

阿南工業高等専門学校		開講年度	令和06年度 (2024年度)		授業科目	物理化学 4	
科目基礎情報							
科目番号	1555504			科目区分	専門 / 選択		
授業形態	授業			単位の種別と単位数	学修単位: 2		
開設学科	専門共通科目 (本科)			対象学年	5		
開設期	後期			週時間数	後期:2		
教科書/教材	Textbook: Professional Engineering Library Butsurikagaku, Fukuchi (Zikkyosyuppan)						
担当教員	中村 厚信						
到達目標							
1. Understand electrical conduction phenomena of electrolyte solutions. 2. Understand the behavior of ions in electric fields and the ionization equilibrium. 3. Understand redox reactions that occur at battery electrodes 4. Understand the standard electrode potential and the electromotive force.							
ルーブリック							
	Ideal Level			Standard Level		Minimum Level	
Achievement 1	Explain electrical conduction phenomenon of aqueous electrolyte solutions and perform related calculations.			Explain an electrical conductivity for aqueous electrolyte solutions.		Calculate an electrical conductivity of aqueous electrolyte solution.	
Achievement 2	Explain the behavior of ions in electric fields and ionization equilibrium, and perform related calculations.			Explain the behavior of ions in an electric field and the ionization equilibrium.		Calculate ionization equilibrium constants.	
Achievement 3	Explain redox reactions that occur at battery electrodes, and perform related calculations.			Explain redox reactions that occur at battery electrodes.		Determine the change in oxidation number for redox reactions that occur at battery electrodes.	
Achievement 4	Explain the standard electrode potential and the electromotive force, and perform related calculations.			Explain the standard electrode potential and the electromotive force.		Calculate an electromotive force from a standard electrode potential.	
学科の到達目標項目との関係							
教育方法等							
概要	Electrochemistry considers electrical phenomena in chemical changes. This field has been applied to various fields such as batteries and energy conversion. In this lecture, the basics of electrochemistry will be explained with exercises.						
授業の進め方・方法	Lectures will be given according to the textbook, but the missing parts will be supplemented with exercises. We will solve exercises as much as possible during class, but if there is no time, solve them yourself. There will be quizzes at the end of each unit, so please review thoroughly in advance.						
注意点	The knowledge about redox reactions and electrolysis learned in the lower grades of chemistry will be used as the basis for this class, so be sure to review it thoroughly in advance. Reference book: Ippankagaku, Atkins (Tokyokagakudouzin)						
授業の属性・履修上の区分							
<input type="checkbox"/> アクティブラーニング		<input type="checkbox"/> ICT 利用		<input type="checkbox"/> 遠隔授業対応		<input type="checkbox"/> 実務経験のある教員による授業	
授業計画							
		週	授業内容		週ごとの到達目標		
後期	3rdQ	1週	Ionization of electrolytes		Calculate the degree of ionization in electrolytes.		
		2週	Electrical conductivity of ions		Calculate molar conductivity.		
		3週	Ion mobility and transport number		Calculate ion transport numbers.		
		4週	Arrhenius theory of ionization		Understand Arrhenius theory of ionization.		
		5週	Activity coefficients in electrolyte solutions		Express physical quantities using Activity coefficients.		
		6週	Ionic strength		Calculate values of ionic strength.		
		7週	Ionization equilibria of acids and bases		Calculate ionization constants.		
		8週	Midterm exam				
	4thQ	9週	Basics of battery		Write chemical equations for half-cells.		
		10週	Redox reaction 1		Calculate oxidation numbers and write simple redox equations.		
		11週	Redox reaction 2		Derive redox equations.		
		12週	Gibbs free energy and electromotive force		Calculate electromotive forces and equilibrium constants of sparingly soluble salts.		
		13週	Battery and electrolysis		Understand the mechanism of practical batteries and perform calculations related to electrolysis.		
		14週	Colloid		Calculate the motion of colloidal particles.		
		15週	Surface tension and adsorption		Solve problems related to surface tension, and understand the characteristics of adsorption isotherms.		
		16週	Final exam				
モデルコアカリキュラムの学習内容と到達目標							
分類	分野	学習内容	学習内容の到達目標			到達レベル	授業週

評価割合						
	Examination	Quiz	Portfolio	Presentation/Attitude	Other	合計
総合評価割合	60	10	30	0	0	100
Basic Proficiency	20	0	10	0	0	30
Specialized Proficiency	40	10	20	0	0	70
Cross Area Proficiency	0	0	0	0	0	0