



**UNIVERSITAS NEGERI YOGYAKARTA**  
FACULTY OF MATHEMATICS AND NATURAL SCIENCES  
DEPARTMENT OF CHEMISTRY  
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**Bachelor of Science in Chemistry**

**MODULE HANDBOOK**

|   |   |
|---|---|
| Module name:  | Organometallic  |
| Module level, if applicable:                                | Undergraduate   |
| Code:   | KMA6227   |
| Sub-heading, if applicable:                                 | -   |
| Classes, if applicable:                                     | -   |
| Semester:   | 6 <sup>th</sup>   |
| Module coordinator:   | Prof. AK Prodjosantoso  |
| Lecturer(s):  | Dr. Kun Sri Budiasih  |
| Language:   | Bahasa Indonesia  |
| Classification within the curriculum:                       | Elective Course   |
| Teaching format / class hours per week during the semester: | Lectures: 100 minutes lectures, 120 structured activities and 120 individual study per week   |
| Workload:   | Total workload of the activity is 90,67 hours per semester which consists of 100 minutes lectures, 120 structured activities and 120 individual study per week for 16 weeks   |
| Credit points:  | 2 SKS (3 ECTS)  |
| Prerequisites course(s):                                    | -   |
| Course Outcomes   | After taking this course, the students have ability to:<br>CO1. Able to explain organometallic compounds, metal organic framework<br>CO2. Able to define organometallic compounds containing transition metal, structure and properties<br>CO3. Able to describe organometallic compounds containing alkaline metal (organomagnesium) and alkaline-earth metal (organolithium), structure and properties<br>CO4. Able to define organometallic compounds containing traditional metals, lanthanides, actinides, and semimetals, structure and properties<br>CO5. Able to explain organometallic reactions: oxidative addition and reductive elimination, transmetalation, carbometalation, hydrometalation, nucleophilic abstraction<br>CO6. Able to explain synthesis method to prepare organometallic compounds<br>CO7. Able to explain application organometallic compounds in catalysis reaction: mechanism<br>CO8. Able to explain application organometallic compound in industry<br>CO9. Able to do a search and describe the results of their study using their own language regarding the research in bioinorganic chemistry |
| Content:  | This course studies organometallic compounds, chemical  |

|                            | compounds containing at least one chemical bond between a carbon atom of an organic molecule and a metal, including alkaline, alkaline-earth, and transition metals.  |  |                      |                   |                      |        |   |   |   |            |     |   |            |     |  |            |     |   |            |     |               |              |     |            |              |     |       |  |  |      |
|----------------------------|---|--|----------------------|-------------------|----------------------|--------|---|---|---|------------|-----|---|------------|-----|--|------------|-----|---|------------|-----|---------------|--------------|-----|------------|--------------|-----|-------|--|--|------|
| Study / exam achievements: | <p>The final mark will be weight as follow:</p> <table border="1"> <thead> <tr> <th>No</th> <th>CO</th> <th>Assessment Object</th> <th>Assessment Technique</th> <th>Weight</th> </tr> </thead> <tbody> <tr> <td rowspan="6">1</td> <td rowspan="6">CO1, CO2, CO3, CO4, CO5, CO6, CO7, CO8, CO9</td> <td>Structural assignment: ability to rasionalize</td> <td>Assignment</td> <td>15%</td> </tr> <tr> <td>Structural assignment: ability to applying the formula according to context</td> <td>Assignment</td> <td>15%</td> </tr> <tr> <td>Structural assignment: ability to collaborate, analyze, rasionalize, and communicate</td> <td>Assignment</td> <td>15%</td> </tr> <tr> <td>Individual assignment: skill to collect literacy, understanding, and describing</td> <td>Assignment</td> <td>15%</td> </tr> <tr> <td>Mid term exam</td> <td>Written test</td> <td>20%</td> </tr> <tr> <td>Final exam</td> <td>Written test</td> <td>20%</td> </tr> <tr> <td colspan="3">Total</td> <td>100%</td> </tr> </tbody> </table> | No   | CO                   | Assessment Object | Assessment Technique | Weight | 1 | CO1, CO2, CO3, CO4, CO5, CO6, CO7, CO8, CO9 | Structural assignment: ability to rasionalize | Assignment | 15% | Structural assignment: ability to applying the formula according to context | Assignment | 15% | Structural assignment: ability to collaborate, analyze, rasionalize, and communicate | Assignment | 15% | Individual assignment: skill to collect literacy, understanding, and describing | Assignment | 15% | Mid term exam | Written test | 20% | Final exam | Written test | 20% | Total |  |  | 100% |
| No                         | CO  | Assessment Object  | Assessment Technique | Weight            |                      |        |   |   |   |            |     |   |            |     |  |            |     |   |            |     |               |              |     |            |              |     |       |  |  |      |
| 1                          | CO1, CO2, CO3, CO4, CO5, CO6, CO7, CO8, CO9   | Structural assignment: ability to rasionalize  | Assignment           | 15%               |                      |        |   |   |   |            |     |   |            |     |  |            |     |   |            |     |               |              |     |            |              |     |       |  |  |      |
|                            |   | Structural assignment: ability to applying the formula according to context          | Assignment           | 15%               |                      |        |   |   |   |            |     |   |            |     |  |            |     |   |            |     |               |              |     |            |              |     |       |  |  |      |
|                            |   | Structural assignment: ability to collaborate, analyze, rasionalize, and communicate | Assignment           | 15%               |                      |        |   |   |   |            |     |   |            |     |  |            |     |   |            |     |               |              |     |            |              |     |       |  |  |      |
|                            |   | Individual assignment: skill to collect literacy, understanding, and describing      | Assignment           | 15%               |                      |        |   |   |   |            |     |   |            |     |  |            |     |   |            |     |               |              |     |            |              |     |       |  |  |      |
|                            |   | Mid term exam  | Written test         | 20%               |                      |        |   |   |   |            |     |   |            |     |  |            |     |   |            |     |               |              |     |            |              |     |       |  |  |      |
|                            |   | Final exam   | Written test         | 20%               |                      |        |   |   |   |            |     |   |            |     |  |            |     |   |            |     |               |              |     |            |              |     |       |  |  |      |
| Total                      |   |  | 100%                 |                   |                      |        |   |   |   |            |     |   |            |     |  |            |     |   |            |     |               |              |     |            |              |     |       |  |  |      |
| Forms of media:            | Board, LCD Projector, handouts, PPT slides, and stationaries  |  |                      |                   |                      |        |   |   |   |            |     |   |            |     |  |            |     |   |            |     |               |              |     |            |              |     |       |  |  |      |
| Reference:                 | <p>A. Narayan S Hosmane and Robert Eagling, 2018, Handbook of Boron Science With Applications in Organometallics, Catalysis, Materials and Medicine, Volume 2: Boron in Catalysis. World Scientific.</p> <p>B. Jack V.Davis et al., 2020, The Mechanism of Carboxylative Cyclization of Propargylamine by N-Heterocyclic Carbene Complexes of Au(I), <i>J. Organomet. Chem.</i>, 121583.</p> <p>C. Gautam R.Merreddy, Anjali Chakradhar, Ryan M.Rutkoski, Subash C.Jonnalagadda, 2018, Benzoboroxoles: Synthesis and applications in medicinal chemistry, <i>J. Organomet. Chem</i>, 865, 12-22.</p> <p>D. Prodjosantosa (2010), <i>Kimia Organologam</i>, UNY Press</p> <p>E. Miessler, G.L., Spessard, G.O. (1997), <i>Organometallic Chemistry</i>, Prentice-Hall.</p>   |  |                      |                   |                      |        |   |   |   |            |     |   |            |     |  |            |     |   |            |     |               |              |     |            |              |     |       |  |  |      |

## PLO and CO mapping

| CO  | PLO      |                |      |           |      |      |      |                 |      |       |
|-----|----------|----------------|------|-----------|------|------|------|-----------------|------|-------|
|     | Attitude | Generic Skills |      | Knowledge |      |      |      | Specific Skills |      |       |
|     | PLO1     | PLO2           | PLO3 | PLO4      | PLO5 | PLO6 | PLO7 | PLO8            | PLO9 | PLO10 |
| CO1 |          |                |      |           |      |      | ✓    |                 |      |       |
| CO2 |          |                |      |           |      |      | ✓    |                 |      |       |
| CO3 |          |                |      |           |      |      | ✓    |                 |      |       |
| CO4 |          |                |      |           |      |      |      |                 | ✓    |       |
| CO5 |          |                |      |           |      |      |      |                 | ✓    |       |
| CO6 |          |                |      |           | ✓    |      |      |                 |      |       |
| CO7 |          |                |      |           | ✓    |      |      |                 |      |       |
| CO8 |          |                |      |           | ✓    |      |      |                 |      |       |
| CO9 |          |                |      |           | ✓    |      |      |                 |      |       |