	Universitas Negeri Surabaya Fakultas Teknik Program Studi S1 Teknik Mesin	Kode Dokumen

RENCANA PEMBELAJARAN SEMESTER

MATA KULIAH (MK)	KODE	Rumpun MK	BOBOT (sks)			SEMESTER	Tgl Penyusunan
Kimia Dasar	2120102162		T=2	P=0	ECTS=3.18	1	12 April 2025

OTORISASI	Pengembang RPS	Koordinator RMK	Koordinator Program Studi
	Bellina Yunitasari, S.Si., M.Si.	Bellina Yunitasari, S.Si., M.Si.	Ir. Priyo Heru Adiwibowo, S.T., M.T.

Model Pembelajaran	**Case Study**	
Capaian Pembelajaran (CP)	**CPL-PRODI yang dibebankan pada MK**	
	CPL-4	Mengembangkan diri secara berkelanjutan dan berkolaborasi.
	CPL-5	Kerja secara mandiri dan kelompok
	CPL-6	Eksperimen dan analisis data
	CPL-9	Kewirausahaan dan etika profesi
	CPL-11	Perancangan dan pengembangan solusi yang memperhatikan lingkungan dan keberlanjutan
	CPL-14	Pengetahuan sains dan teknik
	Capaian Pembelajaran Mata Kuliah (CPMK)	
	CPMK - 1	Demonstrate an understanding of chemistry and be able to explain the general principles,laws, and theories of chemistry Mampu menjelaskan konsep dan prinsip dasar struktur atom, tabel periodik unsur, ikatan kimia, stoikiometri, termokimia, kinematika kimia, kesetimbangan kimia, dan elektrokimia, sebagai dasar untuk studi lebih lanjut
	CPMK - 2	Be able to Use critical thinking and logic in the solution of chemistry problems Mampu memformulasikan dan memecahkan persoalan kimia
	CPMK - 3	Apply learned chemistry skills to analyze new issue Mampu menganalisa hubungan antara perilaku molekuler dan sifat fisik yang dapat diamati
	Matrik CPL - CPMK	

CPMK	CPL-4	CPL-5	CPL-6	CPL-9	CPL-11	CPL-14
CPMK-1						
CPMK-2						
CPMK-3						

Matrik CPMK pada Kemampuan akhir tiap tahapan belajar (Sub-CPMK)

CPMK	Minggu Ke															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
CPMK-1																
CPMK-2																
CPMK-3																

Deskripsi Singkat MK	Pengantar ilmu kimia, struktur atom, tabel periodik unsur, ikatan kimia, stoikiometri, termokimia, kinematika kimia, kesetimbangan kimia, elektrokimia, dan kimia nuklir
Pustaka	**Utama :**

1. Petrucci, Ralph H., dkk. 2011. General Chemistry: Priciples and Modern Application. 10th ed. Pearson Prentice Hall: USA;
2. Laird, Brian B. 2009. University of Chemistry.New York: McGraw-Hil
3. Whitten KW, et. al. General Chemistry London, Saunders College
4. Flower, Paul, et. al. Chemistry 2e. OpenStax, Rice University. https://openstax.org/details/books/chemistry-2e.

Pendukung :

Dosen Pengampu	Prof. Dr. Ir. Aisyah Endah Palupi, M.Pd. Dr. Mohammad Effendy, S.T., M.T. Bellina Yunitasari, S.Si., M.Si.

Mg Ke-	Kemampuan akhir tiap tahapan belajar (Sub-CPMK)	Penilaian		Bantuk Pembelajaran, Metode Pembelajaran, Penugasan Mahasiswa, [Estimasi Waktu]		Materi Pembelajaran [Pustaka]	Bobot Penilaian (%)
		Indikator	Kriteria & Bentuk	Luring (*offline*)	Daring (*online*)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Understanding The Chemistry in Context, Classification of Matter and Physical and Chemical Properties	1.1 Describe how chemistry and engineering helped transform aluminum from a precious metal into an inexpensive structural material. 1.2 Explain the usefulness of the macroscopic, microscopic, and symbolic perspectives in understanding chemical systems. 1.3 Identify properties of and changes in matter as physical or chemical 1.4 Identify properties of matter as extensive or intensive 1.5 Draw pictures to illustrate simple chemical phenomena (like the differences among solids, liquids, and gases) on the molecular scale. 1.6 Use appropriate ratios to convert measurements from one unit to another. 1.7 Express the results of calculations using the correct number of significant figures.	**Kriteria:** Sesuai Rubrik Penilaian **Bentuk Penilaian** : Aktifitas Partisipasif	Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	**Materi:** Aluminum The Study of Chemistry The Science of Chemistry: Observations and Models Numbers and Measurements in Chemistry Problem Solving in Chemistry and Engineering Material Selection and Bicycle Frames Phases and Classification of Matter Physical and Chemical Properties **Pustaka:** *Flower, Paul, et. al. Chemistry 2e. OpenStax, Rice University. https://openstax.org/....* **Materi:** Aluminum The Study of Chemistry The Science of Chemistry: Observations and Models Numbers and Measurements in Chemistry Problem Solving in Chemistry and Engineering Material Selection and Bicycle Frames Phases and Classification of Matter Physical and Chemical Properties **Pustaka:** *Laird, Brian B. 2009. University of Chemistry.New York: McGraw-Hil*	5%

2	Understanding The Atoms Structure,, Molecules, and Ions	2.1 Outline milestones in the development of modern atomic theory 2.2 Summarize and interpret the results of the experiments of Thomson, Millikan, and Rutherford 2.3 Describe the three subatomic particles that compose atoms 2.4 Define isotopes and give examples for several elements 2.5 Explain the basic behavior of waves, including travelling waves and standing waves 2.6 Describe the wave nature of light 2.7 Describe the Bohr model of the hydrogen atom 2.8 Extend the concept of wave–particle duality that was observed in electromagnetic radiation to matter as well 2.9 Understand the general idea of the quantum mechanical description of electrons in an atom, and that it uses the notion of three-dimensional wave functions, or orbitals, that define the distribution of probability to find an electron in a particular part of space 2.10 List and describe traits of the four quantum numbers that form the basis for completely specifying the state of an electron in an atom 2.11 Write and interpret symbols that depict the atomic number, mass number, and charge of an atom or ion 2.12 Define the atomic mass unit and average atomic mass 2.13 Derive the predicted ground-state electron configurations of atoms 2.14 Identify and explain exceptions to predicted electron configurations for atoms and ions 2.15 Relate electron configurations to element classifications in the periodic table	**Kriteria:** Sesuai Rubrik Penilaian **Bentuk Penilaian** : Aktifitas Partisipasif	Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	Ceramah, diskusi, tanya jawab, latihan, dan penugasan	**Materi:** - Early ideas in Atomic Theory - Evolution of Atomic Theory 6.1 Electromagnetic Energy 6.2 The Bohr Model 6.3 Development of Quantum Theory 6.4 Electronic Structure of Atoms (Electron Configurations) And symbolism **Pustaka:** *Flower, Paul, et. al. Chemistry 2e. OpenStax, Rice University. https://openstax.org/....* **Materi:** - Early ideas in Atomic Theory - Evolution of Atomic Theory 6.1 Electromagnetic Energy 6.2 The Bohr Model 6.3 Development of Quantum Theory 6.4 Electronic Structure of Atoms (Electron Configurations) And symbolism **Pustaka:** *Laird, Brian B. 2009. University of Chemistry.New York: McGraw-Hil*	5%

3	Understanding The Periodic Table	3.1 Describe and explain the observed trends in atomic size, ionization energy, and electron affinity of the 3.2 elements 3.3 State the periodic law and explain the organization of elements in the periodic table 3.4 Predict the general properties of elements based on their location within the periodic table 3.5 Identify metals, nonmetals, and metalloids by their properties and/or location on the periodic table 3.6 Define ionic and molecular (covalent) compounds 3.7 Predict the type of compound formed from elements based on their location within the periodic table 3.8 Determine formulas for simple ionic compounds 3.9 Derive names for common types of inorganic compounds using a systematic approach 3.10 Symbolize the composition of molecules using molecular formulas and empirical formulas 3.11 Represent the bonding arrangement of atoms within molecules using structural formulas	**Kriteria:** Sesuai Rubrik Penilaian **Bentuk Penilaian** : Aktifitas Partisipasif	Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	**Materi:** Periodic Variations in Element Properties Molecular and Ionic Compounds Chemical Nomenclature Chemical Formulas **Pustaka:** *Flower, Paul, et. al. Chemistry 2e. OpenStax, Rice University. https://openstax.org/....* **Materi:** Periodic Variations in Element Properties Molecular and Ionic Compounds Chemical Nomenclature Chemical Formulas **Pustaka:** *Laird, Brian B. 2009. University of Chemistry.New York: McGraw-Hil*	5%
4	Chemical Bonding and Molecular Geometry	4.1 Explain the formation of cations, anions, and ionic compounds 4.2 Predict the charge of common metallic and nonmetallic elements, and write their electron configurations 4.3 Describe the formation of covalent bonds 4.4 Define electronegativity and assess the polarity of covalent bonds 4.5 Write Lewis symbols for neutral atoms and ions 4.6 Draw Lewis structures depicting the bonding in simple molecules 4.7 Explain the concepts of polar covalent bonds and molecular polarity 4.8 Assess the polarity of a molecule based on its bonding and structure	**Kriteria:** Sesuai Rubrik Penilaian **Bentuk Penilaian** : Aktifitas Partisipasif	Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	**Materi:** Ionic Bonding 7.2 Covalent Bonding 7.3 Lewis Symbols and Structures 7.6 Molecular Structure and Polarity **Pustaka:** *Flower, Paul, et. al. Chemistry 2e. OpenStax, Rice University. https://openstax.org/....* **Materi:** Ionic Bonding 7.2 Covalent Bonding 7.3 Lewis Symbols and Structures 7.6 Molecular Structure and Polarity **Pustaka:** *Laird, Brian B. 2009. University of Chemistry.New York: McGraw-Hil*	5%

5	Understanding The Composition of Substances and Solutions	5.1 Calculate formula masses for covalent and ionic compounds 5.2 Define the amount unit mole and the related quantity Avogadro's number Explain the relation between mass, moles, and numbers of atoms or molecules, and perform calculations deriving these quantities from one another 5.3 Compute the percent composition of a compound 5.4 Determine the empirical formula of a compound 5.5 Determine the molecular formula of a compound 5.6 Describe the fundamental properties of solutions 5.7 Calculate solution concentrations using molarity 5.8 Perform dilution calculations using the dilution equation 5.9 Define the concentration units of mass percentage, volume percentage, mass-volume percentage, parts-permillion (ppm), and parts-per-billion (ppb) 5.10 Perform computations relating a solution's concentration and its components' volumes and/or masses using these units	**Kriteria:** 1. Sesuai Rubrik Penilaian 2. 5 **Bentuk Penilaian** : Tes	Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	**Materi:** Formula Mass and the Mole Concept Determining Empirical and Molecular Formulas Molarity Other Units for Solution Concentrations **Pustaka:** *Flower, Paul, et. al. Chemistry 2e. OpenStax, Rice University. https://openstax.org/....* **Materi:** Formula Mass and the Mole Concept Determining Empirical and Molecular Formulas Molarity Other Units for Solution Concentrations **Pustaka:** *Laird, Brian B. 2009. University of Chemistry.New York: McGraw-Hil*	5%

6	Understanding The Stoichiometry of Chemical Reactions	6.1 Derive chemical equations from narrative descriptions of chemical reactions. 6.2 Write and balance chemical equations in molecular, total ionic, and net ionic formats. 6.3 Define three common types of chemical reactions (precipitation, acid-base, and oxidation-reduction) 6.4 Classify chemical reactions as one of these three types given appropriate descriptions or chemical equations 6.5 Identify common acids and bases 6.6 Predict the solubility of common inorganic compounds by using solubility rules 6.7 Compute the oxidation states for elements in compounds 6.8 Explain the concept of stoichiometry as it pertains to chemical reactions 6.9 Use balanced chemical equations to derive stoichiometric factors relating amounts of reactants and products 6.10 Perform stoichiometric calculations involving mass, moles, and solution molarity 6.11 Explain the concepts of theoretical yield and limiting reactants/reagents. 6.12 Derive the theoretical yield for a reaction under specified conditions. 6.13 Calculate the percent yield for a reaction.	**Kriteria:** Sesuai Rubrik Penilaian **Bentuk Penilaian** : Tes	Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	**Materi:** 4.1 Writing and Balancing Chemical Equations 4.2 Classifying Chemical Reactions 4.3 Reaction Stoichiometry 4.4 Reaction Yields **Pustaka:** *Flower, Paul, et. al. Chemistry 2e. OpenStax, Rice University. https://openstax.org/....* **Materi:** 4.1 Writing and Balancing Chemical Equations 4.2 Classifying Chemical Reactions 4.3 Reaction Stoichiometry 4.4 Reaction Yields **Pustaka:** *Laird, Brian B. 2009. University of Chemistry.New York: McGraw-Hil*	5%

7	Understanding The Stoichiometry of Chemical Reactions	6.1 Derive chemical equations from narrative descriptions of chemical reactions. 6.2 Write and balance chemical equations in molecular, total ionic, and net ionic formats. 6.3 Define three common types of chemical reactions (precipitation, acid-base, and oxidation-reduction) 6.4 Classify chemical reactions as one of these three types given appropriate descriptions or chemical equations 6.5 Identify common acids and bases 6.6 Predict the solubility of common inorganic compounds by using solubility rules 6.7 Compute the oxidation states for elements in compounds 6.8 Explain the concept of stoichiometry as it pertains to chemical reactions 6.9 Use balanced chemical equations to derive stoichiometric factors relating amounts of reactants and products 6.10 Perform stoichiometric calculations involving mass, moles, and solution molarity 6.11 Explain the concepts of theoretical yield and limiting reactants/reagents. 6.12 Derive the theoretical yield for a reaction under specified conditions. 6.13 Calculate the percent yield for a reaction.	**Kriteria:** Sesuai Rubrik Penilaian **Bentuk Penilaian** : Tes	Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	**Materi:** 4.1 Writing and Balancing Chemical Equations 4.2 Classifying Chemical Reactions 4.3 Reaction Stoichiometry 4.4 Reaction Yields **Pustaka:** *Flower, Paul, et. al. Chemistry 2e. OpenStax, Rice University. https://openstax.org/....* **Materi:** 4.1 Writing and Balancing Chemical Equations 4.2 Classifying Chemical Reactions 4.3 Reaction Stoichiometry 4.4 Reaction Yields **Pustaka:** *Laird, Brian B. 2009. University of Chemistry.New York: McGraw-Hil*	5%
8	USS	USS	**Kriteria:** Sesuai Rubrik Penilaian **Bentuk Penilaian** : Tes	USS 2 X 50	USS 2 X 50	**Materi:** Materi Pertemuan 1 sampai 7 **Pustaka:** *Petrucci, Ralph H., dkk. 2011. General Chemistry: Priciples and Modern Application. 10th ed. Pearson Prentice Hall: USA;* **Materi:** Materi Pertemuan 1 sampai 7 **Pustaka:** *Flower, Paul, et. al. Chemistry 2e. OpenStax, Rice University. https://openstax.org/....*	5%

9	Understanding The Electrochemistry	7.1 Define electrochemistry and a number of important associated terms 7.2 Split oxidation-reduction reactions into their oxidation half-reactions and reduction half-reactions 7.3 Produce balanced oxidation-reduction equations for reactions in acidic or basic solution 7.4 Identify oxidizing agents and reducing agents 7.5 Use cell notation to describe galvanic cells 7.6 Describe the basic components of galvanic cells 7.7 Determine standard cell potentials for oxidation-reduction reactions 7.8 Use standard reduction potentials to determine the better oxidizing or reducing agent from among several possible choices 7.9 Relate cell potentials to free energy changes 7.10 Use the Nernst equation to determine cell potentials at nonstandard conditions 7.11 Perform calculations that involve converting between cell potentials, free energy changes, and equilibrium constants 7.12 Classify batteries as primary or secondary 7.13 List some of the characteristics and limitations of batteries 7.14 Provide a general description of a fuel cell 7.15 Define corrosion 7.16 List some of the methods used to prevent or slow corrosion 7.17 Describe electrolytic cells and their relationship to galvanic cells 7.18 Perform various calculations related to electrolysis	**Kriteria:** Sesuai Rubrik Penilaian **Bentuk Penilaian** : Penilaian Hasil Project / Penilaian Produk	Presentasi, Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	Presentasi, Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	**Materi:** 17.1 Balancing Oxidation-Reduction Reactions 17.2 Galvanic Cells 17.3 Standard Reduction Potentials 17.4 The Nernst Equation 17.5 Batteries and Fuel Cells 17.6 Corrosion 17.7 Electrolysis **Pustaka:** *Flower, Paul, et. al. Chemistry 2e. OpenStax, Rice University. https://openstax.org/....* **Materi:** 17.1 Balancing Oxidation-Reduction Reactions 17.2 Galvanic Cells 17.3 Standard Reduction Potentials 17.4 The Nernst Equation 17.5 Batteries and Fuel Cells 17.6 Corrosion 17.7 Electrolysis **Pustaka:** *Laird, Brian B. 2009. University of Chemistry.New York: McGraw-Hil*	10%

10	Understanding The Electrochemistry	7.1 Define electrochemistry and a number of important associated terms 7.2 Split oxidation-reduction reactions into their oxidation half-reactions and reduction half-reactions 7.3 Produce balanced oxidation-reduction equations for reactions in acidic or basic solution 7.4 Identify oxidizing agents and reducing agents 7.5 Use cell notation to describe galvanic cells 7.6 Describe the basic components of galvanic cells 7.7 Determine standard cell potentials for oxidation-reduction reactions 7.8 Use standard reduction potentials to determine the better oxidizing or reducing agent from among several possible choices 7.9 Relate cell potentials to free energy changes 7.10 Use the Nernst equation to determine cell potentials at nonstandard conditions 7.11 Perform calculations that involve converting between cell potentials, free energy changes, and equilibrium constants 7.12 Classify batteries as primary or secondary 7.13 List some of the characteristics and limitations of batteries 7.14 Provide a general description of a fuel cell 7.15 Define corrosion 7.16 List some of the methods used to prevent or slow corrosion 7.17 Describe electrolytic cells and their relationship to galvanic cells 7.18 Perform various calculations related to electrolysis	**Kriteria:** Sesuai Rubrik Penilaian **Bentuk Penilaian** : Penilaian Hasil Project / Penilaian Produk	Presentasi, Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	Presentasi, Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	**Materi:** 17.1 Balancing Oxidation-Reduction Reactions 17.2 Galvanic Cells 17.3 Standard Reduction Potentials 17.4 The Nernst Equation 17.5 Batteries and Fuel Cells 17.6 Corrosion 17.7 Electrolysis **Pustaka:** *Flower, Paul, et. al. Chemistry 2e. OpenStax, Rice University. https://openstax.org/....* **Materi:** 17.1 Balancing Oxidation-Reduction Reactions 17.2 Galvanic Cells 17.3 Standard Reduction Potentials 17.4 The Nernst Equation 17.5 Batteries and Fuel Cells 17.6 Corrosion 17.7 Electrolysis **Pustaka:** *Laird, Brian B. 2009. University of Chemistry.New York: McGraw-Hil*	10%

11	Understanding The Entropy and the Second Law of Thermodynamics	8.1 describe the scientific and economic obstacles to more widespread recycling of plastics 8.2 explain the concept of entropy in your own words. 8.3 deduce the sign of DS for many chemical reactions by examining the physical state of the reactants and products. 8.4 state the second law of thermodynamics in words and equations and use it to predict spontaneity. 8.5 state the third law of thermodynamics. 8.6 use tabulated data to calculate the entropy change in a chemical reaction. 8.7 derive the relationship between the free energy change of a system and the entropy change of the universe. 8.8 use tabulated data to calculate the free energy change in a chemical reaction. 8.9 explain the role of temperature in determining whether a reaction is spontaneous. 8.10 use tabulated data to determine the temperature range for which a reaction will be spontaneous.	**Kriteria:** Sesuai Rubrik Penilaian **Bentuk Penilaian** : Penilaian Hasil Project / Penilaian Produk	Presentasi, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	Presentasi, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	**Materi:** Recycling of Plastics Spontaneity Entropy The Second Law of Thermodynamics The Third Law of Thermodynamics Gibbs Free Energy Free Energy and Chemical Reactions **Pustaka:** *Flower, Paul, et. al. Chemistry 2e. OpenStax, Rice University. https://openstax.org/....* **Materi:** Recycling of Plastics Spontaneity Entropy The Second Law of Thermodynamics The Third Law of Thermodynamics Gibbs Free Energy Free Energy and Chemical Reactions **Pustaka:** *Laird, Brian B. 2009. University of Chemistry.New York: McGraw-Hil*	10%
12	Thermochemistry	9.1 Define energy, distinguish types of energy, and describe the nature of energy changes that accompany 9.2 chemical and physical changes 9.3 Distinguish the related properties of heat, thermal energy, and temperature 9.4 Define and distinguish specific heat and heat capacity, and describe the physical implications of both 9.5 Perform calculations involving heat, specific heat, and temperature change 9.6 Explain the technique of calorimetry 9.7 Calculate and interpret heat and related properties using typical calorimetry data 9.8 State the first law of thermodynamics 9.9 Define enthalpy and explain its classification as a state function 9.10 Write and balance thermochemical equations 9.11 Calculate enthalpy changes for various chemical reactions 9.12 Explain Hess's law and use it to compute reaction enthalpies	**Kriteria:** Sesuai Rubrik Penilaian **Bentuk Penilaian** : Penilaian Hasil Project / Penilaian Produk	Presentasi, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	Presentasi, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	**Materi:** 5.1 Energy Basics 5.2 Calorimetry 5.3 Enthalpy **Pustaka:** *Flower, Paul, et. al. Chemistry 2e. OpenStax, Rice University. https://openstax.org/....* **Materi:** 5.1 Energy Basics 5.2 Calorimetry 5.3 Enthalpy **Pustaka:** *Laird, Brian B. 2009. University of Chemistry.New York: McGraw-Hil*	5%

13	Understanding the Chemical Kinetics	10.1 explain the role of chemical kinetics in the formation and destruction of ozone in the atmosphere. 10.2 . 10.3 define the rate of a chemical reaction and express the rate in terms of the concentrations of individual reactants or products. 10.4 10.5 use the method of initial rates to determine rate laws from experimental data. 10.6 use graphical methods to determine rate laws from experimental data 10.7 explain the role of a catalyst in the design of practical chemical reactions	**Kriteria:** Sesuai Rubrik Penilaian **Bentuk Penilaian** : Penilaian Hasil Project / Penilaian Produk	Presentasi, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	Presentasi, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	**Materi:** Ozone Depletion Rates of Chemical Reactions Rate Laws and the Concentration Dependence of Rates Catalysis **Pustaka:** *Flower, Paul, et. al. Chemistry 2e. OpenStax, Rice University. https://openstax.org/....* **Materi:** Ozone Depletion Rates of Chemical Reactions Rate Laws and the Concentration Dependence of Rates Catalysis **Pustaka:** *Laird, Brian B. 2009. University of Chemistry.New York: McGraw-Hil*	5%
14	Nuclear Structure and Stability Nuclear Equations Radioactive Decay Transmutation and Nuclear Energy Uses of Radioisotopes Biological Effects of Radiation	11.1 explain that equilibrium is dynamic and that at equilibrium, the forward and backward reaction rates are equal. State these ideas in your own words. 11.2 write the equilibrium constant expression for any reversible reaction. 11.3 calculate equilibrium constants from experimental data. 11.4 calculate equilibrium composition from initial data and the numerical value of the equilibrium constant. 11.5 calculate molar solubility from Ksp or vice versa. 11.6 write equilibrium constants for the dissociation of weak acids and weak bases and use them to calculate pH or the degree of ionization. 11.7 use LeChatelier's principle to explain the response of an equilibrium system to applied stresses. 11.8 calculate the new equilibrium composition of a system after an applied stress. 11.9 explain the importance of both kinetic and equilibrium considerations in the in the design of industrial chemical processes. 11.10 list chemical reactions important in the production and weathering of concrete.	**Kriteria:** Sesuai Rubrik Penilaian **Bentuk Penilaian** : Penilaian Hasil Project / Penilaian Produk	Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	**Materi:** Chemical Equilibrium Equilibrium Constants Equilibrium Concentrations LeChatelier's Principle Solubility Equilibria Acids and Bases Free Energy and Chemical Equilibrium Concrete Production and Weathering Borates and Boric Acid **Pustaka:** *Flower, Paul, et. al. Chemistry 2e. OpenStax, Rice University. https://openstax.org/....* **Materi:** Chemical Equilibrium Equilibrium Constants Equilibrium Concentrations LeChatelier's Principle Solubility Equilibria Acids and Bases Free Energy and Chemical Equilibrium Concrete Production and Weathering Borates and Boric Acid **Pustaka:** *Laird, Brian B. 2009. University of Chemistry.New York: McGraw-Hil*	5%
15	Understanding of Nuclear chemistry,	1. 2.12.1 Describe nuclear structure in terms of protons, neutrons, and electrons 12.2 Explain trends in the relative stability of nuclei 12.3 Identify common particles and	**Kriteria:** Sesuai Rubrik Penilaian **Bentuk Penilaian** : Penilaian Hasil Project / Penilaian Produk	Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	Ceramah, diskusi, tanya jawab, latihan, dan penugasan 2 X 50	**Materi:** Nuclear Structure and Stability Nuclear Equations Radioactive Decay Transmutation and Nuclear Energy Uses of Radioisotopes Biological Effects of Radiation **Pustaka:** *Flower, Paul, et. al. Chemistry 2e. OpenStax, Rice University. https://openstax.org/....*	5%

		energies involved in nuclear reactions 12.4 Write and balance nuclear equations 12.5 Recognize common modes of radioactive decay 12.6 Identify common particles and energies involved in nuclear decay reactions 12.7 Write and balance nuclear decay equations 12.8 Calculate kinetic parameters for decay processes, including half-life 12.9 Describe common radiometric dating techniques 12.10 Describe the synthesis of transuranium nuclides 12.11 Explain nuclear fission and fusion processes 12.12 Relate the concepts of critical mass and nuclear chain reactions 12.13 Summarize basic requirements for nuclear fission and fusion reactors 12.14 List common applications of radioactive isotopes 12.15 Describe the biological impact of ionizing radiation 12.16 Define units for measuring radiation exposure 12.17 Explain the operation of common tools for detecting radioactivity 12.18 List common sources of radiation exposure in the US				**Materi:** Nuclear Structure and Stability Nuclear Equations Radioactive Decay Transmutation and Nuclear Energy Uses of Radioisotopes Biological Effects of Radiation **Pustaka:** *Laird, Brian B. 2009. University of Chemistry.New York: McGraw-Hil*	

16	Memahami seluruh materi mata kuliah	UAS	**Kriteria:** Sesuai Rubrik Penilaian **Bentuk Penilaian** : Penilaian Hasil Project / Penilaian Produk	UAS 2 X 50	UAS 2 X 50	**Materi:** Memahami seluruh materi mata kuliah **Pustaka:** *Flower, Paul, et. al. Chemistry 2e. OpenStax, Rice University. https://openstax.org/....* **Materi:** Memahami seluruh materi mata kuliah **Pustaka:** *Flower, Paul, et. al. Chemistry 2e. OpenStax, Rice University. https://openstax.org/....*	10%

Rekap Persentase Evaluasi : Case Study

No	Evaluasi	Persentase
1.	Aktifitas Partisipasif	20%
2.	Penilaian Hasil Project / Penilaian Produk	60%
3.	Tes	20%
		100%

Catatan

1. **Capaian Pembelajaran Lulusan Prodi (CPL - Prodi)** adalah kemampuan yang dimiliki oleh setiap lulusan prodi yang merupakan internalisasi dari sikap, penguasaan pengetahuan dan ketrampilan sesuai dengan jenjang prodinya yang diperoleh melalui proses pembelajaran.
2. **CPL yang dibebankan pada mata kuliah** adalah beberapa capaian pembelajaran lulusan program studi (CPL-Prodi) yang digunakan untuk pembentukan/pengembangan sebuah mata kuliah yang terdiri dari aspek sikap, ketrampulan umum, ketrampilan khusus dan pengetahuan.
3. **CP Mata kuliah (CPMK)** adalah kemampuan yang dijabarkan secara spesifik dari CPL yang dibebankan pada mata kuliah, dan bersifat spesifik terhadap bahan kajian atau materi pembelajaran mata kuliah tersebut.
4. **Sub-CPMK Mata kuliah (Sub-CPMK)** adalah kemampuan yang dijabarkan secara spesifik dari CPMK yang dapat diukur atau diamati dan merupakan kemampuan akhir yang direncanakan pada tiap tahap pembelajaran, dan bersifat spesifik terhadap materi pembelajaran mata kuliah tersebut.
5. **Indikator penilaian** kemampuan dalam proses maupun hasil belajar mahasiswa adalah pernyataan spesifik dan terukur yang mengidentifikasi kemampuan atau kinerja hasil belajar mahasiswa yang disertai bukti-bukti.
6. **Kreteria Penilaian** adalah patokan yang digunakan sebagai ukuran atau tolok ukur ketercapaian pembelajaran dalam penilaian berdasarkan indikator-indikator yang telah ditetapkan. Kreteria penilaian merupakan pedoman bagi penilai agar penilaian konsisten dan tidak bias. Kreteria dapat berupa kuantitatif ataupun kualitatif.
7. **Bentuk penilaian:** tes dan non-tes.
8. **Bentuk pembelajaran:** Kuliah, Responsi, Tutorial, Seminar atau yang setara, Praktikum, Praktik Studio, Praktik Bengkel, Praktik Lapangan, Penelitian, Pengabdian Kepada Masyarakat dan/atau bentuk pembelajaran lain yang setara.
9. **Metode Pembelajaran:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, dan metode lainnya yg setara.
10. **Materi Pembelajaran** adalah rincian atau uraian dari bahan kajian yg dapat disajikan dalam bentuk beberapa pokok dan sub-pokok bahasan.
11. **Bobot penilaian** adalah prosentasi penilaian terhadap setiap pencapaian sub-CPMK yang besarnya proposional dengan tingkat kesulitan pencapaian sub-CPMK tsb., dan totalnya 100%.
12. TM=Tatap Muka, PT=Penugasan terstruktur, BM=Belajar mandiri.

RPS ini telah divalidasi pada tanggal 24 Desember 2024

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