\text{NaHCO}_3$
4. Electronic Configuration

### Chapter 10 Alkaline Earth Metals (5 hours)

1. Physical Properties Color, State, density
2. Chemical Properties Reactions of Ca and Mg with oxygen, water, halogens
3. Electronic Configuration
4. Industrial use of lime and limestone Application of lime and limestone
5. Hard water

### VI. Teaching Materials and Reference Books:

#### Teaching Materials:

1. Theodore L Brown, H Eugene Lemay, Bruce E Bursten Jr et al. 2013. **Chemistry: The Central Science** [M]. 10<sup>th</sup> Ed. New York: Pearson.

#### Reference Books:

1. Fu Xiancai. 1999. **College Chemistry** [M]. Beijing: Higher Education Press.
2. John W. Hill, Ralph H. Petrucci, Terry W. Mcceary et al. 2005. **General Chemistry** [M]. 4<sup>th</sup> Ed. New York: Pearson.
3. John W Moore, Conrad L Stanitski, Peter C Jurs. 2008. **Principles of Chemistry: The Molecular Science** [M]. Boston: Cengage.
4. William L. Masterton, Cecile N. Hurley, Edward Neth. 2013. **Chemistry: Principles and Reactions** [M]. 7<sup>th</sup> Ed. Boston: Cengage.

### VII. Teaching team: Zhaoli Xue

### VIII. The Author who write the Syllabus: Zhaoli Xue

Notice to fill out the form:

1. Fill out the term in which to open the course with I or II
2. Teaching Method: Class teaching、Class teaching and Seminar、Seminar、Others, Please make it clear which kind of method if it belongs to **Others**
3. Assessment Method: Exam(Open、Close), Essay Report, Others, Please make it clear which kind of method if it belongs to **Others**