



**Diponegoro University**  
**Faculty of Science and Mathematics**  
**Undergraduate Program Of Chemistry**

Module designation	<b>Solid Substance Chemistry (KZP)</b>
Semester(s) in which the module is taught	4
Person responsible for the module	Dra. Arnelli, MS Tri Windarti, M.Si
Language	Indonesian
Relation to curriculum	<del>Compulsory</del> / elective / <del>specialisation</del>
Teaching methods	Lecture
Workload (incl. contact hours, self-study hours)	Face to face : 1 x (2 x 50 min); Structured study: 1 x (2 x 60 min); Self study: 1 x (2 x 60 min)
Credit points	2
Required and recommended prerequisites for joining the module	ENG
Module objectives/intended learning outcomes	<ol style="list-style-type: none"><li>1. M1: Able to explain the components of a crystal lattice, the differences in the seven forms of the Bravais lattice, and be able to explain the relationship between crystal structure and material properties</li><li>2. M2: Able to explain how XRD can be used for solids analysis</li><li>3. M3: Able to describe the solid-state synthesis method</li><li>4. M4: Able to present thermal research on solids</li><li>5. M5: Able to explain the point, line/plane defects, and describe the color center.</li><li>6. M6: Able to explain the types and mechanisms of solid solutions and their experiments.</li><li>7. M7: Able to classify the types and kinetics of phase transitions.</li><li>8. M8: Able to explain magnetic, electrical, and optical properties of solids.</li><li>9. M9: Able to classify glass, cement, and refractory properties.</li></ol>

Content	<ol style="list-style-type: none"> <li>1. Introduction to Solid Substance Chemistry</li> <li>2. Structure of Solids: a. Crystal grating b. Crystal structure and material properties</li> <li>3. Crystal Structure Analysis: a. XRD basic principles a. Characterization of Solids With XRD</li> <li>4. Synthesis of Solids: a. Reaction: solid phase with high-temperature b. Mechanochemical reactions c. Precipitation reaction d. Reaction with a membrane system</li> <li>5. Thermal analysis of solids</li> <li>6. Crystal Defects: a. Point defects b. Line/field defects c. color center</li> <li>7. Solid solution: a. Type and mechanism of solid solution b. An experiment about solid solution</li> <li>8. Phase transition: a. Phase transition classification b. Kinetics and factors affecting phase transition</li> <li>9. Magnetic, electrical, and optical properties: a. Magnetic properties b. Band theory c. luminance</li> <li>10. Glass, cement, refractories, and organic solids</li> </ol>
Exams and assessment formats	Mid-Semester Exam and Final Exam
Study and examination requirements	Participatory Activities 20% Project Results 30% Task 10% Quiz 10% Mid-semester 15% Final exams 15%
Reading list	<ol style="list-style-type: none"> <li>1. West, A. R., 1984, Solid State Chemistry and its Applications, John Wiley and sons.</li> <li>2. Van Vlack, L. H., 1995, Ilmu dan Teknologi Bahan, ed 5, Erlangga</li> <li>3. Atkins, P and de Paula, J., 2014, Physical Chemistry, 10th ed, Oxford University Press."</li> <li>4. Windarti, T, 2015, Buku Ajar: Biomaterial: Desain Tulang Artifisial</li> </ol>