

# PORTFOLIO

COURSE:  
AGRICULTURAL PRODUCT CHEMISTRY  
(PTH103217)



## TEACHING TEAM:

Prof. Dr. Ir. Basuni Hamzah, M.Sc.  
Prof. Ir. Filli Pratama, M.Sc.(Hons), Ph.D  
Sugito, S.TP., M.Si.

AGRICULTURAL PRODUCT TECHNOLOGY  
STUDY PROGRAM, FACULTY OF AGRICULTURE  
UNIVERSITAS SRIWIJAYA

## A. COURSE IDENTITY

Module designation	<i>Agricultural Product Chemistry</i>	
Semester (s) in which the module is taught	3 <sup>th</sup> semester/2 <sup>nd</sup> year	
Person responsible for the module	1. Prof. Dr. Ir. Basuni Hamzah, M.Sc. 2. Prof. Ir. Filli Pratama, M.Sc., (Hons), Ph.D. 3. Sugito, S.TP., M.Si.	
Language	Indonesian	
Relation to curriculum	Compulsory Course	
Type of teaching, contact hours	-Lectures (explanation, discussion) -Structured assignment (i.e.: article reading and review) -The class size 30-75 students per class -Contact hours for lecture are 51.33 hours per semester -Total hours practical is 19.83 hours per semester	
Workload (incl. Contact hours, self-study hours)	1. Lectures (2 x 50 minutes) per week or 51.33 hours per semester 2. Structured assignment (i.e.: article reading and review): 2 x 60 minutes per week or 24 hours per semester 3. Self-study: 2 x 60 minutes per week or 24 hours per semester	
Credit points	3 credits (equivalent with 4.91 ECTS)	
Requirements according to the examination regulations	A student must have attended the lecture at least 85% of total lectures and submitted all the assignments prior to join the final exam	
Module objectives/intended learning outcomes	After completing this course, a student is expected to:	
CLO=Course Learning Outcomes	<b>CLO1</b>	understand and be able to explain the properties of major and minor components as well as the functional components in agricultural products
	<b>CLO2</b>	understand and be able to explain the cause-and-effect relationship of food components pertaining to food alteration during handling, processing and storage
	<b>CLO3</b>	understand and be able to explain the reaction relating to damage mechanism
	<b>CLO4</b>	understand and be able to explain the changes properties of the major, minor and functional components in agricultural product as affected by external factors

Content	<ol style="list-style-type: none"> <li>1. Introduction and scope area in agricultural products (macro- and micro-chemical components, functional)</li> <li>2. Water properties and water activity, and its effect on agricultural product's quality</li> <li>3. Fat/Oil properties and its effects on agricultural product's quality</li> <li>4. Emulsifier and HLB (hydrophilic and Lipophilic Balance) calculations</li> <li>5. Carbohydrate properties</li> <li>6. Carbohydrate's derivatives and its application</li> <li>7. Protein properties</li> <li>8. Enzyme properties and controlling enzyme activity</li> <li>9. Food additives</li> <li>10. Phytochemical compounds</li> <li>11. Flavor for foods and drinks</li> </ol>
Examination forms	Quiz, Mid-terms and Final Examination
Media employed	LCD, whiteboard, websites
Reading List	<ol style="list-style-type: none"> <li>1. Belitz, H.D.; Grosch, W.; Schieberle, P. 2009. Food Chemistry. 4<sup>th</sup> Revised and Extended Ed. Springer-Verlag-Berlin Heidelberg. 1114 pages</li> <li>2. Damodaran, S.; Parkin K.L. 2017. Fennema's Food Chemistry. 5<sup>th</sup> edition. CRC Press Taylor &amp; Francis Group. 1125 pages.</li> </ol>

## B. STUDY LEARNING PLAN



**UNIVERSITAS SRIWIJAYA (UNSRI)**  
**FACULTY OF AGRICULTURE**  
**DEPARTMENT OF AGRICULTURAL TECHNOLOGY**  
**STUDY PROGRAM OF AGRICULTURAL PRODUCT TECHNOLOGY**  
**SEMESTER LEARNING PLAN**

### A. COURSE IDENTITY

<b>Subject</b>	<b>: Agricultural Product Chemistry</b>	<b>Code: PTH103217</b>	<b>Semester : 3</b>	<b>Credits : 3(2-1)</b>
<b>Relation to curriculum</b>	<b>Compulsory</b>			
<b>Course Description</b>	This course will deal with the major and minor constituent chemical components in agricultural products, their properties and interactions as well as their changes that might occur during processing, storage and utilization. Food additives such as preservatives, emulsifier, pigments, flavors) are also included in this course.			
<b>PLO/ILO</b>	<ol style="list-style-type: none"><li>1. Able to demonstrate a responsible attitude towards work in their field of expertise independently (AV-9).</li><li>2. Able to internalize the spirit of independence, struggle, and entrepreneurship (AV-10).</li><li>3. Able to explain the main chemical events that underline the properties and reactions of various components of agricultural production (KA-1.1).</li><li>4. Able to explain how to control chemical reactions that occur in agricultural products (KA-1.2).</li><li>5. Able to explain the relationship between chemical reactions and the mechanism of damage and shelf life of agricultural products (KA-1.3).</li><li>6. Able to describe the characteristics of raw materials, ingredients and food additives and their effect on the characteristics agricultural production (KA-4.1).</li><li>7. Able to design agricultural product production process based on the application of technology principles and agricultural</li></ol>			

	<p>product processing in an effective, efficient, and precise manner so as to produce a well-standardized production process (SC-1).</p> <ol style="list-style-type: none"> <li>8. Able to design the development of agricultural products that meet the quality criteria of agricultural products, are safe, nutritious and/or useful based on the principles of agricultural technology (SC-2).</li> <li>9. Able to analyze problems with agricultural products technology approach in solving production problems and agricultural products so that they are efficient, safe, and with guaranteed quality (SC-4).</li> <li>10. Able to provide added value to agricultural products with Indonesian characteristics, especially the Southern part of Sumatera with locally-based agricultural products and optimal utilization of Indonesia's biological diversity through production processes that are safe, standardized, efficient, and effective (SC-6).</li> <li>11. Able to apply logical, critical, systematic, and innovative thinking in the context of the development or implementation of science and technology that pay attention to and applies humanities values in accordance with their field of expertise(GC-1).</li> <li>12. Able to demonstrate independent, quality, and measurable performance (GC-2)</li> <li>13. Able to examine the implications of developing or implementing science and technology that pay attention to and applies humanities values according to their expertise based on scientific principles, procedures and ethics in order to produce solutions, ideas, designs or art criticism (GC-3).</li> <li>14. Able to make appropriate decisions in the context of solving problems in their area of expertise, based on the results of analysis of information and data (GC-5).</li> </ol>
Lecturers	: Prof. Dr. Ir. Basuni Hamzah, M.Sc. Prof. Ir. Filli Pratama, M.Sc.(Hons), Ph.D Sugito, S.TP., M.Si.

## B. LEARNING PROGRAM

Week	CLO	SUB-CLO	Subject	Learning method and time	Assignment	Assessment	Weight (%)
1	1	<ul style="list-style-type: none"> <li>Understand and be able to explain the objectives and scope of areas of agricultural product chemistry.</li> <li>Understand the major and minor components in agricultural products as well as food additives</li> </ul>	Overview; importance, role of agricultural product chemistry in food system	Lecture, discussion (2 x50 minutes)(face to face)		Ask and answer question (face-to-face). At least 5% of students in the class are able to answer the question correctly.	
2	2	<ul style="list-style-type: none"> <li>Understand and be able to explain the molecular structure and physical properties of water.</li> <li>Understand and be able to explain the hydrogen bond between water and water, water and other component such as glucose.</li> <li>Understand and be able to explain about Water Activity (<math>a_w</math>) and its effect on shelf life of product.</li> </ul>	Water in agricultural product (physical and chemical properties, interaction with other components, effect on product, water activity)	Lecture, discussion (2 x50 minutes) (face to face)	Students search, discuss and review a scientific article regarding effect of water content or water activity on quality of agricultural product. The selected papers are those published in international journals. The results of the review are written on a power point slide of a maximum of 3 pages	Ask and answer question (face-to-face). At least 5% of students in the class are able to answer the question correctly.  A lab practical regarding the role of water in agricultural products (The assessment of the lab practicum is separate from the evaluation/exam)	4 (assignment)

3	1 and 2	<ul style="list-style-type: none"> <li>Understand and be able to explain about the molecular structure of triglycerides (fats), fat properties and reactions</li> </ul>	Fat/oil in agricultural product (classification, role of fat in food production, reaction, oxidation, fat/oil quality)	Lecture, discussion (2 x50 minutes) (face to face)	Students search literature for the mechanism of fat oxidation and summarize it in one page of writing	Ask and answer questions (face-to-face). At least 5% of students in the class are able to answer the question correctly	4 (assignment)
4	2 and 3	<ul style="list-style-type: none"> <li>Understand and be able to explain types of emulsion, properties, HLB determination, stability of emulsion</li> </ul>	Emulsifier (types, process, HLB, stability)	Lecture, discussion (2 x50 minutes) (face to face)		<p>Ask and answer questions (face-to face). At least 5% of students in the class are able to answer the question correctly.</p> <p>A lab practical regarding the role of emulsifier in food products (The assessment of the lab practicum is separate from the evaluation/exam)</p>	
5	1, 2 and 3	<b>EVALUATION I (lecture 1-4)</b>					20
6	1	<ul style="list-style-type: none"> <li>Understand and be able to explain overview of carbohydrate.</li> <li>Understand and be able to explain the molecular structures of mono-, di-, oligo and poly-saccharides</li> </ul>	Types of carbohydrates and derivatives	Lecture, discussion (2 x50 minutes) (face to face)		<p>Ask and answer questions (face-to-face). Accuracy in explaining the types of carbohydrates</p> <p>A lab practical regarding the physical properties of starch (The assessment of the lab practicum is separate from the evaluation/exam) from the evaluation/exam)</p>	

7	2, 3 and 4	<ul style="list-style-type: none"> <li>Understand and be able to explain the properties of mono-, di-, oligo and poly-saccharides.</li> <li>Understand and be able to explain the chemical reactions occur related with mono-, di-, oligo and poly-saccharides.</li> <li>Understand and be able to explain the existence of carbohydrates in agricultural products.</li> </ul>	Physical Properties of carbohydrates and reactions with other components	Lecture, discussion (2 x50 minutes) (face to face)	Summarizing article related to existence of carbohydrates in agricultural products.	<p>Ask and answer questions (face-to-face). Accuracy in explaining the reactions of carbohydrates with other components</p> <p>A lab practical regarding the browning reaction in agricultural products (The assessment of the lab practicum is separate from the evaluation/exam)</p>	4 (assignment)
8	2 and 3	<ul style="list-style-type: none"> <li>Understand and be able to explain types of protein, amino acids and peptides chain.</li> <li>Understand and be able to explain the reactions occur between proteins with other chemical substances.</li> </ul>	Protein (types and properties, its functions and reaction in food system)	Lecture, discussion (2 x50 minutes) (face to face)		<p>Ask and answer questions (face-to-face). Accuracy in explaining the reactions of types of proteins, functions and reaction</p>	
9	2, 3 and 4	<ul style="list-style-type: none"> <li>Understand and be able to explain the existence of protein in agricultural products</li> </ul>	Existence of protein in agricultural products	Lecture, discussion (2 x50 minutes) (face to face)		<p>Ask and answer questions (face-to-face). Accuracy in explaining the existence of protein in agricultural products</p> <p>A lab practical regarding the effect of ice crystal in high protein-products (The assessment of the lab practicum is separate from the evaluation/exam)</p>	



10	2 and 3	<ul style="list-style-type: none"> <li>Understand and be able to explain on the kinds of enzymes in agricultural products</li> <li>Understand and be able to explain the advantage and disadvantages of enzyme in agricultural products</li> </ul>	Enzyme (properties and reactions)	Lecture, discussion (2 x50 minutes) (face to face)		Ask and answer questions (face-to-face). Accuracy in explaining the types of the enzyme in agricultural products	
11	1, 2, 3 and 4	<b>EVALUATION I (lecture 6 to 10)</b>					20
12	2 and 3	Understand and be able to explain food additives (preservative and stabilizer)	Food additives I (preservatives, stabilizer)			Ask and answer questions (face-to-face). Accuracy in explaining about the types of food preservative and stabilizer  A lab practical regarding the role of stabilizer in food products (The assessment of the lab practicum is separate from the evaluation/exam)	
13	2 and 3	Understand and be able to explain food additives (colorant, anticaking, max. level)	Food additives II (colorant, anticaking, max. level)				

14	2 and 3	Understand and be able to explain the types of flavorant and its properties	Flavor I (food and drink)		Students are asked to calculate the max level of food additive allowed in a product. They calculate the amount of the product that can be consumed based on the regulation of food additives allowed and their concentration in the product	Ask and answer questions (face-to-face). Accuracy in explaining on types of flavorant and its properties	4 (assignment)
15	2, 3 and 4	The making of flavorant and application in food processing	Flavor II (processing)		Students are asked to predict the preferred type of the flavors for future products	Ask and answer questions (face-to-face). Accuracy in explaining on the making of flavorant and how to applied in food processing  A lab practical regarding the pigment and flavors (The assessment of the lab practicum is separate from the evaluation/exam)	4 (assignment)
16	2, 3 and 4	<b>EVALUATION III (Lecture 11 to 15)</b>					20
		<b>Total percentage for the lecture</b>					<b>80</b>
		<b>Percentage for Lab Practical</b>					<b>20</b>
		<b>Grand Total</b>					<b>100</b>

**READING LISTS:**

3. Belitz, H.D.; Grosch, W.; Schieberle, P. 2009. Food Chemistry. 4<sup>th</sup> Revised and Extended Ed. Springer-Verlag-Berlin Heidelberg. 1114 pages
4. Damodaran, S.; Parkin K.L. 2017. Fennema's Food Chemistry. 5<sup>th</sup> edition. CRC Press Taylor & Francis Group. 1125 pages.

**Course Outlines:****Face-to-Face:**

No.	Course materials	Duration (face-to-face) (minutes)	CLO			
			1	2	3	4
1	Overview; importance, role of agricultural product chemistry in food system	110	v			
2	Water in agricultural product(physical and chemical properties, interaction with other components, effect on product, water activity)	110	v	v		
3	Fat/oil in agricultural product (classification, role of fat in food production, reaction, oxidation, fat/oil quality)	110	v	v		
4	Emulsifier (types, process, HLB, stability)	110		v	v	
5	Evaluation (1-4)	110		v	v	v
6	Types of carbohydrates and derivatives	110	v			
7	Physical Properties of carbohydrates and reactions with other components	110		v	v	v
8	Protein (types and properties, its functions and reaction in food system)	110		v	v	
9	Protein (types and properties, functions in food system)	110		v	v	v
10	Enzyme (properties and reactions)	110		v	v	
11	Evaluation (6-10)	110		v	v	v
12	Food additives I (preservatives, stabilizer)	110		v	v	
13	Food additives II (colorant, anticaking, max. level)	110		v	v	
14	Flavor I (food and drink)	110		v	v	
15	Flavor II (processing)	110		v	v	
16	Evaluation (12-15)	110		v	v	

### Contribution of Course Assessment to PLO

Course Assessment	AV	KA	SC	GC	Type
Assignments	5, 6, 8, 9, 10	1.1; 1.2; 1:3	1; 2; 4; 6	1, 2, 3, 5	Formative
Evaluation I (lecture 1 to 4)	1, 8, 10	1.1; 1.2; 1:3	1; 2	1, 2, 3, 5	Summative
Evaluation II (lecture 6 to 10)	1, 8, 10	1.1; 1.2; 1:3	1; 2; 4; 6	1, 2, 3, 5	Summative
Evaluation III (lecture 12 to 15)	1, 8, 10	1.1; 1.2; 1:3	1; 2; 4; 6	1, 2, 3, 5	Summative
Lab Practicum	5, 6, 8, 9, 10	1.1; 1.2; 1:3	1; 2; 4; 6	2, 4, 5, 9	Formative

### Assignment Assessment Rubric

No.	Criteria	Weight (%)	Score			
			≥ 86	71-85.99	56-70.99	40-55.99
			Excellent	Good	Enough	Bad
1	Format and presentation of written assignment	10	The assignment is presented in accordance with the instructions	There are parts (10%) of the assignment not in accordance with the instructions	There are parts (25%) of the assignment not in accordance with the instructions	There are half of the written assignment not in accordance with the instructions
2	Discussion in the written assignment	50	Information to support the discussion in the assignment is adequate, and the discussion is well organized	Information to support the discussion in the assignment is adequate; however the information is not well written	Information to support the discussion in the assignment is adequate; however the information is copied and pasted in the assignment without paraphrasing	There is not enough information in the assignment. It is just a compilation of information derived from internet searching
3	Publication year of literature cited in the assignment	15	Most of literatures cited are up-to date ( $\leq 5$ years)	Most of literatures cited are between 5-10 years	Most of literatures cited are ( $\geq 10$ years)	There is no literature cited
4	Number of literatures cited in the assignment	15	There are $\geq 3$ literature cited	There are $\leq 3$ literature cited	One literature cited	There is no literature cited
5	Submission time	10	Assignment is submitted	Assignment is submitted	Assignment is submitted two	Assignment is submitted after

			before the deadline	one day after the deadline	days after the deadline	two days from deadline
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### Benchmark for Scoring

No.	Range of Score	Grade	Description
1	86.00 - 100.00	A	Excellent
2	71.00 – 85.99	B	Good
3	56.00 – 70.99	C	Fair
4	40.00 – 55.99	D	Bad
5	<40.00	E	Worst

### Benchmark for Evaluation of the achievement of CLO

No.	Performance of Evaluation	Criteria
1	Very satisfactory	If $\geq 80\%$ of students in a class achieve Grade A
2	Satisfactory	If 70-79.9% of students in a class achieve Grade A
3	Fairly satisfactory	If 60-69.9% of students in a class achieve Grade A
4	Unsatisfactory	If $<60\%$ of students in a class achieve Grade A

### Remedial Exam:

Students are allowed to join Remedial Exam if the score is under 60 out of 100.

## RESULTS OF ASSESSMENT PALEMBANG CLASS

STUDY PROGRAM :		AGRICULTURAL PRODUCT TECHNOLOGY																
ACADEMIC YEAR :		2021/2022 (ODD)																
COURSE :		AGRICULTURAL PRODUCT CHEMISTRY(3 SKS)																
ROOMG :		RK C1104																
LECTURERS :		PROF. DR. IR. BASUNI HAMZAH, M.SC. / PROF. IR. FILLI PRATAMA, M.SC., (HONS.), PH.D / SUGITO, S.TP., M.SI.																
SCHEDULE :		TUESDAY (07:30 - 09:10 WIB)																
ASSESSMENT																		
NO.	STUDENT ID	NAME	PRAC	ASSIGNMENT	EVALUATION 1	EVALUATION 2	EVALUATION 3	PRAC	ASSIGNMENT	EVALUATION 1	EVALUATION 2	EVALUATION 3	NTR	NUTS	NUAS	Final Score	Grade	Over all Assessment
1	05031182025001	NYIMAS SINTA SATIA	97	93	86	95	100	Achieved	Achieved	Achieved	Achieved	Achieved	95	86	98	94	A	Achieved
2	05031282025042	ALIFIA ANGGRAINI	95	95	90	92.5	100	Achieved	Achieved	Achieved	Achieved	Achieved	95	90	96	94	A	Achieved
3	05031381722067	SURYO SUGONDO ADI PRASETYO	97	93	90	94.5	97	Achieved	Achieved	Achieved	Achieved	Achieved	95	90	96	94	A	Achieved
4	05031381722079	MUHAMMAD IHYAN NURRAHMAN	96	90	88	92.5	95	Achieved	Achieved	Achieved	Achieved	Achieved	93	88	94	92	A	Achieved
5	05031381823057	M SYHRUL GUNAWAN	95	97	90	92.5	100	Achieved	Achieved	Achieved	Achieved	Achieved	96	90	96	95	A	Achieved
6	05031381823058	MUHAMMAD ATHIEF GHUFRAN	95	93	90	90	100	Achieved	Achieved	Achieved	Achieved	Achieved	94	90	95	94	A	Achieved
7	05031381823060	FIRZA FAHLEFFI SUHARTO	94	93	88	92.5	100	Achieved	Achieved	Achieved	Achieved	Achieved	93	88	96	93	A	Achieved
8	05031381823061	YOSAVAT TAMARO NAINGGOLAN	93	95	90	87.5	100	Achieved	Achieved	Achieved	Achieved	Achieved	94	90	94	93	A	Achieved
9	05031381823065	WIJI LESTARI	94	95	90	94.5	92	Achieved	Achieved	Achieved	Achieved	Achieved	94	90	93	93	A	Achieved
10	05031381823073	MEIKA TRIYA ANDANI	95	89	95	97.5	90	Achieved	Achieved	Achieved	Achieved	Achieved	92	95	94	93	A	Achieved
11	05031381823078	AYU SEPTIANA	98	90	88	90	90	Achieved	Achieved	Achieved	Achieved	Achieved	94	88	90	91	A	Achieved
12	05031382025063	MUHAMMAD ALIF MUFLIH	98	93	84	90	100	Achieved	Achieved	not achieved	Achieved	Achieved	96	84	95	93	A	Achieved
13	05031382025064	VALLENTIA PIDI ARTA MULIA	91	94	88	89	99	Achieved	Achieved	Achieved	Achieved	Achieved	93	88	94	92	A	Achieved
14	05031382025065	FERDINANTRI AKBAR	98	93	80	87	97	Achieved	Achieved	not achieved	Achieved	Achieved	95	80	92	91	A	Achieved
15	05031382025067	MUHAMMAD DAVID ALFARISI	92	91	75	90	90	Achieved	Achieved	not achieved	Achieved	Achieved	91	75	90	88	A	Achieved
16	05031382025069	HANIFAH AULIA ANALYRA	96	94	75	90	100	Achieved	Achieved	not achieved	Achieved	Achieved	95	75	95	91	A	Achieved
17	05031382025070	RICKY RIKARDO	92	92	86	85	100	Achieved	Achieved	Achieved	not achieved	Achieved	92	86	93	91	A	Achieved
18	05031382025072	YOHANNES MANIK	93	90	90	90	90	Achieved	Achieved	Achieved	Achieved	Achieved	92	90	90	91	A	Achieved
19	05031382025074	YUNI SARA MARISYAH	97	92	80	97.5	90	Achieved	Achieved	not achieved	Achieved	Achieved	94	80	94	91	A	Achieved
20	05031382025076	ANNISA NUR SAFIRA WIJAYA	98	95	90	90	95	Achieved	Achieved	Achieved	Achieved	Achieved	96	90	93	94	A	Achieved
21	05031382025077	VICKY RIFANSYA	89	94	90	87.5	100	Achieved	Achieved	Achieved	Achieved	Achieved	91	90	94	92	A	Achieved
22	05031382025078	HIDAYATULLAH	91	92	95	90	95	Achieved	Achieved	Achieved	Achieved	Achieved	91	95	93	93	A	Achieved
23	05031382025080	AISYAH NURLIANI	89	93	88	97.5	90	Achieved	Achieved	Achieved	Achieved	Achieved	91	88	94	92	A	Achieved
24	05031382025081	FARHAN MUHARAM	92	92	86	95	95	Achieved	Achieved	Achieved	Achieved	Achieved	92	86	95	92	A	Achieved
25	05031382025083	RADNA SEKAR KUSUMA NINGRUM	89	93	90	80	100	Achieved	Achieved	Achieved	not achieved	Achieved	91	90	90	90	A	Achieved
26	05031382025085	MUHAMMAD FARHAN	91	90	80	90	90	Achieved	Achieved	not achieved	Achieved	Achieved	91	80	90	88	A	Achieved
27	05031382025089	ANNISA KHALA NABILLAH	91	95	92	78	98	Achieved	Achieved	Achieved	not achieved	Achieved	93	92	88	91	A	Achieved
28	05031382025091	INTAN NOVALIA	87	90	90	87.5	90	Achieved	Achieved	Achieved	Achieved	Achieved	89	90	89	89	A	Achieved
29	05031382025098	FIKRI NAUFALDY DANANJAYA	92	94	90	92.5	100	Achieved	Achieved	Achieved	Achieved	Achieved	93	90	96	94	A	Achieved
30	05031382025099	KHAIDIR ALI	86	87	75	82	90	Achieved	Achieved	not achieved	not achieved	Achieved	86	75	86	84	B	not achieved
<b>AVERAGES PER CLASS=</b>			<b>93</b>	<b>93</b>	<b>87</b>	<b>90</b>	<b>96</b>									<b>92</b>		
<b>ACHIEVEMENT=</b>			<b>Achieved</b>	<b>Achieved</b>	<b>Achieved</b>	<b>Achieved</b>	<b>Achieved</b>	<b>30 students achieved</b>	<b>30 students achieved</b>	<b>23 students achieved</b>	<b>26 students achieved</b>	<b>30 students achieved</b>					<b>Achieved</b>	
								<b>100.00%</b>	<b>100.00%</b>	<b>76.67%</b>	<b>86.67%</b>	<b>100.00%</b>						
There were 1 student out of 30 students got Grade B																		

**NTR = 20% PRAC + 20% ASSIGNMENT**

**NUTS = 20% EVALUATION I**

**NUAS = 20% EVALUATION II + 20% EVALUATION III**

**INDERALAYA CLASS**

**VERY SATISFACTORY = 96.67%**

STUDY PROGRAM :		AGRICULTURAL PRODUCT TECHNOLOGY																
ACADEMIC YEAR :		2021/2022 (ODD)																
COURSE :		AGRICULTURAL PRODUCT CHEMISTRY(3 SKS)																
ROOMG :		RK C1104																
LECTURERS :		PROF. DR. IR. BASUNI HAMZAH, M.SC. / PROF. IR. FILLI PRATAMA, M.SC., (HONS.), PH.D / SUGITO, S.TP., M.SI.																
SCHEDULE :		TUESDAY (07:30 - 09:10 WIB)																
													<b>ASSESSMENT</b>					
NO.	STUDENT ID	NAME	PRAC	ASSIGNMENT	EVALUATION 1	EVALUATION 2	EVALUATION 3	PRAC	ASSIGNMENT	EVALUATION 1	EVALUATION 2	EVALUATION 3	NTR	NUTS	NUAS	Final Score	Grade	Over all Assessment
1	05031082122004	ERI NAFISAH	89	90	90	97.5	95	Achieved	Achieved	Achieved	Achieved	Achieved	89	90	96	92	A	Achieved
2	05031181823005	TOBY AGUSTINO	93	88	70	85	83	Achieved	Achieved	not achieved	not achieved	not achieved	91	70	84	84	B	not achieved
3	05031181823007	M. ALDI SURYAWAN	95	92	80	85	93	Achieved	Achieved	not achieved	not achieved	Achieved	94	80	89	89	A	Achieved
4	05031181823012	ABDI RIDHOANSYAH	91	87	80	85	83	Achieved	Achieved	not achieved	not achieved	not achieved	89	80	84	85	B	not achieved
5	05031181823013	AIDIL FITRA RAMADHAN	91	94	88	96.5	94	Achieved	Achieved	Achieved	Achieved	Achieved	93	88	95	93	A	Achieved
6	05031181823091	FEBRI MAYANG SARI	94	93	88	90.5	93	Achieved	Achieved	Achieved	Achieved	Achieved	94	88	92	92	A	Achieved
7	05031182025002	REVI RIANI	96	96	90	91	96	Achieved	Achieved	Achieved	Achieved	Achieved	96	90	94	94	A	Achieved
8	05031182025003	PUTRI WULAN DARI	94	95	95	87.5	100	Achieved	Achieved	Achieved	Achieved	Achieved	94	95	94	94	A	Achieved
9	05031182025004	VIONITA SEPTRIANI	92	91	90	90.5	98	Achieved	Achieved	Achieved	Achieved	Achieved	92	90	94	92	A	Achieved
10	05031182025005	ERIKA NANDA SYOFIANTI	86	85	88	93	98	Achieved	not achieved	Achieved	Achieved	Achieved	86	88	96	90	A	Achieved
11	05031182025006	NOFIANTO	94	98	90	87.5	100	Achieved	Achieved	Achieved	Achieved	Achieved	96	90	94	94	A	Achieved
12	05031182025007	HENI MARICO	94	90	90	91.5	99	Achieved	Achieved	Achieved	Achieved	Achieved	92	90	95	93	A	Achieved
13	05031182025008	CELCILIA ASRI PUTRI	98	92	86	90	95	Achieved	Achieved	Achieved	Achieved	Achieved	95	86	93	92	A	Achieved
14	05031182025009	FADILLA FEBRIANI	88	88	80	87.5	100	Achieved	Achieved	not achieved	Achieved	Achieved	88	80	94	89	A	Achieved
15	05031182025010	FRISKA AZAHRA	87	90	80	99	94	Achieved	Achieved	not achieved	Achieved	Achieved	89	80	97	90	A	Achieved
16	05031182025011	ANJELITA PRAMUDIA	83	80	90	92.5	100	not achieved	not achieved	Achieved	Achieved	Achieved	81	90	96	89	A	Achieved
17	05031182025012	HIS ARISKA	82	81	80	90	90	not achieved	not achieved	not achieved	Achieved	Achieved	82	80	90	85	B	not achieved
18	05031182025013	ELIZA DWI PUTRI	97	94	88	87.5	100	Achieved	Achieved	Achieved	Achieved	Achieved	95	88	94	93	A	Achieved
19	05031182025014	ANA AMINAH	97	95	95	87.5	100	Achieved	Achieved	Achieved	Achieved	Achieved	96	95	94	95	A	Achieved
20	05031182025015	HANA OKTARIYANI	87	93	95	97.5	90	Achieved	Achieved	Achieved	Achieved	Achieved	90	95	94	92	A	Achieved
21	05031182025016	DELI SARTIKA	94	92	88	100	95	Achieved	Achieved	Achieved	Achieved	Achieved	93	88	98	94	A	Achieved
22	05031182025017	FERI NURMALA SARI	83	86	95	99	89	not achieved	not achieved	Achieved	Achieved	Achieved	84	95	94	90	A	Achieved
23	05031182025018	CICI AMBARWATI	83	85	90	90	95	not achieved	not achieved	Achieved	Achieved	Achieved	84	90	93	89	A	Achieved
24	05031281823022	RIYAN WAHYUDI	87	89	95	97.5	90	Achieved	Achieved	Achieved	Achieved	Achieved	88	95	94	92	A	Achieved
25	05031281823035	FRAMIDA	93	90	95	94.5	92	Achieved	Achieved	Achieved	Achieved	Achieved	92	95	93	93	A	Achieved
26	05031281823038	ILHAM AKBAR MUALIM	93	95	90	96	91	Achieved	Achieved	Achieved	Achieved	Achieved	94	90	94	93	A	Achieved
27	05031281823083	ANDRIAN AGUSTA	85	91	80	89	99	not achieved	Achieved	not achieved	Achieved	Achieved	88	80	94	89	A	Achieved
28	05031281823094	NUR AINI AGUSTIN	93	94	80	87.5	100	Achieved	Achieved	not achieved	Achieved	Achieved	93	80	94	91	A	Achieved
29	05031282025019	SANTANIA ALDITA KABAN	90	92	90	99.5	92	Achieved	Achieved	Achieved	Achieved	Achieved	91	90	96	93	A	Achieved
30	05031282025020	DELIA MAHARANI	90	87	95	99	89	Achieved	Achieved	Achieved	Achieved	Achieved	88	95	94	92	A	Achieved
31	05031282025021	MUHAMMAD RIZQI LIOGA PUTRA	88	88	90	92.5	100	Achieved	Achieved	Achieved	Achieved	Achieved	88	90	96	92	A	Achieved
32	05031282025022	KRISNA RAMADHAN	97	93	88	78	98	Achieved	Achieved	Achieved	not achieved	Achieved	95	88	88	91	A	Achieved
33	05031282025023	SHAKIRA ALFISYAH RINI	92	92	88	91.5	94	Achieved	Achieved	Achieved	Achieved	Achieved	92	88	93	91	A	Achieved
34	05031282025024	M. FADLY WAHYUDHI	95	92	88	90.5	98	Achieved	Achieved	Achieved	Achieved	Achieved	93	88	94	93	A	Achieved
35	05031282025025	PANI ISMIRA	94	88	88	87.5	100	Achieved	Achieved	Achieved	Achieved	Achieved	91	88	94	91	A	Achieved
36	05031282025026	NYAYU FITHRIAH AL KAMILAH	97	95	90	87.5	100	Achieved	Achieved	Achieved	Achieved	Achieved	96	90	94	94	A	Achieved
37	05031282025027	WILLY PERDANA	87	85	80	82	88	Achieved	not achieved	not achieved	not achieved	Achieved	86	80	85	84	B	not achieved
38	05031282025028	WIDYA ADENINGRUM	95	91	90	92.5	100	Achieved	Achieved	Achieved	Achieved	Achieved	93	90	96	94	A	Achieved
39	05031282025029	GRESSI PAKPAHAN	87	86	95	97.5	90	Achieved	Achieved	Achieved	Achieved	Achieved	86	95	94	91	A	Achieved
40	05031282025030	ELA ROSWASTI ANGELIA SYEBA GINTING	94	90	90	87.5	100	Achieved	Achieved	Achieved	Achieved	Achieved	92	90	94	92	A	Achieved
41	05031282025031	DIAN KURNIATI	89	87	90	99.5	92	Achieved	Achieved	Achieved	Achieved	Achieved	88	90	96	91	A	Achieved
42	05031282025032	JIHAN PUTRI NABILA	91	86	88	89	99	Achieved	Achieved	Achieved	Achieved	Achieved	89	88	94	91	A	Achieved

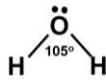




Samples of course materials in Power Point Slides

Week 1	
<p style="text-align: center;"><b>Kimia Hasil Pertanian</b> <b>(Agricultural Products Chemistry)</b> <b>PTH 103217</b></p> 	<p style="text-align: center;"><b>Information and Course Contracts</b></p> <ul style="list-style-type: none"> <li>• Subject Co-Ordinator : Prof. Dr. Ir. Basuni Hamzah, M.Sc.</li> <li>• Team Members : Prof. Ir. Filli Pratama, M.Sc.(Hons), Ph.D Sugito, S.TP., M.Si.</li> <li>• Lecturing Classes : 16 meetings</li> <li>• Practical/Lab Classes : 7 meetings</li> <li>• Attendance : at least 14 out of 16 meetings (=&gt;85%)</li> <li>• Assessment : Quiz (10%); Assignment (25%); Mid- Term (20%), Final Exam (20%); Assignment (25%)</li> </ul>
<p><b>What are Agricultural Products?</b></p> 	<p><b>What is Agricultural Product Chemistry?</b></p> <ul style="list-style-type: none"> <li>▶ The study of chemistry in the agricultural products- production, processing, storage</li> </ul> 
<p><b>Major components:</b></p> <ul style="list-style-type: none"> <li>▶ Water</li> <li>▶ Carbohydrate</li> <li>▶ Fat</li> <li>▶ Protein</li> </ul> <p><b>Minor components:</b></p> <ul style="list-style-type: none"> <li>▶ Vitamins</li> <li>▶ Minerals</li> <li>▶ Bioactive components</li> </ul>	<p><b>Questions:</b></p> <ul style="list-style-type: none"> <li>▶ The benefits of learning APC?</li> <li>▶ Discuss about its application in processing, storage.</li> <li>▶ What kind of damaging process occur in your daily observation? What do you think about the reaction might occur?</li> <li>▶ How do you retard the damaging process?</li> <li>▶ What do you think about the external factor that can accelerate the reaction in agricultural products?</li> </ul>
Week 2	
<p style="text-align: center;"><b>KARAKTERISTIK AIR</b></p> <p>Komponen AIR merupakan komponen yang utama pada pangan</p> <p>Sebagai contoh:</p> <ul style="list-style-type: none"> <li>Daging (65-75%)</li> <li>Susu cair (87%)</li> <li>Buah/sayuran (70-90%)</li> <li>Roti Tawar (35%)</li> <li>Madu (20%)</li> <li>Mentega (16-18%)</li> <li>Tepung (12-14%)</li> <li>Susu bubuk (4%)</li> <li>Minyak goreng (0%)</li> </ul>	

Sangat elektro negatif dan tidak berpasangan



Berbentuk Tetrahedral

- ▶ Oksigen lebih elektronegatif daripada atom hidrogen yang memungkinkan elektron ikatan polar menghabiskan lebih banyak waktu lebih dekat ke sisi oksigen molekul.
- ▶ Sisi oksigen menjadi lebih negatif, dan atom hidrogen memiliki muatan sedikit positif. Ini membentuk molekul polar.

### WATER PROPERTIES

Water exists in every agricultural product

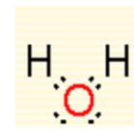
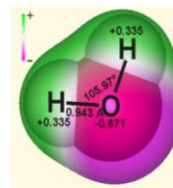
It is available in small or substantial amount.

Water affects the physical, chemical and microbiological properties of products

GIVE SOME EXAMPLES FOR THE ABOVE STATEMENTS

### Water Molecule Structure

V-Shaped



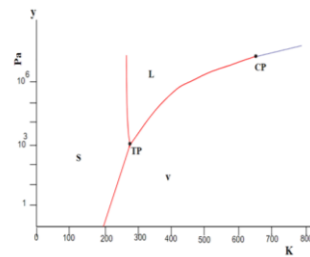
O-H covalent Bond

Molecular diameter 2.75 Angstrom

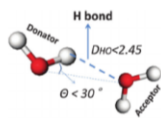
(Source: Chaplin, 2020)

### WATER IS UNIVERSAL SOLVENT, IT'S PROPERTIES ARE:

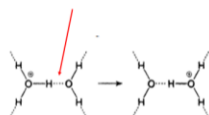
- Molar Mass: 18.01528
- Density: 1000 kg/m<sup>3</sup>
- Melting point: 0°C
- Boiling point: 99.98°C
- Viscosity: 0.001 Pas at 20oC]Crystal structure; Hexagonal
- Molecule shape: BENT
- Dipole Moment: 1.85D



Phase Diagram of Water



Hydrogen Bridges



Source: Dongshuai et al. (2015); Belitz et al. (2009).

### What is Coordination Number (CN)?

- The number of water molecules arranged in an orderly fashion around each water molecule
- An increase in CN----increases density, an increase in distance between the nearest neighbors decreases the density.

Coordination Number and distance between two water molecules:

	Coordination number	O-H...O Distance
Ice (0 °C)	4	0.276 nm
Water (1.5 °C)	4.4	0.290 nm
Water (83 °C)	4.9	0.305 nm

Source: Belitz et al. (2009).

Questions:

- How to determine water in a product?
- What are the effects of reducing and increasing water content in a product?
- How to control and maintain the desired amount of water content in a product?

GIVE YOUR SHORT ANSWERS

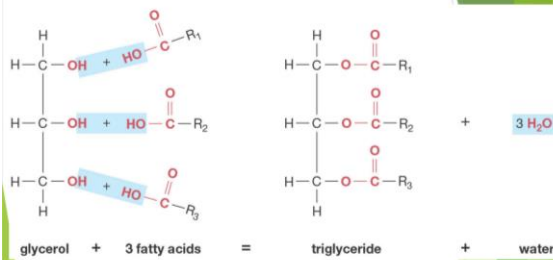
### Week 3

## FAT OR LIPIDS

By: Filly Pratama

### What is Fat?

- ▶ Fats are large molecules made up of elements - Carbon, Hydrogen, Oxygen.
- ▶ Oils and fats are made up of more than one component : Glycerol and Fatty acids.
- ▶ Glycerol is a 3 carbon molecule each with a hydroxyl group (-OH). This 3 carbon molecule forms the backbone of fat molecule.
- ▶ Fatty acids are long chains with only carbon and hydrogen in a chain and at the end there will be another group, carboxyl group (-COOH)



### Major function of Fats:

- ▶ 1) Source of energy for body.
- ▶ 2) For fats soluble vitamins (A, D, E and K) to dissolve.

**SOURCE OF FATS/OILS?** → Plants and Animals

**What is the difference between fat and oil?**

Where is oil located in Plants?

How to extract oil?

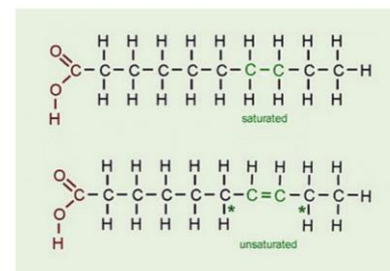
Please give the answers?

### Types of Fats: Based on some properties

- ▶ Saturation/presence or absence of double bonds (saturated and unsaturated)
- ▶ Source of fat (plant and animals)
- ▶ Dietary requirement (Essential or non essential)

**SATURATED FATTY ACID = Asam Lemak Jenuh**  
**UNSATURATED FATTY ACID = Asam Lemak Tak Jenuh**

How about the properties of saturated and unsaturated fatty acids?



Saturated and Unsaturated Fatty Acids

<p><b>Some physical properties of fat and oil:</b></p> <ul style="list-style-type: none"> <li>▶ Mostly Colorless, Odorless and Tasteless (Cenderung TIDAK BERWARNA, TIDAK BERBAU dan TIDAK BERASA) for freshly extracted oil (yang baru diekstrak).</li> <li>▶ Specific gravity &lt;1 (berat jenis kurang dari 1).</li> <li>▶ Insoluble in water but soluble in organic solvent</li> </ul>	<p><b>Some chemical properties of fat and oil:</b></p> <ul style="list-style-type: none"> <li>▶ Hydrolysis</li> <li>▶ Saponification</li> <li>▶ Halogenation</li> <li>▶ Oxidation</li> </ul> <p>Hydrolysis and Oxidation produce unpleasant odor</p> <p style="text-align: center;">↓</p> <p style="text-align: center;"><b>RANCIDITY (KETENGIKAN)</b></p>
<p><b>How to prevent rancidity?</b></p> <ul style="list-style-type: none"> <li>▶ Keeping fats or oils in well-closed containers.</li> <li>▶ Avoid from catalysts (lead and copper)</li> <li>▶ Add anti-oxidant to prevent rancidity.</li> </ul>	<p><b>How to determine quality of FAT/OIL?</b></p> <ul style="list-style-type: none"> <li>▶ Iodine number (bilangan Iodine)</li> <li>▶ Acids number (Bilangan asam)</li> <li>▶ Peroxides value (Bilangan peroksida)</li> </ul>

**Samples of Assignment:**

<p><i>Effect of Moisture Content On The Viscosity of Honey at Different Temperatures</i> (Pengaruh Kadar Air Pada Visikositas Madu)</p> <p style="text-align: center;"><b>KELOMPOK 3</b></p> <p>Nur Bunga Fatimah (05031182126012) Felycha Alamanda (05031182126013) Nanda Mahashil (05031182126015) Cindy Amalia Putri (05031182126016) Shynta Aprilia (05031182126017)</p>	<p>Metode yang digunakan yaitu mengukur kadar air sampel dengan refraktometer digital ABBE WAY-IS.</p> <p>Cara kerjanya dengan : jumlah air suling yang diperlukan, ditentukan oleh keseimbangan massa, ditambahkan ke setiap sampel untuk menyesuaikan kadar airnya dengan nilai yang telah ditentukan yaitu 17%, 19% dan 21%.</p>
<p><b>PEMBAHASAN</b></p> <p>Viskositas madu dipengaruhi oleh suhu, kadar air, serta keberadaan kristal dan koloid dalam produk. Berbagai peneliti telah mempelajari viskositas madu sebagai fungsi suhu pada kadar air tertentu. Kadar air madu tergantung pada kondisi lingkungan dan manipulasi dari peternak lebah pada saat panen. Hal ini dapat bervariasi dari tahun ke tahun. Kadar air yang tinggi dapat mempercepat kristalisasi pada jenis madu tertentu dan bisa meningkatkan aktivitas airnya ke nilai di mana ragi tertentu dapat tumbuh.</p> <p><b>KESIMPULAN</b></p> <p>Energi aktivasi menurun seiring dengan meningkatnya kadar air yang menunjukkan bahwa viskositas madu lebih sensitif terhadap perubahan suhu pada kadar air rendah.</p>	<p style="text-align: center;"><b>KELOMPOK 11</b></p> <p>1. Ragil Hadi Nugroho (05031282126055) 2. Afiyah Putri Kinanti (05031282126056) 3. Elsa Febrantia (05031282126057) 4. Dini Nuraini (05031282126058) 5. Amrina Rosyada (05031282126059)</p> <p style="text-align: center;">Pengaruh Air pada Sifat Caking dari Berbagai Jenis Tepung Terigu (<i>Effect of Water on The Caking Properties of Different Types of Wheat Flour</i>)</p> <p style="text-align: right;"><b>KIMIA HASIL PERTANIAN</b></p>



### Examples of Questions

<p>15.23 * Wajib</p> <p><b>PILIH LAH SATU JAWABAN YANG BENAR</b></p> <p>ADA 25 SOAL</p> <p>Menurut Perka BPOM No 36 tahun 2013, ada beberapa jenis asam sorbat yang penggunaannya diperbolehkan di Indonesia, 4 jenis tersebut adalah.. * 2 poin</p> <ul style="list-style-type: none"> <li><input type="radio"/> Asam sorbat, Natrium sorbat, Kalium sorbat, Kalsium sorbat</li> <li><input type="radio"/> Asam sorbat, Natrium sorbat, Magnesium sorbat, Kalsium sorbat</li> <li><input type="radio"/> Asam sorbat, Boronium sorbat, Kalium sorbat, Kalsium sorbat</li> <li><input type="radio"/> Asam sorbat, Natrium sorbat, Kalium sorbat, Trisodium sorbat</li> </ul> <p>Dalam dunia flavor ada istilah astringensi. Apa yang dimaksud dalam istilah tersebut? * 4 poin</p> <ul style="list-style-type: none"> <li><input type="radio"/> Citarasa yang ditimbulkan oleh rasa kelat atau kesat dimulut, akibat adanya denyawa polifenol atau protein yang bereaksi dengan cairan saliva</li> <li><input type="radio"/> Cita rasa yang disebabkan oleh adanya</li> </ul>	<p><b>CHOOSE THE CORRECT ANSWER</b></p> <p>There are 25 questions</p> <p>According to Perka BPOM No. 36 year 2013, how many kinds of sorbate acid that are allowed to be applied in food in Indonesia, the 4 kinds are:</p> <ul style="list-style-type: none"> <li><input type="radio"/> Sorbic acid, Natrium o Sorbic, Kalium Sorbic, Calcium Sorbic</li> <li><input type="radio"/> Sorbic acid, Natrium Sorbic, Magnesium Sorbic, Calcium Sorbic</li> <li><input type="radio"/> Sorbic acid, Boronium Sorbic, Kalium Sorbic, Calcium Sorbic</li> <li><input type="radio"/> Sorbic acid, Natrium Sorbic, Kalium Sorbic, Trisodium Sorbic</li> </ul>
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15.23

78%

Berikut disajikan teori tentang asam sorbat, pilih satu jawaban yang tidak tepat..... \* 4 poin

- Asam sorbat memiliki aktivitas optimum diatas pH 6,5
- Nilai ADI asam sorbat berkisar antara 0-0,25 mg/Kg BB
- Maksimum level asam sorbet berbeda-beda, tergantung pada jenis produk yang diawetkan
- Asam sorbat lebih cocok digunakan untuk mengawetkan produk daging dibandingkan dengan produk cair

Dibawah ini disajikan teori mengenai dry powder coating. Dari teori tersebut, pilih satu jawaban yang salah..... \* 5 poin

- Dilakukan coating dimana sisa minyak pada permukaan produk memudahkan menempelkan bumbu pada snack.
- Flavour atau bumbu berbentuk serbuk kering, biasanya digunakan untuk produk makanan ringan
- Kandungan minyaknya lebih tinggi dari metode oil slurry coating
- Bahan utamanya berupa tepung sebagai carier yang berfungsi sebagai pengikat top notes.

The following is a theory about sorbic acid, choose an incorrect answer:

- Sorbic acid has optimum activity at above pH pf 6.5
- The ADI value of Sorbic acid is in the range of 0-0.25 mg/Kg body weight
- The maximum level of Sorbic acid is different which depend on the product to be preserved
- Sorbic acid is more suitable for preserving meat products than liquid product.

The following is the theory on the dry powder coating. Choose one incorrect answer:

- residual oil on the surface of the product makes it easier for spicy dry powder coating to stick to the product
- The powdery of flavor or spices are used for snack products
- The oil content is higher than the oil slurry coating method
- The major ingredient of flour as carrier has the function of binding the upper materials

<p>15.23      78%</p> <p>Seorang peneliti akan membuat flavor * 4 poin tiruan bekasam. Yang dilakukannya adalah melakukan analisa bahan- bahan penyusun bekasam, baik bahan yang berupa asam lemak, karbohidrat, protein dan senyawa volatile. Penelitian dilakukan secara detil untuk mendapatkan komposisi lengkap senyawa penyusun flavor. Setelah didapat data lengkapnya sang peneliti kemudian mulai mencampurkan bahan-bahan yang sama, tetapi diperoleh dari senyawa- senyawa kimia murni. Pendekatan seperti ini dikenal dengan metode...</p> <p><input type="radio"/> Metode tradisional</p> <p><input type="radio"/> Metode ilmiah</p> <p><input type="radio"/> Metode campuran</p> <p><input type="radio"/> Metode praktis</p> <p>Berikut disajikan teori tentang asam * 4 poin sorbit, pilih satu jawaban yang tidak tepat.....</p> <p><input type="radio"/> Asam sorbit memiliki aktivitas optimum diatas pH 6,5</p> <p><input type="radio"/> Nilai ADI asam sorbit berkisar antara 0- 0,25 mg/Kg BB</p> <p>     </p>	<p>A researcher would like make a bekasam like-flavorant. The researcher analyzed the content of fatty acid, carbohydrate, protein and volatile compounds. The experiment was carried out in detail to obtain the flavor compound. After collecting the data, the researcher started to mix all of the components in the pure form. That kind of experiment is known as :</p> <ul style="list-style-type: none"> <li>○ Traditional method</li> <li>○ Scientific method</li> <li>○ Mixing method</li> <li>○ Practical method</li> </ul>
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**Percentage of CLO Achievement per Class****CLASS: PALEMBANG**

No.	Evaluation	Weight (%)	Score	CLO1	CLO2	CLO3	CLO4	Level of achievement
1	Assignment	20	93	100%	100%	100%	100%	Very Satisfactory
2	Evaluation I	20	87	76.67%	76.67%	76.67%		Satisfactory
3	Evaluation II	20	90	86.67%	86.67%	89.16%	86.67%	Very Satisfactory
4	Evaluation III	20	96		100%	93.88%	93.88%	Very Satisfactory
5	Lab Practicum	20	93		100%	90.36%	90.36%	Very Satisfactory

**CLASS: INDERALAYA**

No.	Evaluation	Weight (%)	Score	CLO1	CLO2	CLO3	CLO4	Level of achievement
1	Assignment	20	90	81.93%	81.93%	81.93%	81.93%	Very Satisfactory
2	Evaluation I	20	88	80.72%	80.72%	80.72%		Very Satisfactory
3	Evaluation II	20	91	89.16%	89.16%	89.16%	89.16%	Very Satisfactory
4	Evaluation III	20	95		93.88%	93.88%	93.88%	Very Satisfactory
5	Lab Practicum	20	90		90.36%	90.36%	90.36%	Very Satisfactory