

Module code

SPC-2203

Type of module

Undergraduate: Chemistry – Major Core

Principles of Equilibria and Analytical Methods



Modular credits

4

Total student
engagement

56 hours

Prerequisite

SPC-1203
Fundamentals of
Physical and
Spectroscopic
Chemistry

Anti-requisite

None

Aims

To develop understanding of chemical equilibria in aqueous systems and introduce key analytical techniques in chemistry. It equips students with the conceptual and quantitative skills necessary to solve problems related to equilibrium and classical/modern analytical methods.

Module learning outcomes (MLO)

On successful completion of this module, a student will be expected to be able to:

MLO 1

Apply the First Law of Thermodynamics and principles of thermochemistry to calculate and interpret energy changes associated with physical and chemical processes, including phase transitions and reaction enthalpies.

MLO 2

Analyse chemical and acid-base equilibria in aqueous systems, including the behaviour of ions in solution, to solve problems related to pH, buffer systems, solubility, and ionic conductivity.

MLO 3

Evaluate redox systems using the Nernst equation and electrochemical cell conventions and compare the applications of basic electroanalytical techniques.

MLO 4

Evaluate the principles, capabilities, and limitations of atomic spectroscopic techniques for qualitative and quantitative chemical analysis.

MLO 5

Evaluate the suitability of chromatographic, separation, and classical analytical methods for the analysis and purification of chemical substances.

Module contents

First Law of Thermodynamics	Phase transitions, atomic and molecular changes	Chemical equilibria, dynamic equilibrium and reversible reactions
Acid-base equilibria, precipitation equilibria and solubility calculations	Ion transport	Basic electrochemistry and electroanalytical methods
Atomic spectroscopy: AAS, AES, AFS, ICP-OES principles and analytical applications	Chromatographic methods: Principles, instrumentation, GC, GC-MS, HPLC, IC, applications	Separation techniques: Precipitation, extraction, distillation, ion-exchange, purification principles

Assessment

60% **40%**

Examination

Coursework



■ Examination — 60% ■ Assignments and quizzes — 20% ■ Class tests — 20%

Formative assessment

Weekly discussion and feedback

Summative assessment

COMPONENT	WEIGHTING
Examination	60%
Coursework	40%
Individual	40%
Assignments and quizzes	20%
Class tests	20%

Graduate attributes and skills

Programme learning objectives (PLO) addressed

- 1** PLO 1 (Fundamental Knowledge in Chemistry)
- 6** PLO 6 (Digital Literacy and Lifelong Learning Skills)

- 3** PLO 3 (Critical Thinking and Problem-Solving Skills)

Sustainability concept addressed

- 4** SDG 4 Quality Education

Digital skills/software used (not limited to)

- Word processing software (e.g. Microsoft Word)
- Data processing software (e.g. Microsoft Excel)
- Organisational tools (e.g. Outlook calendar)
- Learning management system (e.g. Canvas)

Micro-credentialling option

No

Stackable towards GenBESTARI Undergraduate Degree Programme or other relevant Lifelong Learning Programmes

No

Document details

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