

## Course: Chemical Equilibria

credits: 5

|                     |                              |                          |                                                                         |
|---------------------|------------------------------|--------------------------|-------------------------------------------------------------------------|
| <b>Course code</b>  | CCVP25EVENWICHT              | <b>Modes of delivery</b> | Assignment                                                              |
| <b>Name</b>         | Chemical Equilibria          |                          | Practical / Training                                                    |
| <b>Study year</b>   | 2026-2027                    |                          | Tutorial                                                                |
| <b>ECTS credits</b> | 5                            | <b>Assessments</b>       | Chemische Evenwichten Theorie - Written, organised by STAD examinations |
| <b>Language</b>     | Dutch, with parts in English |                          | Practicum - Other assessment                                            |
| <b>Coordinator</b>  | J. Geertsema                 |                          |                                                                         |

### Learning outcomes

You predict the location of chemical equilibria of acids and bases in water based on strength of the acids and bases involved ( $K_a$ ,  $K_b$ ,  $K_w$ ).

You apply acid-base theory according to Brønsted-Lowry to acid-base calculations for single and polyvalent acids, bases and salts ( $pH$ ,  $pK_a$ ,  $K_a$ ,  $K_b$ ,  $pK_b$ , BOE table, common ion, dissociation percentage)

You calculate the  $pH$  of buffer systems under specified conditions (using Henderson-Hasselbach formula).

You perform acid-base titrations and determine the location of equilibrium ( $K_n$ , acid-base titration).

You predict the occurrence of precipitation reactions using the solubility and ion product ( $K_{sp}$  and  $IP$ ) and the influence of additional ions,  $pH$  and of complex ions on the solubility of ions, and you quantify them ( $K_f$ ) (common ion).

You apply theoretical knowledge about chemical equilibria in an independent, safe and responsible way while performing a simple experiment and communicate about this via a logbook and/or result form according to the applicable guidelines.

#### DAS competencies

Competency Level (I-IV)

Research I

Experimentation I

Development

Management

Advise

Instruction

Leadership

Self-management I

### Content

This module focuses on chemical equilibria. Using various equilibrium reactions, titrations and  $pH$  measurements, students apply the theory during a practical session. Practical work is assessed through logbooks, result form and practical competences. Theory is taught through instructional lectures and tested with a written examination.

It is highly desirable that the "Chemical Calculus" module has been taken.

### Included in programme(s)

Chemistry

Chemical Engineering

### School(s)

Engineering, Life Sciences & ICT