Appended Form 1

Specifications for Major Program

Name of School (Program)〔School of Engineering Cluster 3(Applied Chemistry, Biotechnology and Chemical Engineering)〕

things multilaterally from a global perspective, the ability to pursue self-development, and creative powers beyond the above knowledge frameworks so that the graduates of this Program can play an full active role in the real world. With many graduates going on to the Pre-
Program to graduate school education is fully taken into account.

Graduates from this Program are employed mainly by chemicals manufacturers, in such fields as chemistry, fibers, and pharmaceuticals, as well as industrial fields related to electricity, machines, metal, and the environment, and are playing an active role inside and outside of Japan, utilizing the abilities they acquired in this Program.

3.Diploma policies (degree conferment policy & program attainment goals)

The Program of Applied Chemistry shall develop human resources who have acquired basic knowledge, skills, and attitude as professional chemical engineers, and who can demonstrate scientific thinking and creative power.

This Program shall confer a bachelor degree (engineering) on students who have acquired the standard number of credits prescribed in the curriculum and attained the goals described below.

This Program adopts (Ka) ~ (Ko) as attainment goal. The goal of this Program from program registration to graduation is for students to cultivate the basic essentials required of an engineer/researcher, including creative powers and communication skills, as well as expertise related to applied chemistry.

(Ka) To acquire reliable basic knowledge,
(Ki) To acquire the maturity to fulfill their social responsibilities as an engineer,
(Ku) To acquire creative power and design ability,
(Ke) To become independent as a researcher & engineer through continuous self-development, and
(Ko) To acquire communication skills and an international outlook.

Attainment goals from (Ka) to (Ko) shall be achieved by completing the class subjects set for each goal. The content of each attainment goal is as follows:

(Ka) To acquire reliable basic knowledge

Students will acquire a broad basic knowledge and basic specialized knowledge of chemistry in the Liberal Arts Education and Specialized Education as well as advanced expertise in applied chemistry, and will acquire conceptual skills based on logical thinking supported by their acquired knowledge.

(Ki) To acquire the maturity to fulfill their social responsibilities as an engineer

To contribute to society through research and technologies, students will acquire the maturity required to fulfill their responsibilities as a researcher/engineer. To do this, they should cultivate their understanding of technologies and the effect of these technologies on society, acquire knowledge of economy, safety, and reliability of technology, and to acquire judgment in utilizing the acquired knowledge from a global perspective.

(Ku) To acquire creative power and design ability

Students will acquire the creative power required to solve diverse problems related to applied chemistry using the acquired knowledge and technologies. They will also develop a sense of ethics as

recognized by society, and design skills in research and development, so that they can demonstrate their problem-solving abilities as a researcher/engineer.

(Ke) To become independent as a researcher & engineer through continuous self-development

Students will devise their own methods of information collection, technological improvement, improvement of research methods, analysis and understanding of research results and achievements, in addition to developing their own ability to continue to learn, and actively engage as an independent researcher or engineer, developing the attitude required to make multidimensional approaches toward solving problems.

(Ko) To acquire communication skills and an international outlook

Students will cultivate the ability to make logical descriptions, give presentations, and hold discussions, as well as the ability to collect and convey information from an international perspective. They will simultaneously acquire the international outlook required to handle problems from a global perspective.

4.Curriculum policies (policies for organizing & providing curricula)

To achieve the goals of this Program, after acquiring basic academic abilities and knowledge in Liberal Arts Education Subjects, students are required to study specialized fields in engineering and chemistry. This Program offers a curriculum in which students will take Liberal Arts Education Subjects up to the first semester of the second year, and after being assigned to this Program at the second semester of the second year, they will take Specialized Subjects.

The distinguishing feature of this curriculum is that it classifies Specialized Basic Subjects as a common Basic the second semester of their first year, at an early time after admission. While allowing new students to take Specialized Basic Subjects, their awareness of their own specialized fields and motivation for study will be enhanced, and this

lectures by faculty members in programs other than Applied Chemistry (Chemical Engineering and Biotechnology).

The following describes the program system consisting of liberal arts education subjects and specialized education subjects which will enable students to achieve the targets from (Ka) to (Ko). Academic achievement is evaluated based on the grade scores for subjects and the level of achievement against the target defined for the educational program.

・Broad basic knowledge of the liberal arts and specialized education subjects, together with basic expertise in chemistry (achievement target (Ka)). Students acquire this knowledge and expertise while taking liberal arts subjects provided in the 1st and 2nd years such as "Introduction to University Education" and "Introductory Seminar for First-Year Students", area courses and information subjects, Foundation Courses such as "Calculus I"; specialized basic subjects such as "Basic Organic Chemistry I " and "Basic Inorganic Chemistry ", and specialized subjects provided in the 3rd and 4th terms of the 2nd year; and in the 3rd year; such as "Advanced Organic Chemistry I" and "Inorganic Chemistry"

・Advanced expertise in applied chemistry (achievement target (Ka)). Students acquire this expertise while taking specialized basic subjects provided in the 1st year; and in the 1st and 2nd terms of the 2nd year; such

as "Physical Chemistry I" and "Analytical Chemistry", specialized subjects provided in the 3rd and 4th terms of the 2nd year; and in the 3rd year; such as "Synthetic Polymer Chemistry" and "Physical Chemistry II", and preparation of the "Graduation Thesis" in the 4th year.

・Creativity, based on logical thinking together with basic knowledge and expertise (achievement target (Ka)). Students acquire this ability while taking specialized basic subjects provided in the 1st year; and in the 1st and 2nd terms of the 2nd year; such as "Physical Chemistry I", specialized subjects provided in the 3rd and 4th terms of the 2nd year; and in the 3rd year; such as "Chemical Experiments I" and "Chemical Experiments II", and preparation of the "Graduation Thesis" in the 4th year.

◯ Abilities & skills

・The qualities required for understanding the effect of science and technology on society, and for taking responsibility for making a contribution to society as researchers or technicians (achievement target (Ki)). Students acquire these qualities while taking liberal arts education subjects such as "Introductory Seminar for First-Year Students" and area courses that are provided in the 1st year, "Basic Experiments in Chemistry" provided as a specialized basic subject in the 3rd and 4th terms of the 2nd year, "Engineering and Ethics" provided as a specialized subject in the 4th year, and preparation of the "Graduation Thesis"

・Knowledge of areas such as economics, and the safety and reliability of technology, as well as the ability to utilize this knowledge in making judgments from a global point of view (achievement target (Ki)). Students acquire these qualities while taking liberal arts education subjects such as " Introductory Seminar for First-Year Students" and area courses that are provided in the 1st year, " Basic Experiments in Chemistry" provided as a specialized basic subject in the 3rd and 4th terms of the 2nd year, "Engineering and Ethics" provided as a specialized subject in the 4th year, and preparation of the "Graduation Thesis."

・A creative way of thinking that makes it possible to use the acquired knowledge and skills to solve various problems related to applied chemistry (achievement target (Ku)). Students acquire this ability while taking liberal arts education subjects such as "Introductory Seminar for First-Year Students" and area courses that are provided in the 1st and 2nd year, specialized subjects provided in the 3rd year such as "Chemical Experiments I" and "Chemical Experiments II", and preparation of the "Graduation Thesis" in the 4th year.

・The ethics required for exercising problem-solving abilities as researchers or technicians, as well as a capability for designing research and development (achievement target (Ku)). Students acquire these qualities while taking area courses provided as liberal arts education subjects in the 1st year, "Engineering and Ethics" provided in the 4th year, and preparation of the "Graduation Thesis."

・The ability to engage in autonomous and continuous study (achievement target (Ke)). Students acquire the ability while taking liberal arts education subjects in the 1st and 2nd years such as "Introduction to University Education", "Introductory Seminar for First-Year Students", peace science courses, area courses, "Experimental Methods and Laboratory Work in Physics" provided as a foundation course, "Basic Experiments in Chemistry" provided as a specialized basic subject in the 2nd semester of 2nd year, "Chemical Experiments I"; "Chemical Experiments II"; "Exercises in Organic Chemistry"; and "Exercises in Physical Chemistry"; which are all provided as specialized subjects in the 3rd year, and preparation of the "Graduation Thesis" in the 4th year.

・The attitude necessary for being actively and autonomously engaged, as independent researchers or

technicians, in problem-solving processes related to information gathering, the improvement of technology, the improvement of research methods, and the analysis and understanding of research results, in order to be able to identify versatile approaches (achievement target (Ke)). Students acquire this attitude while taking liberal arts education subjects in the 1st and 2nd years such as "Introductory Seminar for First-Year Students", peace science courses, area courses, "Experimental Methods and Laboratory Work in Physics" provided as a foundation course; "Basic Experiments in Chemistry " provided as a specialized basic subject in the 3rd and 4th terms of 2nd year; specialized subjects such as "Chemical Experiments I" and "Chemical Experiments II" provided in the 3rd year; and preparation of the "Graduation Thesis" in the 4th year.

・The ability to produce logical descriptions, presentations, and discussion in the Japanese language (achievement target (Ko)). Students acquire this ability while taking liberal arts education subjects such as " Introductory Seminar for First-Year Students", peace science courses, area courses provided in the 1st year, " Basic Experiments in Chemistry" provided as a specialized basic subject in the 3rd and 4th terms of 2nd year, specialized subjects such as "Chemical Experiments I" and "Chemical Experiments II" provided in the 3rd year, and preparation of the "Graduation Thesis" in the 4th year.

・The ability for collect and transmit information from an international perspective (achievement target (Ko)). Students acquire this ability while taking foreign language subjects provided as liberal arts education subjects such as "Communication IA" and "Basic Foreign Language", "Technical English" provided as a specialized basic subject in the 3rd and 4th terms of 2nd year, and preparation of the "Graduation Thesis" in the 4th year.

・The international awareness required for solving problems from a global point of view (achievement target (Ko)). Students acquire this awareness while taking liberal arts education subjects such as "Introductory Seminar for First-Year Students", peace science courses, area courses, and preparation of the "Graduation Thesis" in the 4th year.

5.Start of the program / Admission conditions

~~Second semester of the second year~~ The English-

of the first year. Enrollment in Program of Applied Chemistry occurs in the second semester of the second year.

Cluster 3 provides a distinctive education into which fields related to Chemistry, Biotechnology and Process Engineering are organically integrated. Specifically, the educational purpose of Cluster 3 is to develop human resources who have acquired a broad integrated basic knowledge in the development of new functional substances and materials, biotechnology of animals, plants, and microorganisms, design and control of chemical processes, environmental conservation and purification, and the development of resources and energy, as well as advanced expertise and technologies. To achieve this, three programs in Applied Chemistry, Biotechnology, and Chemical Engineering are offered in addition to the common-subject basic specialized education to offer Specialized Education related to Chemistry, Biotechnology and Process Engineering, respectively. In Cluster 3, in registering these three programs at the second semester of the second year, students are allowed to choose specialized fields or programs that suit them, in addition to acquiring extensive specialized basic knowledge.

To be assigned to each program, students must obtain more than 16 credits out of a total of 18 credits from required subjects in the Specialized Basic Subjects (excluding Basic Experiments in Chemistry and

Technical English), and a total of at least 60 credits (including Liberal Arts Education Subjects).

The Program has an upper limit on the number of students to be accepted. Assignment to the Programs in Applied Chemistry, Biotechnology, and Chemical Engineering shall be decided after

6.Qualification(s)

- A Type-1 High School Teaching License (industry) (Students can obtain the Type-1 High School

,

B (Good: 70 79 points)	2
C (Fair: 60 69 points)	1

* See the relationships between evaluation items and evaluation criteria on Attached Sheet 2.
* See the relationships between evaluation items and class subjects on Attached Sheet 3.
* See the Curriculum Map on Attached Sheet 4.

9.Graduation thesis (graduation research) (position and method & time of assignment, etc.)

The Graduation Thesis is positioned as one of the major subjects in the attainment goals of this educational program listed below.

(Ka) To acquire reliable basic knowledge,
(Ki) To acquire the maturity to fulfill their social responsibilities as an engineer,
(Ku) To acquire creative power and design ability,
(Ke) To become independent as a researcher & engineer through continuous self-development, and
(Ko) To acquire communication skills and an international outlook.

Details of the goals are as follows:

(1) Collect and analyze literature and materials (including those in English) related to the given research theme, and understand the purpose and significance of the research. (Ka), (Ki), and (Ko)
(2) Set concrete goals, and design a research plan. (Ka) and (Ku)
(3) Analyze and consider data obtained in the research process based on a knowledge of basic chemistry and specialized technologies. (Ka)
(4) Understand problems in attaining the goal, and set an appropriate new goal and plan. (Ka), (Ku), and (Ke)
(5) Consider the effect and importance of research results on society, nature, and learning from a multifaceted perspective. (Ki)
(6) Organize and logically describe research results. (Ka) and (Ko)
(7) Give an easy-to-understand oral presentation on research results, and discussion. (Ko)

Conditions for starting a graduation thesis

(1) To have taken all the required Experimental Subjects (including experiments in fundamental subjects) and have acquired eight credits in foreign language subjects,
(2) To have taken at least 115 credits, and at least 65 of those credits to be obtained in Specialized Basic Subjects and Specialized Subjects.

After the number of acceptable students by each laboratory is shown, students, who can begin their graduation thesis, will be assigned according to their requests. However, since only a limited number of students can be accepted, the assignment may be adjusted.

eparing a graduation thesis

Although different academic advisors have different methods of giving academic guidance, the process is generally as follows:

(1) Set a research theme, and frame a research plan after exploring the literature and materials related to the theme.

(2) Carry out the research. During the research period, students will receive individual guidance from faculty members as required and research report sessions will be held periodically.

(3) Prepare a graduation thesis.

(4) Give a presentation on the graduation thesis.

(5) Read an English book in turn with other students and exchange opinions, and introduce the abstract of related articles in the form of seminar.

10.Responsibility system

The Program of Applied Chemistry

among Subjects as its subsidiary organization. These entities engage in planning, implementation,

the committees that comprise the educational checking system, and

- Whether there is any system to continuously improve the Program based on the results of the educational checks, and whether the related activities are being carried out.

The Program Reviewing Committee plays a leading role in assessing and improving the Program. As assessment of this Program, external assessment is made by graduates of the Program of Applied Chemistry and questionnaires on classes and the educational environment are answered by students.

Specific organizations for assessment and improvement of the Program and improvement flows are

educational goals, and evaluates the achievement levels for the learning & educational goals. This Committee requests graduates of the Program of Applied Chemistry to conduct external assessments and for students to answer questionnaires on classes and the educational environment, and then checks the overall education by the Program based on the questionnaires. After checking the validity of the learning & educational goals and the educational environment, the Committee further proposes methods of improving class subjects and class contents when deemed necessary. Cluster 3 is composed of three programs: Applied Chemistry, Chemical Engineering, and Biotechnology. Some subjects offered are shared by the three programs. Requests for checks and improvements to these shared subjects, when deemed necessary, will be proposed to the Cluster 3 Curriculum Reviewing Committee, and will be checked and discussed.

Part-time lecturers and former faculty members conduct external assessment of class subjects and their contents, and using the assessment results as a reference, the committee perform basic checks on whether the class subjects and the class contents are appropriate or not, and draft improvement plans. If further adjustments between subjects and examinations and improvements to contents, the committee will request discussions by the respective Specialized Subject Group Liaison Conferences on organic chemistry related subjects, inorganic & physical chemistry related subjects, experiments related subjects, and liberal arts education related subjects. In each Specialized Subject Group Liaison Conference, concrete measures to improve class subjects and class content will be taken. Detailed improvement plans drafted in the Specialized Subject Group Liaison Conference will be proposed to the Program Reviewing Committee. The Program Reviewing Committee, based on these improvement plans, will formulate comprehensive improvement measures that include the learning & educational goals. The decision on the improvement measures will be taken in the Applied Chemistry Classroom Meeting, and a system to implement the measures has been established. In the School of Engineering, the Self-checking and Evaluation Committee has distributed questionnaires on the assessment of classes by students regularly since fiscal 1993, the assessment results of classes have been notified to each faculty member in charge, and improvements to the class content and methods have been implemented by all faculty members.

In this Program, in further developing the Tutor System adopted at this university, requests from students obtained from their tutors are used to improve the Program. To improve classes based on requests from students, faculty members in charge of the relevant classes are asked to improve by devising ways to give their classes based on the results of the questionnaire on classes answered by

students.

.)

◎
○
△ A

			)		⌒		( )																								
										-				.				/												
									A			A			A			A			A			A			A				
								-	.	/		-	.	/		-	.	/		-	.	/		-	.	/		-	.	/	
			-		-			○																							
			-		-		◎																								
	A (		-	A (	-		◎																								
			/	C *	-		○		○																						
			/		-			○		○																						
			-				◎	◎																							
									◎	◎																					
			-				◎	◎																							
							◎	◎																							
			-						◎	◎																					
		II							◎	◎																					
		A	-				○																								
		B A						○																							
			-	(/)	-			○																							
	C		-		-		○	○	○	○																					
					-		◎																								
					-				◎																						
					-			◎																							
					-					◎																					
				B	-			◎																							
				B	-					◎																					
											◎																				
												◎																			
								◎																							
										○																					
				( )					○																						
										○																					
					-					○																					
	A		-	A			A	△	△	△	△	△	△	△	△																
	)		/ /																												

: ◎, ○, △
)
))
- : (A (.
)
I II) A
. :) A
)
/ :)
)
: 「 I( ) 」 「 II

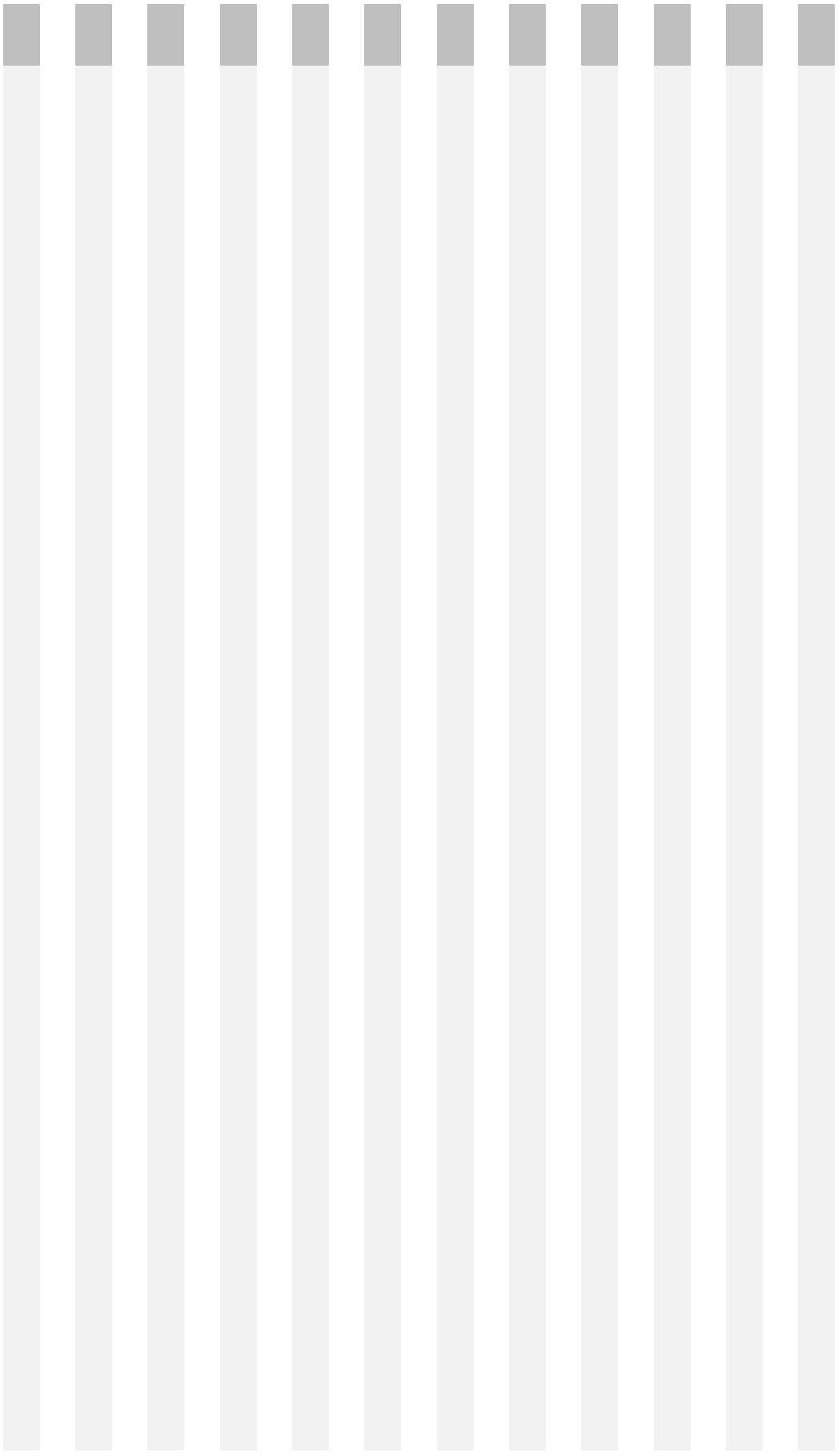
		◎	◎	◎																			
		◎	◎	◎																			
		◎	◎	◎																			
		◎	◎	◎																			
		◎	◎	◎																			
		◎	◎	◎																			
		◎	◎	◎																			
		◎	◎	◎																			
		◎	◎	◎																			
		◎	◎	◎																			
		◎	◎	◎																			

（　　）

◎
○

		◎																		
		◎																		
		◎																		
		◎																		
		◎																		
		◎																		
		◎																		
		◎																		
		◎																		
		◎																		
		◎																		
		○																		
		○																		
		○																		
		○																		
		○																		
		○																		
		◎																		
		○																		
		○																		
		◎																		※
		◎																		

※



		(◎)	(◎)	·Ⅱ(◎)	(◎)	(◎)	(◎)		
		(◎)	(◎)	(◎)	(◎)	(◎)	(◎)		
		(△)	(◎)	(◎)	(◎)	(◎)	(◎)		
		(△)	(○)	(◎)	(◎)	(◎)	(○)		
		(◎)	·Ⅱ(○)	(◎)	(◎)	(◎)	(○)		
		(◎)	(○)	(◎)		(○)	(○)		
		(◎)	(◎)	(◎)		(○)			
		(◎)	(◎)	(○)		(○)			
			(◎)	(○)		(○)			
			(○)	(○)		(○)			
			(○)						
			(◎)	(◎)	(◎)	(◎)		(◎)	(◎)
			(◎)	(◎)	(◎)	(◎)			
				(○)	(◎)	(◎)			
				(○)					
				(○)	(◎)	(◎)			
		(◎)	(◎)	(◎)	(◎)	(◎)	(◎)	(◎)	(◎)
		(△)	(◎)	(◎)	(◎)	(◎)	(◎)		
				(◎)	(◎)	(◎)	(◎)		
				(◎)	(◎)	(◎)			
				(○)		(◎)			
		(◎)	(△)		(◎)			(◎)	(◎)
	.	(△)						(◎)	
		(◎)	(△)		(◎)			(◎)	(◎)
		(△)						(◎)	
		(◎)	(△)			(◎)	(◎)	(◎)	(◎)
		(△)					(◎)		
							(◎)		
		(◎)	(△)					(◎)	(◎)
		(△)						(◎)	
	.								
		(◎)	(△)	·Ⅱ(◎)	(◎)	(◎)	(◎)	(◎)	(◎)
		(◎)					(◎)		
		(◎)					(◎)		
		(△)							
		(◎)	(△)	·Ⅱ(◎)	(◎)	(◎)	(◎)	(◎)	(◎)
		(◎)					(◎)		
		(◎)					(◎)		
		(△)							
		(◎)	(△)		(◎)	(◎)	(◎)	(◎)	(◎)
		(◎)							
		(△)							
		(◎)							
		(◎)							
		A(◎)	A(◎)		(◎)			(◎)	(◎)
		(◎)	(◎)						
		(○)							
		(○)							
		(◎)	(△)					(◎)	(◎)
		(◎)							
		(△)							

( ) (◎) (○) (△)