



# Catalyzer

No. 1

42nd International Chemistry Olympiad 2010, Tokyo July 26, 2009



## Chemistry the key to our future



**Ryu Shionoya**

Minister of Education,  
Culture, Sports, Science  
and Technology (MEXT)

**I**t is our great pleasure to invite young talent from about 70 countries and regions to participate in the 42nd International Chemistry Olympiad (IChO 2010), with its rich history dating back to 1968.

Chemistry is a basic but practical science that has enabled many of our daily necessities—all important elements that support our way of life. Modern problems such as the energy and food crises demand further innovation and advancements in the field of chemistry.

We believe that talented students participating in this competition are the strongest prospects for tackling and ultimately resolving such issues through progress in science and technology. Hence, uncovering and cultivating such talent is a crucial task for all governments. Science Olympiads, along with the IChO, have provided these students with a venue for challenge. The Japanese government firmly believes in the value of this competition and has supported it with resolve.

In holding the IChO 2010 in Japan, we earnestly hope that all the youth involved give it their all, in the process developing friendships that last well into the future.

We eagerly await seeing you all next summer in Tokyo.

**A**s chairman of the 42nd IChO Organizing Committee, I would like to extend my sincere welcome to the students, mentors and scientific observers, from roughly 70 different countries, flying from all over the world in July, 2010.

The importance of the field of chemistry cannot be overemphasized: closely connected to a variety of other disciplines, it brings us, through the chemical industry, cutting-edge products that enrich our daily lives.

Students attending the IChO have no doubt been enchanted by the beauty of chemistry, by its logic, by its capacity to both create and convert matter, and by the potential it holds in uncovering those secrets of nature that still await our discovery.

We encourage you all to do your best in this competition, and make full use of your knowledge, your skills and your intuition—in other words, your chemical wisdom. We also encourage you to enjoy your stay here, and make new friends. I hope the IChO serves as a catalyst for the establishment of many international friendships.



**Dr. Ryoji Noyori**

President, RIKEN  
2001 Nobel Laureate  
in Chemistry



**Dr. Hiroyuki Nakanishi**

President  
The Chemical Society of Japan

**I**t is my great pleasure to welcome so many students from around the world who are interested in chemistry to the 42nd International Chemistry Olympiad held in Japan.

Chemistry, as a central science, plays a key role in responding to global challenges with which we are faced, such as securing natural resources, and dealing with environmental issues and so on.

The Olympiad is not just a scientific competition but also an important stage for students in becoming future leaders capable of contributing greatly to further progress in science and technology and changing the world for the better.

For the prestigious event held in this beautiful country Japan, we will do our best to provide a venue for students to improve their abilities and creativity in chemistry as well as to promote friendship among participants from various countries.

We hope you will enjoy your stay in Japan and develop yourself through competition and friendship.

We look forward to seeing you next year.

# About JAPAN 日本

**Geography:** Japan is situated in northeastern Asia between the North Pacific and the Sea of Japan. The area of Japan is 377,873 square kilometers, nearly equivalent to Germany and Switzerland combined or slightly smaller than California. Japan consists of four major islands, surrounded by more than 4,000 smaller islands.

**Climate:** Summer begins in June with a three to four week rainy season. It becomes rather hot and humid from July onward. Clothing: Light clothing is recommended. A cardigan may also come in handy, as rooms are generally well air-conditioned. The average temperature in Tokyo (July) is around 25 °C (77 °F).

**Population:** Japan's population is over 126 million. Most people reside in densely populated urban areas. Japan's capital city is Tokyo. The population of the Tokyo Metropolitan Area including the city, some of its suburbs and the surrounding area is approximately 12 million.



## Traditional Dishes:

Japanese cuisine has in recent years become much more familiar and appreciated around the world. Many visitors will have already sampled the pleasures of raw fish or batter-fried shrimp. But few first-time visitors are prepared for the variety and sumptuousness of Japanese food, as it is traditionally prepared.



# About TOKYO 東京



Asakusa



Shibuya



Shinjuku

Tokyo is not only the political and economic center of Japan, it has also emerged as a center of the world economy and culture. There are large-scale downtown areas, including Ginza where famous shops from around the world stand side by side. The sleepless area of Shinjuku has become the "new city center of Tokyo." Asakusa is reminiscent of traditional Edo

(the former name of Tokyo), while Shibuya starts the trends for the young people. Other unique areas include Akihabara, a retail shopping area, dense with electronic product stores that compete against each other for shoppers from Japan and overseas. Tsukiji is an open-air wholesale food market catering to shops and consumers all over Japan.

The Imperial Palace



Tsukiji Fish Market



Akihabara



Ginza







## WASEDA University



The practical examination of the IChO will be held at Waseda University's Nishiwaseda Campus in Shinjuku-City of Tokyo where The Science and Engineering Schools, as well as other research institutions of Waseda University, are located.

Shigenobu Okuma founded Waseda University in 1882 upon three ideals: "independence of learning", "utilization of knowledge", and "creation of good citizenship". Waseda University remains true to these founding principles by striving to contribute to the progress of society, to the development of talent, to the deepening of scientific principles, and to leading progressive changes in education with a global perspective.

Waseda University's commitment to the founding ideals is exemplified by the 57,000 students studying at 13 undergraduate and 23 graduate schools on 9 campuses

located throughout Japan.

This commitment is also exemplified by more than 3,000 international students studying at Waseda University, by more than 550 academic partnerships with universities around the world, such as Columbia University, Yale University, University of Oxford and University of Cambridge, and by Waseda University's progressive Double Degree programs created with many prestigious universities around the world.

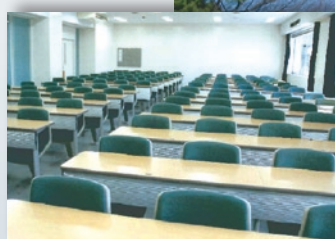


## THE UNIVERSITY OF TOKYO

The venue for the theoretical examination of the 42nd IChO will be The University of Tokyo (UT) Komaba campus, situated roughly on a western rim of downtown Tokyo. The 25-hectare campus of lush greenery environment accommodates the College (plus Graduate School) of Arts and Sciences with 160 professors, 130 associate professors and 80 research associates, and a total of some 8,700 undergraduate/graduate students. About 78% of the students are freshmen and sophomores who take basic courses in three human sciences and three natural sciences.

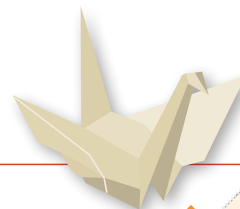
The College is one of the ten Faculties constituting UT, or Todai in an abbreviated Japanese wording, which had been established in 1877 as the first national university in Japan and has since served as a resource of leading people in government, business and academia.

The whole UT today, with a faculty of ca. 4,000 and an enrollment amounting to ca. 29,000, is based on three core campuses in Tokyo and its neighborhood, namely Hongo, Komaba and Kashiwa. As of 2008 the number of international students exceeded 2,300, and more than 2,200 foreign researchers came over to UT for short or extended visits.

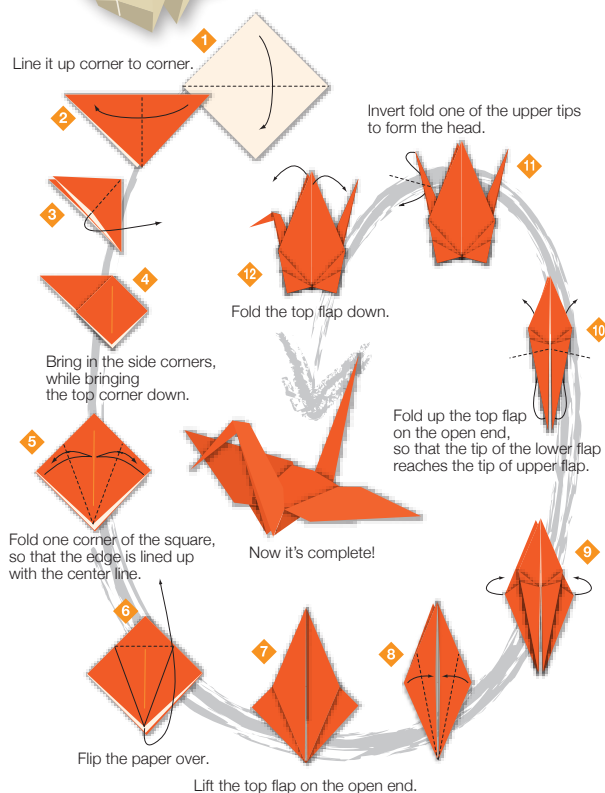


# 42nd IChO Tentative Program

Date	Students	Mentors, Observers
July 19 Mon	whole day	Arrivals, Registration
July 20 Tue	morning	Opening Ceremony
	afternoon	Excursion
	night	Lab Safety Instruction
July 21 Wed	whole day	Excursion
		Translation
July 22 Thu	morning	Practical Exam
	afternoon	Excursion
	night	Free Time
July 23 Fri	whole day	Excursion
		Translation
July 24 Sat	morning	Theoretical Exam
	afternoon	Excursion
	night	Reunion Party
July 25 Sun	morning	Score Marking
	afternoon	Recreation
	night	Excursion
July 26 Mon	morning	Excursion
	afternoon	Arbitration
	night	4th Jury Meeting
July 27 Tue	morning	Free Time
	afternoon	Closing Ceremony
	night	Banquet
July 28 Wed	whole day	Departures



## Folding a paper crane



## Access to Tokyo

**Narita Airport (Tokyo)** is located 60 km to the east of central Tokyo. Airport fees are included in the flight fares to all overseas destinations if departing from Narita Airport.  
<http://www.narita-airport.jp/en/access/index.html>

**Time Difference:** All of Japan is in the same time zone, 9 hours ahead of G.M.T. Daylight saving time is not observed in Japan.

**Currency:**  
 The unit of Japanese currency is the yen. Coins are available in denominations of 1, 5, 10, 50, 100, and 500 yen, and bank notes in denominations of 1,000, 2,000, 5,000, and 10,000 yen.

**Tokyo Travel Guide:**  
<http://www.tokymetro.jp/global/en/travel/>

**For Further Travel Information:**  
 Japan National Tourism Organization  
<http://www.jnto.go.jp/eng/index.html>

## Useful Japanese Phrases

English		Japanese
Good morning	Ohayou gozaimasu	おはようございます
Good afternoon	Kon'nichiwa	こんにちは
Good evening	Kon'banwa	こんばんは
Good night	Oyasumi nasai	おやすみなさい
Good-bye	Sayounara	さようなら
Excuse me	Sumimasen	すみません
I am sorry	Gomen nasai	ごめんなさい
I don't understand	Wakarimasen	わかりません
Thank you	Arigatou	ありがとう
Yes	Hai	はい
No	Iie	いいえ
Chemistry Olympiad	Kagaku orinpikku	化学オリンピック

## 42nd International Chemistry Olympiad

*Catalyzer*

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# Catalyzer

No.2

42nd International Chemistry Olympiad, Japan

July 19, 2010

Chemistry   
the key to our future



*Nishijin Style of Weaving*



# 西陣織 *Nishijin-ori*

## Nishijin Style of Weaving



Colored silk thread

*Nishijin* style of weaving (*Nishijin-ori*) has a history of more than 1000 years in Kyoto. The essence of *Nishijin-ori* lies in the following two processes: dyeing a variety of silk threads (yarns) first and weaving the textile using them. The silk thread so prepared is called yarn-dyed silk, which is the secret of gorgeous patterns and motifs of *Nishijin-ori*. Though it requires numerous processes to complete, here part of chemistry-related processes are briefly explained.

**Raw Silk Wash:** Raw silk is washed to cleanse dirt and other impurities using soap or soda ash to bring out unique shiny and soft texture of silk.

**Dyeing:** For obtaining wide range of color, natural dyes have been traditionally used. In 20th century, synthetic dyes came to be widely used, and metal complex acid dyes are also used.

**Making of Gold/Silver Threads:** Embroideries on the fabric may have glossy parts. Threads used for these embroideries are called *kin-gin-shi* (gold/silver thread). These threads used to be made of gold and

silver; however, nowadays also copper and tin are used as their material. The making process is as follows. First, Japanese paper (*washi*) is processed with persimmon tannin, natural lacquer (*urushi*), sulfur dust, and iron acetates (*ohaguro*, dye for teeth black) before pasting very thin metal leaves on it. Then natural lacquer or casein mixed with aqueous ammonia and dyes are applied over the leaves. The applied lacquer hardens as urushiol polymerizes with the help of catalyst laccase, so it protects metal leaves from abrasion and gives strong golden glossy texture. When sulfur dust and pine resin are used on silver leaves, thin film of silver sulfide is produced to give golden shine. Tin is also used to give golden color by heating over charcoal fire or by applying colorant.



Silk cocoon



Weaving



NYC building complex



Meiji jingu shrine



Takeshita street

## NYC National Olympics Memorial Youth Center

The National Olympics Memorial Youth Center (NYC) is the accommodation for the students participating in the International Chemistry Olympiad in Japan. The NYC is located where the Olympics Village was at the Tokyo Olympic Games in 1964. The center consists of various facilities including the Arts Building with large and small halls, the Athletic Building with gymnasiums and swimming pools, the Central Building with lecture rooms, and the International Exchange Building where the international meeting rooms are located, besides the Lodging Building where the participating students are staying. Around the NYC there are located *Meiji Jingu* shrine, one of the largest *Shinto* shrines in Japan, and Harajuku, a town that attracts young people.



# Welcome Message

## Tadashi Watanabe

Head, Executive Committee of IChO 2010



Welcome to Japan for the 42nd Chemistry Olympiad!

We wholeheartedly wish you students, from 69 countries and regions, your best performance in the Practical Exam on the fourth day and the Theoretical Exam on the sixth day, that are to culminate in the Awarding Ceremony on the final evening. Besides, you are strongly encouraged to expand your circle of friends toward an international one, by taking such opportunities as daily lodging life, excursions, sporting events and parties. At least some of your competitors will surely be your future colleagues to join hands in an effort to advance chemical knowledge and technology for the benefit of mankind.

And dear mentors, scientific observers and guests from more than 70 countries, we wish you all the best during your 10-day stay here. Occasionally from your extremely busy

schedule please take time to relish the flavor of this country: you will find it basically of Eastern culture but of Western civilization.

For most of you this may be the first time of flying over to Japan, one of the rare countries encompassing a wide range of climate zones from sub-frigid to sub-tropical, with a north-south extension of about 3000 km. Because of this, the main body of Japan enjoys a temperate climate with four distinct seasons. Although late July in Tokyo is unfortunately amid the hottest time of year, we do believe the fervor of you participants in this big international event will be much more intense than the heat from natural weather.

On behalf of all the members of Organizing and Executive Committees, we promise you to be an efficient catalyst to make your stay a pleasant, memorable and rewarding one.

## OVTA Overseas Vocational Training Association

The registration room and accommodation for the mentors are located at the Overseas Vocational Training Association (OVTA) in Makuhari, Chiba. At the OVTA, seminar rooms and facilities are provided for companies which plan to expand their overseas



OVTA building

businesses, and also Japanese language lessons are given for foreigners who are working in Japan. The Makuhari sub-center (*fuku-toshin*) is a newly developed area created by landfilling the Tokyo bay in late 1970s. There is located the *Makuhari Messe*, or the International Convention Center, as well as numerous offices of domestic and international companies.



Makuhari Messe



Makuhari fukutoshin, the sub-center


5	9	4	1	7	6	2	3	8
7	6	1	3	2	8	5	4	9
2	3	8	4	9	5	1	7	6
6	7	5	2	4	9	3	8	1
4	8	2	5	3	1	6	9	7
3	1	9	8	6	7	4	5	2
8	2	7	6	5	4	9	1	3
1	5	6	9	8	3	7	2	4
9	4	3	7	1	2	8	6	5

# Program, July 19 [mon.]

Students		Mentors and Scientific Observers	
	Arrival · Registration at OVTA		Arrival · Registration at OVTA
12:30-	Lunch at OVTA	12:30-	Lunch at OVTA
14:00-	Registration at OVTA · Transfer to NYC	14:00-	Registration at OVTA
18:00-	Dinner at NYC	18:00-	Dinner at OVTA

## WEATHER NEWS

### Tokyo




occasionally cloudy

high 34 °C  
93 F

low 25 °C  
77 F

### Chiba



occasionally cloudy

high 30 °C  
86 F

low 22 °C  
72 F

As of July 16

## Sudoku LEVEL ★★★

Sudoku is a combinatorial number placement puzzle. Although this number placement puzzle first appeared in the United States in 1970s, it became increasingly popular after a Japanese game company introduced it in Japan, set some fundamental rules, and gave the name *sudoku*, in 1980s.

In *sudoku* a 9×9 grid composed of nine 3×3 sub-grids is given, and some numbers are already placed in the grid. The objective of this puzzle is to fill the rest of the grid with the digits from 1 to 9 so that each row, each column, and each of the nine 3×3 sub-grids contains all of the digits from 1 to 9. Be careful each number appears only once in each group.

		4	1			2		
7				2	8			
	3					1		
6		5	2	4				
	8						9	
				6	7	4		2
		7					1	
			9	8				4
		3			2	8		

Answer : P.3

## Japanese Traditional Arts

The best-known of Japanese traditional performance arts are probably *noh*, *kabuki*, and *bunraku*. *Noh*, believed to be established in 14th century, is a form of theatrical play that features historical events and classic literature and is mainly composed of songs (*utai*) and dances (*mai*). Its distinctive feature may be that the performers wear special masks on stage. Movement is generally very slow but beautiful and quiet, and detached style of music lures the audience into a dreamy world. *Kabuki* is another form of stage play established in 17th century. It mainly features historical events and society in the Edo period. All characters are performed only by male actors, and they often put elaborate make-up with distinctive patterns called *kumadori*. Unlike modern theater plays, the expression is not necessarily true to life, but rather often exaggerative and following patters are used to pursue "look-likeness" on the stage. *Bunraku* is a form of puppet theater also established around 17th century, and like *kabuki*, the subjects are often taken from historical events and society in the Edo period.



## Useful Japanese Phrases 1

English ◀		▶ Japanese
Good morning	Ohayou gozaimasu	おはようございます
Good afternoon	Kon'nichiwa	こんにちは
Good evening	Kon'banwa	こんばんは
Good night	Oyasumi nasai	おやすみなさい
Good-bye	Sayounara	さようなら
Excuse me	Sumimasen	すみません
I am sorry	Gomen nasai	ごめんなさい
I don't understand	Wakarimasen	わかりません
Thank you	Arigatou	ありがとう
Yes	Hai	はい
No	Iie	いいえ
Chemistry Olympiad	Kagaku orinpikku	化学オリンピック

## Emergency

Police 110 "Keisatsu" (警察)

Fire, Emergency 119 "Kaji" (火事), "Kyukyu" (救急)

### Your Guide

ICHO Headquarters / Students (National Youth Center, NYC)  
at Sangu-bashi (国立青少年センター、参宮橋)

▶ 080 2006 8529 / 080 2006 8921

Mentors (Overseas Vocational Training Association, OVTA)  
at Kaihin-Makuhari (海外職業訓練協会、海浜幕張)

▶ 080 2006 9351 / 080 2006 9598

## 42nd International Chemistry Olympiad

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# Catalyzer

No.3

42nd International Chemistry Olympiad, Japan

July 20, 2010



Chemistry  the key to our future



*Lacquerware*

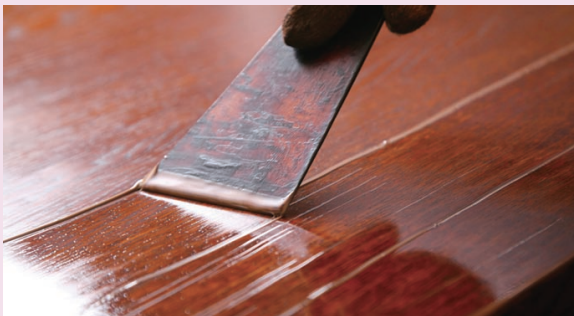
# 輪島塗 Wajima-nuri Lacquerware

The lacquerwares made in Wajima City, Ishikawa Prefecture are called *wajima-nuri*, or wajima lacquerware, which is prepared by repeatedly covering wood or paper with lacquer. The lacquer used for such craftworks is sap taken and processed from Japanese lacquer trees. This natural resin paint mainly consists of urushiol and may cause allergy. It also contains a catalyst called laccase,



Sap from urushi tree

and helps the lacquer to be oxidized in the air and polymerize to make a real hard coating. The climate in Japan, especially in Wajima, provides the desired humidity and temperature for this polymerization reaction.



Painting urushi

Japanese lacquerware is believed to have a history of around 6800 years, and the oldest lacquerware has been excavated in Ishikawa. Some of the reasons why lacquering has flourished around Wajima area may have been that essential materials for making lacquerware (tree that provides lacquer and wood for woodworks as well as good diatomite) were abundantly available, and that there were also active markets thanks to the seaports nearby.

Here is how a lacquerware is made. Making of a *wajima-nuri* starts with obtaining a quality wooden basis. Any fragile parts are reinforced by putting fabric pieces using lacquer. As primer coating, mixture of lacquer and *jinoko* (powdered diatomite) is applied for more than twice, and raw lacquer is applied to further reinforce breakable points. Then middle and finish coatings of lacquer are applied before various decorative techniques, for example, *makie* (painting in colored lacquer) or *chinkin* (sunken gold). For more gorgeous decoration, red color may be added to lacquer using pigments such as colcothar, and thinly polished seashells or gold foils may be embedded on the surface.



Sake cup of Wajima-nuri

## Communal Bath

Bathing is one of popular customs in Japan, and we have a lot of occasions to use public baths. In urban areas, there are public bath houses called *sentō*, which are also places for social interaction among the inhabitants. A volcanic country Japan has also a lot of natural hot springs, or *onsen*, all around the nation. *Onsen*



Monkeys bathing in *onsen*

often contains ions that are beneficial to our health, and bathing in *onsen* has been used to cure various kinds of wounds and diseases. The NYC also has communal bathrooms with bath tubs. There are some strict rules to follow when using communal bathrooms. Learn them and enjoy bathing!

Wash yourself before going into the tub.



Do not put towels or soap in the tub.



Do not wear underwear in the tub.





# Arrival in Japan

The participants arrived in Japan enjoy the 10 days of Chemistry Olympiad!

Team Thailand



Team France, "Bonjour!"



Team Ireland



Team Finland



Team Venezuela, welcome to Japan



Team Ukraine just arrived

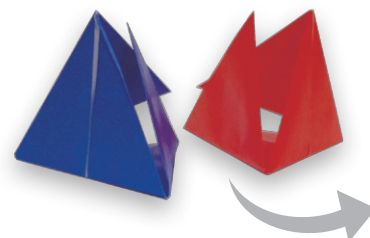


Origami fullerene



## Pot Noodles

You may think of *sushi* or *tempura* when talking of "Japanese food". Certainly they are typical Japanese foods. However pot noodles are as typical as those traditional ones. The first pot noodles marketed in 1971 were "*ramen* (Chinese style noodles)", and today various kinds of noodles including Japanese style *soba*, spaghetti, and fried noodles are also available as pot noodles. At the NYC and the OVTA, pot noodles are given away to you for late-evening snacks. Why don't you give them a try!



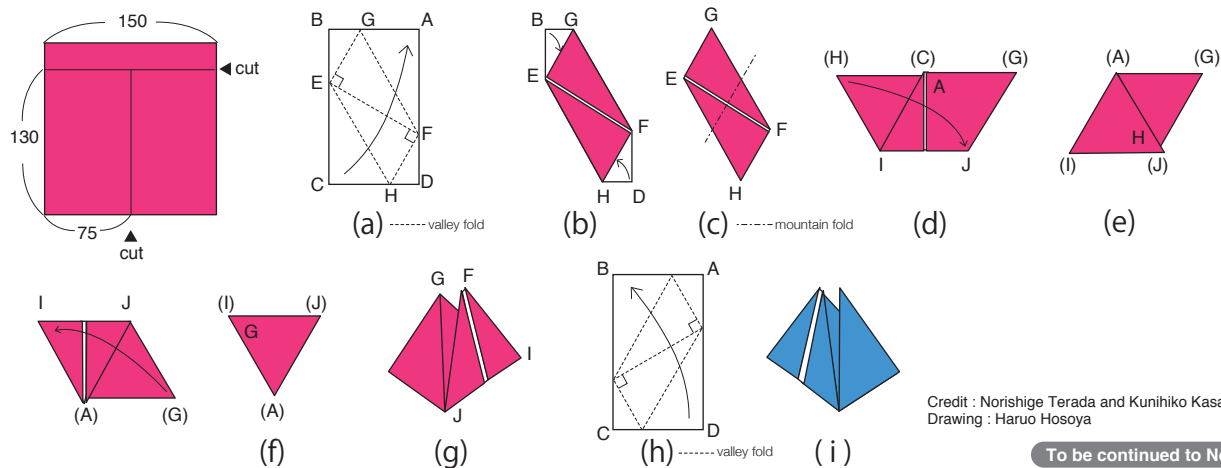
# Program, July 20 [tue.]

Students		Mentors and Scientific Observers	
7:00-	Breakfast	7:00-	Breakfast
9:00-	Transfer to Opening Ceremony	8:00-	Transfer to NYC
9:30-	Opening Ceremony	9:30-	Opening Ceremony
12:10-	Welcome Lunch	12:10-	Welcome Lunch
14:00-	Excursion (Tokyo)	14:15-	Lab Inspection
		15:30-	Transfer to OVTA
		17:00-	Meet with Authors
19:00-	Dinner (NYC)	19:00-	Dinner (OVTA)
20:30-	Free Time	20:00-	1st Jury Meeting

## Stereochemistry with ORIGAMI 1

### Unit origami for making regular tetrahedron, octahedron, etc.

- ❖ Cut out rectangular sheets (a) (130 mm x 75 mm) from origami paper.
- ❖ Make the valley fold creases on the reverse side of (a) as 3)-5).
- ❖ Make crease EF by folding C down onto corner A.
- ❖ Fold in so that edges AF and EC meet into the central crease EF to get (b).
- ❖ Fold corner B (D) down along EG (FH) and hide small triangle BEG (DFH) under big triangle AFG (CEH) to get parallelogram (c).
- ❖ Turn over and fold A down onto F to get trapezoid (d).
- ❖ Fold corner H down onto J along edge AI to get rhombus (e).
- ❖ Turn over and fold G down onto corner I along edge AJ to get regular triangle (f). Press and rub (f) tightly to make sharp creases.
- ❖ Half open triangle (f), and you will find an unstable regular tetrahedron (g). This will be a unit for constructing regular tetrahedron, octahedron, etc.
- ❖ Prepare another unit of unstable regular tetrahedron (i) of opposite chirality. This can be achieved by folding D down onto corner B as in (h).



Credit : Norishige Terada and Kunihiko Kasahara  
Drawing : Haruo Hosoya

To be continued to No.5

## Message from past participant

**Yohei Hattori**  
Japan, participated in 36th IChO



Enjoy the Chemistry Olympiad!  
After you take exams, just forget about them. Of course your effort to get a medal is precious and I expect you to enjoy challenging chemistry problems too. But a medal is just a souvenir of IChO. The most important thing is what you experience now. Talk and know each other and enjoy with chemistry friends gathered for this festival.

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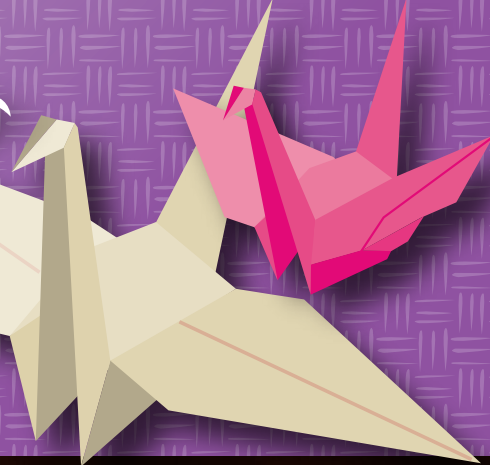


# Catalyzer

No.4

42nd International Chemistry Olympiad, Japan

July 21, 2010



Chemistry   
the key to our future

*Japanese Sword*



# 日本刀 Nihon-to Japanese Sword



Sharpening a sword

Sometimes referred to as “*Bushi no Tamashii* (samurai’s spirit)”, a Japanese sword had been an essential item for a soldier *samurai* until the Edo period. Although it is a weapon, its beauty has come to be highly appreciated today, and it has been deemed as an object of art not only in Japan but worldwide. Japanese swords are made from steel called “*wakou* (Japanese steel)” or “*tamahagane*”, produced by Japanese traditional technique that uses clay furnace and bellows called “*tatara*”. This method uses iron sand instead of iron ore used for other methods found elsewhere in the world, and this makes it possible to reduce to iron metal at relatively

low temperature. Consequently, this method can produce very high quality and high purity steel which exceeds the level of modern steel making methods. This is the reason why Japanese swords attract wide attention as a highest ranked iron sword in the world. The three features required for a noted Japanese sword are that it does not break, it does not bend, and it cuts well. From ancient times Japanese sword makers had made various efforts to realize all three features at the same time. Not only the technique to produce good steel, but also hammering methods to make the material steel into swords have been handed down. Material steel for swords is heated first, hammered into thin and flat piece, and then cooled rapidly in water. Excessive carbon contained in the material is removed by repeating this process. Then the surface is treated with rice straw preventing from excessive oxidation of the steel by the help of silicon contained in the straw. After this process, hammering is repeated for a number of times by folding the hammered steel. In this way, impurities such as sulfur, excessive carbon and non-metal inclusion are removed, and homogenous and strong multi-thousand layered blade is created.



Hammering material steel

## NEW FACE!



Costa Rica

We want to achieve the highest prizes by making our efforts, and also we want to know people, make friends, and have a great time.

It's awesome. The biggest city we have ever seen and also is really organized.

日本はとてもきれいですね。

"Very beautiful" They gave us the comment in Japanese.

Rafael-Angel Rodríguez-Arguedas / Tachmajal Corrales-Sánchez /  
Oscar García-Montero / Wainer Camacho-Arias



Syria

I am so happy and I feel that I'm a lucky person to participate in Japan.

I think that Japan is a very nice country but I can't stand its hot weather.

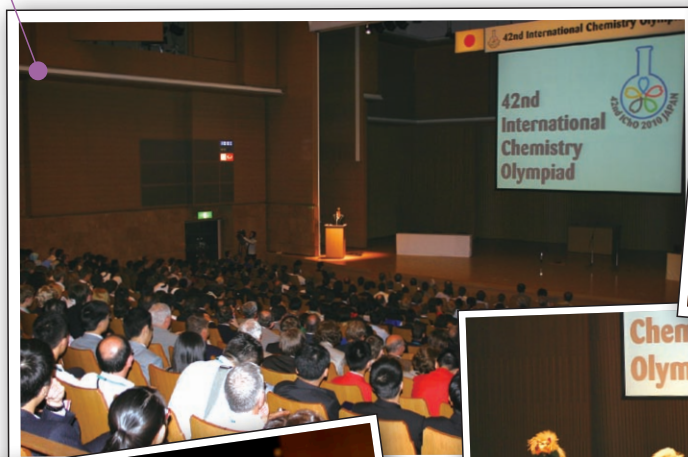
Ali Rachad Mourtada / Ali Feisal Issa /  
Mohammad Ali Shubat / Rouaa Kamal Al Nan



# Opening Ceremony

The opening ceremony of the Olympiad was held at NYC Large Hall from 9:30 am of July 20. After addresses by Prince Akishino, Vice Minister Masaharu Nakagawa (MEXT), Dr. Duckhwan Lee (Chair of Steering Committee of IChO), and Dr. Ryoji Noyori (Chair of IChO 2010), Hayate Saito of Japan team made an oath.

The Chemistry Olympiad has begun



We swear Fair Play!

Shishimai



Everyone is carefully listening to the speech.



Chemistry: the key to our future



## KAMAKURA



Great Buddha of Kamakura

Kamakura is an old city; this was where the *Kamakura bakufu* (shogunate) was based from late 12th century to mid-14th century. There are still many historic temples and *Shinto* shrines which have been there since the Kamakura period. The *Tsurugaoka Hachimangu* shrine built in 1063 is a symbolic one; it enshrines the guardian god for the Genji family, the founders of *Kamakura bakufu*. This shrine still attracts a lot of worshippers and visitors and is a favorite spot for the *Hatsumoude*, the year's first visit to a shrine. The Great Buddha of Kamakura (*Kamakura daibutsu*) is another famous symbol of this town. This huge bronze statue is believed to have been erected in 13th century, and was housed in a huge hall after completion; however, the hall was now said to be destroyed by natural disasters and never rebuilt since then. Therefore, it has been sitting outside as we can see today.





Tsurugaoka Hachimangu shrine

O	C	N	F	P	S	I	H	B
F	P	B	H	I	O	C	N	S
H	I	S	C	N	B	O	F	P
S	O	I	P	F	H	N	B	C
N	B	F	S	O	C	P	I	H
P	H	C	I	B	N	S	O	F
I	F	H	O	C	P	B	S	N
B	S	P	N	H	I	F	C	O
C	N	O	B	S	F	H	P	I

# Program, July 21 [wed.]

Students		Mentors and Scientific Observers	
8:00-	Breakfast	7:00-	Breakfast
9:00-	Excursion (Kamakura)	9:00-	Translation
		12:00-	Lunch (OVTA)
		13:00-	Translation
		18:00-	Dinner (OVTA)
21:00-	Free Time	20:00-	Free Time

## WEATHER NEWS

Tokyo		Chiba	
			
fine		fine	
high	34 °C 93 F	high	33 °C 91 F
low	26 °C 79 F	low	26 °C 79 F

As of July 20

## Message from past participant

**Soetrisno**  
Indonesia, participated in 30th IChO



My memory goes back 12 years when I participated in 30th IChO as one of Indonesian team members held in Australia. This year, I'm very happy that I can join IChO again as an Indonesian team guide. Hope you are all enjoying the unique Japanese summer experience. *Yokoso to Japan!*

## Useful Japanese Phrases 2

English		Japanese
I	Watashi	わたし
You	Anata	あなた
Friend	Tomodachi	友達 (ともだち)
Shop	Omise	お店 (おみせ)
Souvenir	Omiyage	お土産 (おみやげ)
Money	Okane	お金 (おかね)
Station	Eki	駅 (えき)
Train	Densha	電車 (でんしゃ)
Subway	Chikatetsu	地下鉄 (ちかてつ)
Street	Toori	通り (とおり)
House	Ie	家 (いえ)
Room	Heya	部屋 (へや)
Washroom	Toire	トイレ (といれ)



## Chemistry Sudoku 1

LEVEL ★☆☆

There are 14 elements which may be represented by single alphabets in the periodic table, nine of which are non-metals; H, B, C, N, O, F, P, S, and I.

### Instructions

- Take the 9 alphabets above, and place them in the frames so that each single alphabet appears only once in the squares enclosed by bold lines, and along each row or column.
- Rearrange the letters in 1, 2, 3, and 4. What do you find?

O	C			P		1		
F			H	I	O			
	I	S	2				F	
S				F				C
N			S		C			H
P				B				F
	F	3	4			B	S	
			N	H	I			O
				S			P	I

Answer : P.3

## Impression of Japan



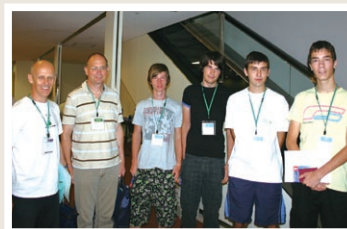
### Canada

Beautiful country and polite people.

### Slovenia

Very interesting and different country.

Many nice foods here!



## 42nd International Chemistry Olympiad

*Catalyzer*



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# Catalyzer

42nd International Chemistry Olympiad, Japan

No. 5

July 22, 2010



Chemistry  the key to our future



*Ceramics of Seto Area*



# 瀬戸焼 Setoyaki Ceramics of Seto Area



*Setoyaki* is a name given to pottery and porcelain which are produced in Seto area of Aichi Prefecture, which has more than 1000 years of history of pottery and ceramics making. Nowadays, the Japanese word *setomono*, literary meaning “things of Seto”, came to be used widely to refer to pottery and porcelain in daily life. In Seto region, high quality kaolin and strata rich in silica sand, which



Shaping a pottery



Glazing decoration



Glost firing

is material of glass, has been abundantly produced. The clay produced in Seto is globally well-known to be suitable to express delicate patterns of plaster mold and beauty of pure whiteness desired as good pottery. The glazing technique of glazed porcelain was originally brought from China to Seto area, and was fused with Japanese traditional glazing method. Approximately 800 years ago, a unique method including ash glaze or iron glaze began to be used for pottery and porcelain making. In this way,

the unique glazing method was established in Seto.

The melting points of these glaze materials are generally 100°C lower than that of the clay. Since a variety of metals are blended with silica or alumina as glazing, distinct colors appear depending on the temperature inside the kiln and/or oxidizing/reducing atmosphere.

In addition, a technique of *sometsuke* porcelain was brought in from the Arita region, a famous area for the porcelain they produce (*Arita-yaki*), which resulted development of *Seto Sometsuke*. When decorating with the *Sometsuke* method, desired form and surface patterns are made with clay and low-fired at relatively low temperature. Then drawing, or underglazing, is done with colored glazing before high-fired at higher temperature. Finally, overglazing is done with colored glazing and finished with a process called fusing, or firing with higher temperature.

After this the mainstream of *Setoyaki* became porcelain. As a number of famous artist painters visited Seto and taught the artisans the painting techniques since earlier days, the quality of painting on *Setoyaki* continued to improve. Consequently *Setoyaki* pieces received high reputation when it was displayed in World Expositions held in Europe in the early 20th century, and they are said to have inspired *Art Nouveau* from the late 19th century.

## Photocatalyst

“Photocatalyst” is found and developed by Professor Akira Fujishima. It accelerates chemical reactions under light. One of such substances that have been put to practical use is titanium dioxide (TiO<sub>2</sub>). Two kinds of photocatalytic action are known: oxidative decomposition and photo-induced hydrophilicity in TiO<sub>2</sub>. The photocatalyst can decompose organic matters or NO<sub>x</sub> adsorbed on the surface when exposed to UV light. Photo-induced hydrophilicity means that the substance exhibits high affinity to water under UV. By bringing out these two actions at the same time, various products with the following five functions come out: antifouling, antifogging, antibacterial, deodorizing, and air purification. Today this technology has come to be widely used as self-cleaning products such as anti-dirt lighting covers that are used inside tunnels, sound insulation walls and curved mirrors on the roadsides, tiles for walls and floors inside the operation rooms that may be sterilized by room lights, and commodities such as deodorizers.



Professor Fujishima coated the outside of his own house with TiO<sub>2</sub>.



## Sightseeing in Tokyo

An excursion in Tokyo was organized in the afternoon of July 20. The participants enjoyed the city view from Tokyo Tower and strolled around Asakusa.

At Sensoji temple in Asakusa



At Tokyo Tower

A variety of things are sold.



Walking around Nakamise-dori (Asakusa)



## Japanese Gardens

In its history, Japanese garden styles have been influenced to transform with changes in architectural styles and religious and ideological impacts of the day. Typical Japanese gardens today have a pond in the center surrounded by natural or artificial miniature hills seen as mountains, and garden rocks and plants are placed so that the landscapes may be enjoyed for every season of the year. Some well-known examples of the techniques include placing a rock in the pond to represent an island, and portraying water streams without using real water but using pebbles and sand. The placement of rocks is sometimes infused with religious or ideological meanings.



At Ryoanji Temple



At Adachi Museum of Art




# Program, July 22 [thu.]

Students		Mentors and Scientific Observers	
7:00-	Breakfast	7:00-	Breakfast
8:30-	Transfer to Waseda Univ.	9:00-	Excursion (Tokyo)
10:00-	Lab Safety Instruction		
	Lunch		
12:00-	Practical Exam	16:00-	Meet with Authors
18:00-	Dinner (Waseda)	18:00-	Dinner (OVTA)
21:00-	Free Time	20:00-	2nd Jury Meeting

## WEATHER NEWS


**Tokyo**



cloudy after fine

high	33 °C 91 F
low	28 °C 82 F

**Chiba**



fine

high	33 °C 91 F
low	27 °C 81 F

As of July 21

## Useful Japanese Phrases 3

### English

Where is ...?  
What time is it now?  
How much does it cost?  
I will take it.  
Where are you from?  
I am from...

...wa doko desuka?

Nanji desuka?

Ikura desuka?

Koreo kudasai.

Dokokara kimashitaka?

...kara kimashita.

### Japanese

...はどこですか?

なんじですか?

いくらですか?

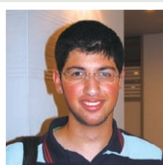
これをください。

どこからきましたか?

...からきました。

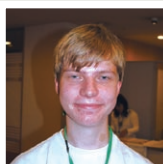
Happy Birthday!!

July 22



**Christos Anastassiades**  
Cyprus

**Hobby**  
Football  
**Favorite Food**  
Chicken souvla



**Jari Tapio Huisman**  
Finland

**Hobby**  
Chemistry, of course  
Playing the clarinet  
**Favorite Food**  
Pizza, no doubt

## Impression of Japan Singapore

Well organized, hospitable, friendly people



## Iceland

Hot climate and a lot of people.



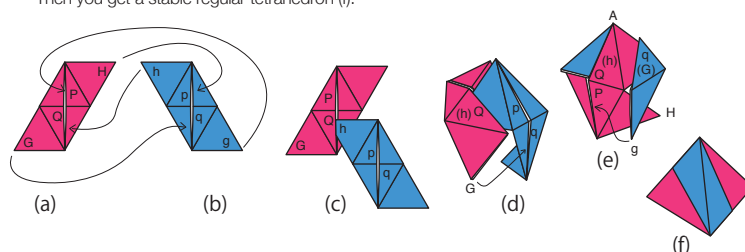
## Stereochemistry with ORIGAMI 2

Continued from No.3

### Regular tetrahedron from two rectangular sheets of origami paper.

A stable regular tetrahedron (f) can be obtained by assembling the pair of unstable tetrahedra (a) and (b) which were folded in the previous issue.

- ◆ Prepare a pair of units (a) and (b) of opposite chirality.
- ◆ Insert horn (h) into pocket (Q) as shown in (c). Then both the units spontaneously become some polyhedral form like (d).
- ◆ Insert horn (G) into pocket (q) as in (e).
- ◆ Continue this process according to the arrows shown in (a) and (b). Then you get a stable regular tetrahedron (f).



## 42nd International Chemistry Olympiad

*Catalyzer*



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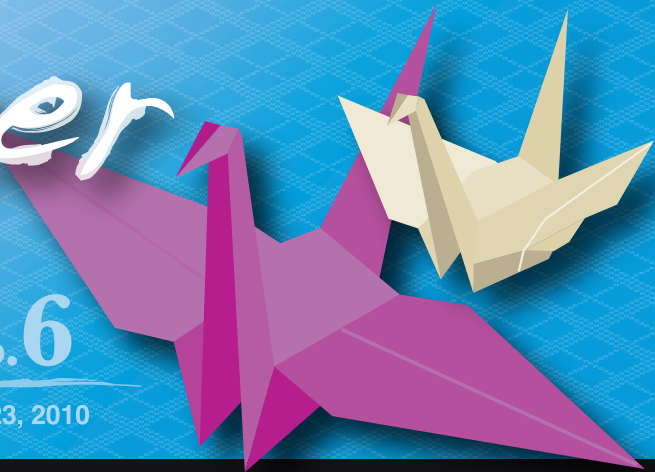


# Catalyzer

42nd International Chemistry Olympiad, Japan

No. 6

July 23, 2010



Chemistry   
the key to our future



*Gold Leaf*

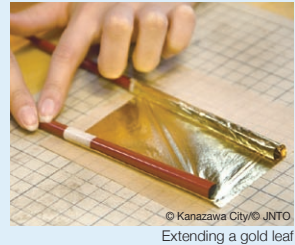


# 金箔 Kinpaku Gold Leaf



Gold is very scarce resource which is chemically very stable and electrochemically keeps high potential; with beautiful shiny texture it is widely sought for as materials for jewelry, and for decorative purpose gold leaf is often used. Today more than 99% of gold leaves made in Japan are produced in Kanazawa, Ishikawa Prefecture. These gold leaves are widely used for National treasures including *Kinkaku-ji* temple and *Konjiki-do* (the Golden Hall) of *Chuson-ji* temple, and for traditional crafts such as *shikki* (lacquerware) and Buddhist altar articles. The reasons why this area came to be home for gold leaf craftwork were that the highly humid climate in Kanazawa is suitable for gold beating, "soft water" needed for gold beating is available, and also regions such as Wajima and Nanao, the areas that produce lacquerwares and Buddhist altar articles respectively were close by: they consume a lot of gold leaves. Kanazawa gold leaves are still handcrafted one by one in the same traditional method as in olden days. The manufacturing process may be briefly divided into three processes. First, gold alloy is prepared by mixing small portion of silver

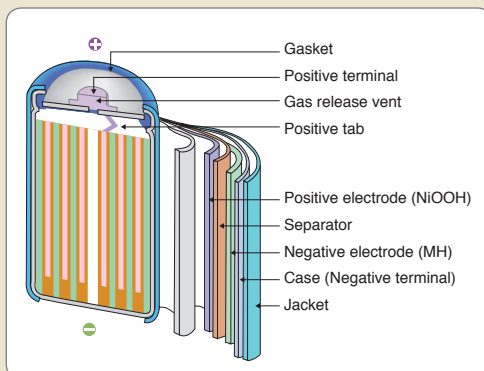
with material gold and melting completely at temperature of 1300°C, then extending it to 10  $\mu\text{m}$  ( $10^{-5}$  m) thick by applying pressure.



Second, the alloy is put between "*sumiuchi-shi*", special paper for this purpose, and beaten until it becomes 1  $\mu\text{m}$  thick called "*uwazumi*". Finally, the *uwazumi* is put between sheets of paper called *haku'uchi-shi* (hammering paper) and beaten again to finish off. High quality paper is essential for producing good gold leaves, and this paper making alone takes around four months.



## Batteries ■■■



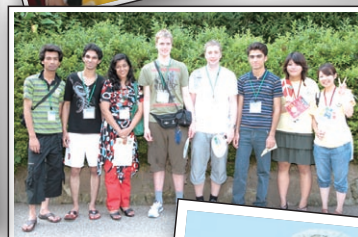
Rechargeable batteries are attracting more interest in recent years due to increasing awareness of environmental issues and wider use of portable electronic devices. Limitations of conventional rechargeable batteries such that unlike cell batteries they need recharge before use when first bought, and that they cannot be stored in long term (due to self discharge) prevented it from broader use. However, newly developed nickel-metal hydride (NiMH) batteries have resolved these limitations. A new material called Superlattice Hydrogen-Absorbing Alloys is used as negative-electrode material, which reduces generation of substances responsible for self-discharge, thus makes it possible to sell fully charged batteries which is ready to use. Since the charging capacity of a battery drastically increased as well as its charge cycle has been improved to approximately 1000 times, it is expected that more new markets will be created.



# A Trip to Kamakura

Excursion to Kamakura was held on July 21. The participants went to see *Tsurugaoka Hachimangu* shrine, Great Buddha (*Kamakura Daibutsu*), and *Kencho-ji* temple.

At *Tsurugaoka Hachimangu* shrine



In front of  
Great Buddha



## Myriad-Year Clock



Myriad-year clock  
© National Museum of Nature and Science

Myriad-year clock (*Man-nen dokei*) is a Japanese mechanical clock designed and produced by a Japanese inventor Hisashige Tanaka, who is the founder of a company that later became Toshiba, and was known as “*Karakuri Giemon*” (literally means *Giemon* of automata; *Giemon* was his childhood name) in around 1850. Driven by two sets of (brass double) springs, this machine could move 6 sets of hands at the same time, as well as it could ring the bell and show Oriental Zodiac and moon phases. This clock exhibits Hisashige’s mastery in metal work as well as his great talents in inventing new machinery, showing high level of technology that Japan had in the Edo period. At the same time, with its grace and elegance this clock is also recognized as a first grade traditional art craft; it was designated a national important cultural property in 2006. It is now displayed at National Museum of Nature and Science where you will visit during your stay in Tokyo. Can you find it?




			8	3	0	1
			9	0	5	2
+	7	8	5	4	6	3
			8	0	2	8
					1	6

# Program, July 23 [fri.]

Students		Mentors and Scientific Observers	
7:00-	Breakfast	7:00-	Breakfast
9:00-	Transfer to Meguro	9:00-	Translation
10:00-	Japanese Culture Experience		
12:00-	Lunch	12:00-	Lunch (OVTA)
13:30-	Excursion (National Museum of Nature and Science)	13:30-	Translation
18:00-	Dinner (NYC)	18:00-	Dinner (OVTA)
20:00-	Free Time	20:00-	Free Time

## WEATHER NEWS

**Tokyo**




occasionally cloudy

high 34 °C  
93 F

low 25 °C  
77 F

**Chiba**




fine

high 33 °C  
91 F

low 24 °C  
75 F

As of July 22



## Fe + Au + Ag → I !?

LEVEL ★★★

Each alphabet represents a different number from 0 to 9, so the same numbers appear where the same alphabets are seen. Now, can you tell which alphabet represents which number?

	I	R	O	N		
	G	O	L	D		
+	S	I	L	V	E	R
<hr/>						
	I	O	D	I	N	E

Hints: N=1, D=2 and R=3

## Impression of Japan

### Kuwait It's awesome.



### Poland Definitely hot and humid.



## Useful Japanese Phrases 4

English		Japanese
1 (one)	Ichi	一 (いち)
2 (two)	Ni	二 (に)
3 (three)	San	三 (さん)
4 (four)	Shi or Yon	四 (し、よん)
5 (five)	Go	五 (ご)
6 (six)	Roku	六 (ろく)
7 (seven)	Shichi or Nana	七 (しち、なな)
8 (eight)	Hachi	八 (はち)
9 (nine)	Ku or Kyu	九 (く、きゅう)
10 (ten)	Juu	十 (じゅう)
42 (forty two)	Yonjuu Ni	四十二 (よんじゅうに)
2010 (two thousand ten)	Nisen Juu	二千十 (にせんじゅう)
100 (hundred)	Hyaku	百 (ひゃく)
1000 (thousand)	Sen	千 (せん)
10000 (ten thousand)	Ichi-Man	一万 (いちまん)

## Happy Birthday!!

July 21



**Davit Arzumanyan, Armenia**

**Hobby**  
Football, Swimming, and  
Collecting stamps

**Favorite Food**  
Pizza

**Gogg Sebastian, Austria**

**Hobby**  
Cycling, Table tennis, Chemistry

**Favorite Food**  
Wiener Schnitzel



## 42nd International Chemistry Olympiad

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("Today's photo" is available on this site.)





# Catalyzer

42nd International Chemistry Olympiad, Japan

No. 7

July 24, 2010

Chemistry   
the key to our future



*Cloisonné Works*



# 七宝焼 *Shippo-yaki* Cloisonné Works



A cloisonné is a piece created with a technique to decorate metalwork made from gold, silver, copper etc. The metal basis is colored with fine glassy powder, and then heated in a kiln for the glaze to fix. In Japanese such technique as well as the pieces created using it is called "*Shippo-yaki*." The word *Shippo* originally came from Buddhist terms meaning "seven precious things", namely, gold, silver, lapis



Shaping a metal basis



Decorating with glazing

lazuli, shells of giant clams (*shako*), agate, pearls and *iye* (a kind of agate produced in China). The name *Shippo-yaki* was given as the cloisonné piece so created was thought to be as beautiful as the *Shippo*.

The technique was originally invented in the region around Middle East, and cloisonné pieces are

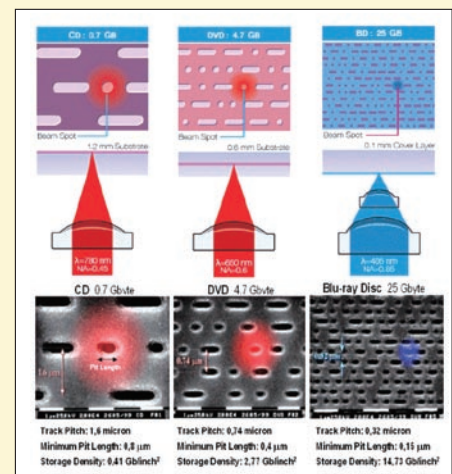
found from excavated ancient Egyptian ruins: it is believed to have been brought to Japan between 3rd and 7th centuries via China. In 19th century, numerous craftworks and decorative articles of definite Japanese style were produced using this technique.

The glazing used in *Shippo-yaki* is mainly composed of  $\text{SiO}_2$ ,  $\text{Pb}_3\text{O}_4$ ,  $\text{KNO}_3$ ,  $\text{Na}_2\text{CO}_3$ , etc, and transition metal compounds such as cobalt oxide, iron oxides, and manganese dioxide are added. Heated up to temperature of around 800 °C on the metallic base, the glazing melts to show glassy color, depending on which kinds of metals are contained (e.g., red for gold, blue for copper oxide, indigo for cobalt oxide, purple for manganese dioxide, and brown for iron oxide). A *Shippo-yaki* piece is completed by painting elaborate patterns and motifs on the base with various glazing and fusing in kilns.

Because the process is relatively simple, some handicraft shops and *Shippo-yaki* shops in Japan offer cloisonné-making experience programs. If you come across one of those, why don't you give it a try?

## Blu-ray

Blu-ray disc is an optical disc storage that uses blue-violet laser to write and rewrite data on the disc. While in case of CD and DVD red laser that has a wavelength of 650 nm is used, the blue violet laser used for Blu-ray has a wavelength of 405 nm; this makes it possible to reduce the radius of beam spot, allowing significantly more data to be stored on a single disc compared to DVDs: the capacity is as high as 25 GB per single-layer disc and 50 GB per dual layered disc. This made it possible not only to enjoy a full high definition movie at home, but also to add interactive functions, and even connection to internet. Usage as completely new types of media is still actively sought for. The blu-ray may hold enormous potentialities to provide brand new visual experience, improving and innovating existing ways of entertainment.





# Practical Exam

The 5-hour practical exam session was held at Waseda University Nishiwaseda Campus from 1 pm to 6 pm of July 22.



## How was the practical exam?

**Stephen Haniel Yuwono, Indonesia**

It's not like what I was expecting, but I can do it well enough. It's tiring actually, but it's always amusing to see the beauty of chemical substances' colors.



**Hanieh Safari, Iran**

I now feel comfortable. It's important that it finished.



**Luciano Barluzzi, Italy**

I think good!!



**Gonçalo Vitorino Bonifácio, Portugal**

I really don't know. I wasn't really sure of most of the answers, but I hope I wasn't that wrong. Now the hopes are on the theoretical exam. Good luck to everyone.




# Program, July 24 [sat.]

Students		Mentors and Scientific Observers	
7:00-	Breakfast	7:00-	Breakfast
8:00-	Transfer to Univ. Tokyo	8:00-	Excursion (Kamakura)
9:00-	Theoretical Exam		
14:30-	Lunch		
16:30-	Transfer to Yokohama		
19:00-	Reunion Party	19:00-	Reunion Party
21:00-	Transfer to NYC	21:00-	Transfer to OVTA

## WEATHER NEWS

**Tokyo**




occasionally cloudy

high 34 °C  
93 F

low 26 °C  
79 F

**Chiba**



occasionally cloudy

high 33 °C  
91 F

low 24 °C  
75 F

As of July 23

## Hope for IChO

### Uruguay

To meet new people from other cultures and do our best for the competition.



### Switzerland

Making new friends from all around the world and keep improving our performance.



### Malaysia

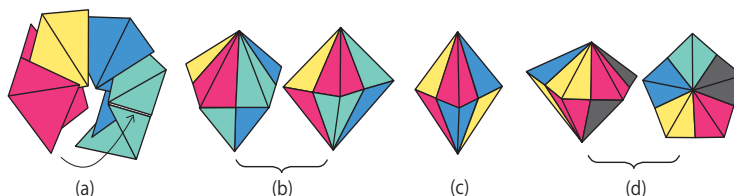
To learn more about chemistry for everything around us involves chemistry. After all, chemistry is "the key for our future"!



## Stereochemistry with ORIGAMI 3

### Regular octhedron from four rectangular sheets of origami paper.

- ❖ A stable regular octahedron (b) can be obtained by assembling four units of the same chirality as in (a). In other words, (b) can be obtained from 4R or 4L (See No.3 or 5), where R and L, respectively, stand for the right- and left-handed units. A regular octahedron can also be obtained from 2R+2L.
- ❖ By using either, 3R, 3L, 2R+1L, or 1R+2L, one can construct a trigonal bipyramid (c).
- ❖ By using either combination of 5-0, 4-1, or 3-2, one can construct a pentagonal bipyramid(d).
- ❖ Many other polyhedra, such as an icosahedron (5R+5L), and even a soccer ball (football) (45R+45L!!) can be constructed from these units.



## Message from past participant



**Zahariev Ivan**  
Bulgaria, participated in 31st and 32nd IChO

I wish you a good luck and success in the olympic competition!!! Try to do your best, I am sure all of you will!!! Don't feel disappointed if some problems are not solved so well and if your results are not the ones you have dreamed for!!! You are country representatives, great people! Remember the Olympic principle that the participation in IChO is the most prestigious thing in the World! Try to create as many friends as possible here in Tokyo, try to get to know Japan and its wonderful culture! Let us enjoy 42nd International Chemistry Olympiad together!!!

## 42nd International Chemistry Olympiad

*Catalyzer*



Editor-in-chief : **Haruo Hosoya**

Editors : Shigeru Machida, Atsunori Mori, Hiroshi Seta, Daisuke Takeuchi, Akiko Utagawa, Yuki Yamasaki  
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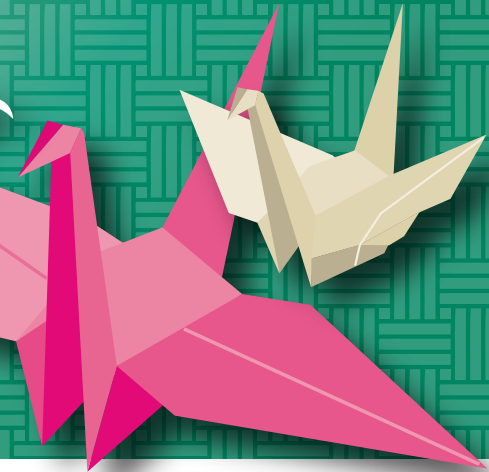


# Catalyzer

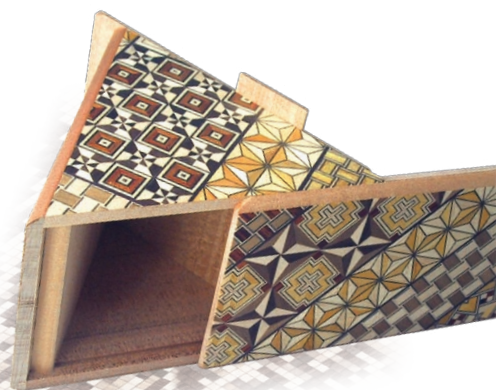
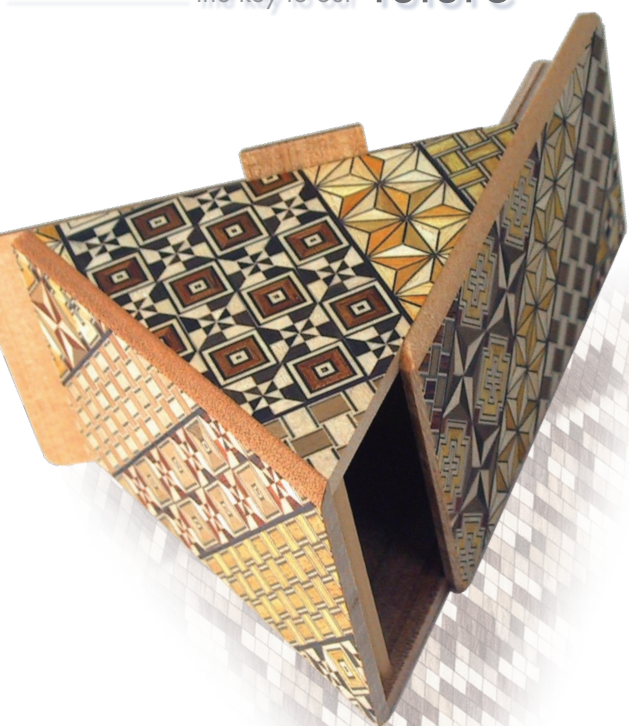
42nd International Chemistry Olympiad, Japan

No.8

July 25, 2010



Chemistry  the key to our future



*Wood Mosaic Works*



# 寄木細工 Yosegi-zaiku

## Wood Mosaic Works

*Yosegi-zaiku* is a kind of wood mosaic works which express geometrical patterns by combining and assembling natural wood materials of various colors and grains. While this kind of wood craft is widely found elsewhere in the world, in Japan *yosegi-zaiku* has especially been produced in Hakone area, Kanagawa Prefecture, and has come to be a well-known traditional handicraft.



Japanese plane (*kanna*)



Shaving the surface

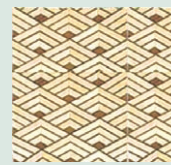


A variety of *yosegi-zaiku*

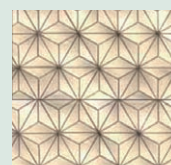
To make a *yosegi-zaiku* wooden pieces of different colors and grains are assembled and glued together to form patterned units, and they are combined to make beautiful larger patterns. Sometimes the patterned wooden pieces could be carved into bowls, trays, and so on, but they are usually shaven using Japanese plane (*kanna*) into thin sheets of approximately 0.2 mm thick and pasted on the surfaces of ordinary wooden boxes, etc.



*kikko*



*nami*



*asanoha*

The geometrical patterns used in *yosegi-zaiku* are often those representing nature, such as *kikko* ("tortoise shell", hexagonal patterns), *nami* ("waves"), and *asanoha* ("hemp leaves", triangle patterns). On the other hand, a method called *mokuzougan* (joined wooden block construction) is also popular in recent years, where wooden pieces are assembled to form pictures and shaven to a sheet, then pasted on sheets of Japanese paper (*washi*).

## Nikko



A famous sculpture, "a sleeping cat"



Yomeimon gate



"See no evil, hear no evil, speak no evil"

Located in the northern mountain range of Kanto plain, Nikko is blessed with beauty of nature, water and forest areas; you can enjoy beautiful scenery of four seasons around Lake *Chuzenji*, and the *Oku-nikko-shitsugen* area inscribed as a registered wetland under the Ramsar Convention, including Lake *Yuno-ko*, River *Yugawa*, *Senjogahara*, and *Odasirogahara*. Additionally, the building complex consisting of a total of 103 buildings (nine of which are registered as Japan's national treasures and 94 the important cultural properties) belonging to *Toshogu* shrine, *Rinnou-ji* temple, and *Futarasan* shrine on Mt. *Nantaisan* and the historic monuments around the area are UNESCO's world cultural heritage. Nikko is a spiritual area, where great beauty of nature and historic temples and shrines coexist in accord, where people can feel their spirits cleansed, and where spiritual culture still exists which Japanese people have cherished since ancient times.



# Experiencing Japanese Culture and Science

In the morning of July 23, a cultural and science experience program for the students was held at Meguro Gajoen and National Museum of Nature and Science.



"Yume" means Dream



"Ai" means Love



"Wa" means Peace, Japanese, ...



## Princess Kaguya welcomes your visit to Japan!

Have you already taken photos of yourself with Princess Kaguya at OVTA?

The story of Princess Kaguya (*Kaguyahime*) is one of the oldest existing fairy tale in Japan. It is a story of a baby found inside a bamboo plant. The baby grows up to become such a beautiful lady that many noblemen of Kyoto come to court her, but without success. She always avoids their proposal by demanding things impossible to get. Finally, she confesses that she is a moon dweller destined to go home on the moon, and she leaves with the servants who come to pick her up.

If you want to make a *Kaguyahime* of yourself, don't miss this opportunity at NYC (International Conference Room) today. She came from OVTA to NYC before going back to the moon.




L	M	V	I	W	K	H	T	F
T	W	H	L	M	F	V	K	I
K	F	I	H	T	V	L	W	M
H	I	T	K	V	L	F	M	W
M	V	W	F	I	T	K	H	L
F	L	K	M	H	W	I	V	T
V	K	M	W	L	I	T	F	H
W	T	L	V	F	H	M	I	K
I	H	F	T	K	M	W	L	V

# Program, July 25 [sun.]

Students		Mentors and Scientific Observers	
7:00-	Breakfast	7:00-	Breakfast
9:00-	Sports (NYC)	7:30-	Marking Task
12:00-	Judo (Kodokan)	10:30-	Excursion (Chiba)
15:00-	Sports and Games (NYC)		
18:00-	Dinner (NYC)		
20:00-	Japanese Drum Performance		
21:00-	Free Time	20:00-	3rd Jury Meeting

## WEATHER NEWS

**Tokyo**




rainy after sunny

high 34 °C  
93 F

low 26 °C  
79 F

**Chiba**



rainy after sunny

high 34 °C  
93 F

low 25 °C  
77 F

As of July 24

Happy Birthday!!

July 25



**Edvard Sargsyan, Armenia**

**Hobby**

Computers and mobiles

**Favorite Food**

Chocolate cake

July 23



**Erwin Mora, Venezuela**

**Hobby**

Chemistry, music, and movies

**Favorite Food**

Sushi and "Arepa"

## Useful Japanese Phrases 5

English		Japanese
Sunny	Hare	晴れ (はれ)
Cloudy	Kumori	曇り (くもり)
Rainy	Ame	雨 (あめ)
Snowy	Yuki	雪 (ゆき)
Hot	Atsui	暑い (あつい)
Cold	Samui	寒い (さむい)
Warm	Atatakai	暖かい (あたかい)
Cool	Suzushii	涼しい (すずしい)
Mountain	Yama	山 (やま)
Sea	Umi	海 (うみ)
River	Kawa	川 (かわ)
Water	Mizu	水 (みず)
Sky	Sora	空 (そら)
Sun	Hi	日 (ひ)
Moon	Tsuki	月 (つき)



## Chemistry Sudoku2

LEVEL ★★☆☆

There are 20 kinds of amino acids that constitute protein, and eight of them which cannot be synthesized inside the human body are called essential amino acids and a human being needs to take them from plants and animals. These are: leucine (L), isoleucine (I), valine (V), methionine (M), phenylalanine (P), threonine (T), tryptophan (W), and lysine (K). Additionally, histidine (H) is sometimes included to this list.

Fill the cells with these alphabets so that each of the essential amino acids appears only once in each row, column and the smaller 3×3 grids surrounded by bold lines.

	M		I			H		
T			L			V		I
K		I					W	
	I		K			F		
M			F	I	T			L
		K			W		V	
	K					T		H
W		L			H			K
		F			M		L	

Answer : P.3

## Introduction



## 42nd International Chemistry Olympiad

*Catalyzer*



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# Catalyzer

No. 9

42nd International Chemistry Olympiad, Japan

July 26, 2010



Chemistry   
the key to our future

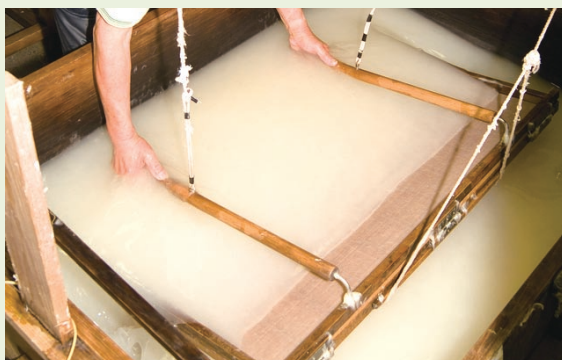


*Japanese Paper*



# 和紙 Washi Japanese Paper

*Washi* is the name given to paper that is made from three kinds of Japanese indigenous trees by the traditional method that was originally brought from Asian mainland and adopted to form a unique technique to Japan. Handmade paper (*tesuki washi*) especially is a traditional craftwork that involves highly advanced skill to pour paper material mixture into a flat bed called “*suketa*” followed by draining the mixture of water to form paper of homogeneous thickness. *Washi* is characterized by longer fiber that constitutes the paper, and neutrality. Because of these features, it is strong and stable in storage despite its extreme thinness at a minimum of 0.02 mm.



Paper making on *suketa*

The longer and interwoven fiber also contributes to its distinctive surface texture. Therefore, *washi* is used in a variety of ways including artistic purposes such as Japanese style painting and wood block printing, bases for *chiyogami* (paper with colored figures), materials for paper craft work, oiled-paper umbrella, and *kaminabe* (paper-made pan). It is also used for Japanese bank notes which are known to be one of the highest quality in the world.



Mitsumata, material trees



Orizuru, arranged cranes

## Reunion Party!!

In the evening of July 24, the students and the mentors met again at the party held at Yokohama Pan Pacific Yokohama Bay Hotel Tokyu for the first time in 5 days after the opening ceremony.



All the exams are done:  
we can only wait.



Met again.  
So much to talk about.





## Theoretical Exam

The 5-hour theoretical exam session was held from 9 am to 2 pm at the University of Tokyo Komaba campus.



## Activities of Mentors

### Interview to Mentor

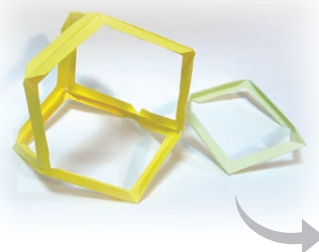
Kimberly A. Gardner, United States



#### How is the Chemistry Olympiad in Japan?

So far everything has been extremely well organized. Everyone is so polite and helpful. Today's excursion to Tokyo has been very fun.

(This interview was conducted on July 22.)




# Program, July 26 [mon.]

Students		Mentors and Scientific Observers	
7:00-	Breakfast	7:00-	Breakfast
8:00-	Excursion (Nikko)	9:00-	Arbitration
		12:00-	Lunch (OVTA)
		13:30-	Arbitration
		18:00-	Dinner (OVTA)
		20:00-	4th Jury Meeting

## WEATHER NEWS


**Tokyo**



**occasionally sunny**

high	33 °C 91 °F
low	26 °C 79 °F

**Chiba**



**occasionally cloudy**

high	34 °C 93 °F
low	26 °C 79 °F

As of July 25

Happy Birthday!!

July 26



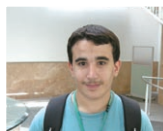
**Konráð Porsteinsson, Iceland**

**Hobby**

Climbing, driving, and rambling about mathematics

**Favorite Food**

Chicken breast & pizza!



**Ali Mourtada, Syria**

**Hobby**

Table tennis

**Favorite Food**

Pasta and lasagna



**Johannes Hellwagner, Austria**

**Hobby**

Swimming, cycling, reading, chemistry

**Favorite Food**

Pizza, Schnitzel

## Introduction



**Mongolia**

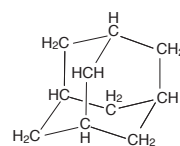
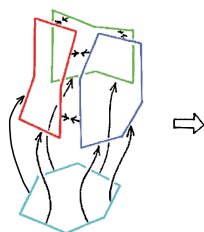
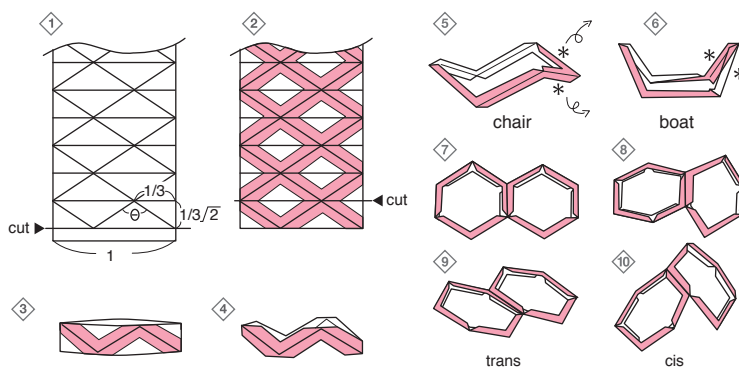


**Brazil**

## Stereochemistry with Envelope

### Multicyclic Hydrocarbons from Envelope.

- 1 Draw these lines on an envelope. Length to breadth ratio = 1:0.236.
- 2 Draw parallel lines along the slant lines to form a grid.
- 3 Cut off rectangles to make cylinders. Make crease along the slant lines.
- 4 Cut out colored zigzag cylinders.
- 5 Open it by folding backward all the way along the zigzag lines, and you get the chair form of cyclohexane.
- 6 Fold up ward a pair of consecutive CC bonds, and you get the boat form.
- 7 By gluing a pair of cyclohexane, you can prepare various kinds of bicyclic hydrocarbons
- 8 such as decaline, bicyclononane, and bicyclooctane.



From four cyclohexane units you can prepare adamantane, and by continuing this process you can construct a diamond lattice.

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# Catalyzer

No. 10

42nd International Chemistry Olympiad, Japan

July 27, 2010



Chemistry   
the key to our future



*Yuzen Dyeing*



# 友禪 Yuzen Yuzen Dyeing



Motif dyeing on textile

*Yuzen* dyeing is one of the most typical techniques to dye textiles in Japan, primarily used to dye *kimonos*. One distinctive feature of this method is the use of protection glue (which prevents dyes from getting into the fiber) for drawing the motifs. The traditional protection glue was starch made of sticky rice, but more recently synthetic gum is also common. First outline of design is done on white textile, and then protection glue is applied along the drawn outline. Then dyes of a variety of colors are used to paint the motifs. Thanks to the protection glue the colors do not intermingle with each other, and clearly separated. Finally the whole motif is covered with the protection glue, and the whole textile is dyed with the background color. After the dyeing the protection

glue and excess dyes are to be washed away. In olden days this washing process was typically done by floating the dyed textiles in the clean streams of rivers; the



Yuzen-nagashi

beautiful sight of dyed textiles in the river was called *yuzen nagashi* (Flowing *yuzen*). Using protective glue makes it possible to dye precise and flexible motifs on soft textile.

Traditionally the dyes used in *yuzen* were pigments and natural dyes extracted from plants such as indigo or safflower (indigo, safflor yellow, carthamin, brazillin etc.) and from insects (cochineal extract); however, chemical dyes have become common in recent years.

## Kaga Yubinuki (thimbles)



A thimble (*yubinuki*) is a small finger shield generally worn during hand sawing to protect fingers from needles and to push the needle through the material more easily. Though typical western thimbles are bell shaped, Japanese ones usually look like rings. A *kaga yubinuki* is a colorful sawing tool, but it is not just beautiful - it also represents "MOTTAINAI" spirit, as it used to be hand made by reusing leftover threads in the process of sawing *kaga yuzen kimonos*. A hand-made *kaga yubinuki* will be awarded to the gold medalists as a special commemorative of Chemistry Olympiad in Japan.

## Senbazuru (thousand origami cranes)

The word "*senbazuru*" commonly refers to one thousand folded (origami) cranes linked together with threads. Cranes are birds that symbolize happiness and a long life. It is a Japanese custom to fold origami cranes when praying for particular wishes, and when a thousand of cranes are made, it is the time the wishes comes true.

In 2003 Japanese students participated in IChO for the first time. Then we wished to hold IChO in Japan, and started folding origami cranes. Our wish has come true. We believe that every participant has enjoyed IChO 2010 in Japan, and wish him/her a "Good Luck".



## Kijima Taiko

At the dinner time of July 25, the students enjoyed the performance of *kijima Taiko* (traditional drumming) by Japanese female students.



Rhythm of Japanese drums is interesting.

Picking up the beat



## Visiting Kodokan

In the afternoon of July 25, the students visited *Kodokan* and watched and experienced Judo practice.



Manners are highly respected in Judo.



It's Judo. Powerful!



## Extra Participants ♥♥♥



"Lille Kurt Brousted"  
— Denmark —



"Kirby"  
— Australia —



"Odd Hassel"  
— Norway —



"Kakas"  
— France —



United States



Belarus



Tajikistan

Ag	Pb	Cu	C	Au	Sn	S	Fe	Hg
Au	Sn	C	Fe	S	Hg	Ag	Cu	Pb
S	Fe	Hg	Cu	Pb	Ag	C	Au	Sn
Sn	Au	Ag	S	Cu	Pb	Fe	Hg	C
Cu	Hg	S	Ag	Fe	C	Sn	Pb	Au
Fe	C	Pb	Hg	Sn	Au	Cu	Ag	S
Hg	S	Au	Sn	Ag	Cu	Pb	C	Fe
C	Ag	Sn	Pb	Hg	Fe	Au	S	Cu
Pb	Cu	Fe	Au	C	S	Hg	Sn	Ag

# Program, July 27 [Tue.]

Students		Mentors and Scientific Observers	
7:00-	Breakfast	7:00-	Breakfast
	Free Time in Tokyo	9:00-	Transfer to Waseda
	Transfer to Waseda	10:00-	Free Time in Tokyo
15:00-	Closing Ceremony	15:00-	Closing Ceremony
18:30-	Farewell Party	18:30-	Farewell Party
20:30-	Transfer to NYC	20:30-	Transfer to OVTA



United Kingdom



Kyrgyzstan



Kazakhstan



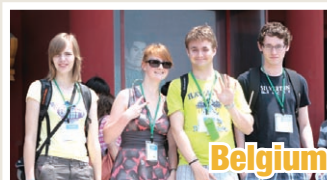
Germany



Chinese Taipei



Bulgaria



Belgium



Azerbaijan

## WEATHER NEWS

### Tokyo



occasionally cloudy

high 34 °C  
93 °F  
low 27 °C  
81 °F

### Chiba



occasionally cloudy

high 33 °C  
91 °F  
low 27 °C  
81 °F

As of July 26



## Chemistry Sudoku 3

LEVEL ★★★

Among the elements constituting the earth's crust, Si is the most abundantly included, and metal elements included are Al, Fe, Ca, Mg, Na, K, Ti, and Mn in the order of abundance.

Fill the cells with the letters representing above elements so that each element appears only once in each row, column and the 3 × 3 grids surrounded by bold lines.

Mn			K			Na	Si
		Si		Al	K		
		K	Mg				Mn
	K			Ca		Fe	
Al	Mn			Si		Ti	Mg
	Si		Fe			Mn	
Si				Fe	Al		
		Al	Si		Mn		
Fe	Ca			Mn			Na

Answer : P.3

## Useful Japanese Phrases 6

### English

July 27th  
Today  
Yesterday  
Tomorrow  
Monday  
Tuesday  
Wednesday  
Thursday  
Friday  
Saturday  
Sunday  
Morning  
Afternoon  
Evening

Shichigatsu  
nijuushichinichi

Kyou  
Kinou  
Ashita  
Getsuyoubi  
Kayoubi  
Suiyoubi  
Mokuyoubi  
Kin-youbi  
Doyoubi  
Nichiyoubi  
Asa  
Hiru  
Ban

### Japanese

七月二十七日  
(しちがつにじゅうしちにち)  
今日 (きょう)  
昨日 (きのう)  
明日 (あした)  
月曜日 (げつようび)  
火曜日 (かようび)  
水曜日 (すいようび)  
木曜日 (もくようび)  
金曜日 (きんようび)  
土曜日 (どようび)  
日曜日 (にちようび)  
朝 (あさ)  
昼 (ひる)  
晩 (ばん)

## 42nd International Chemistry Olympiad

Catalyzer



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# Catalyzer

No. 11

42nd International Chemistry Olympiad, Japan

July 27, 2010



Chemistry   
the key to our future



***Congratulations!***





# Gold



# Silver

Xianghang Shangguan	China	Diptarka Hait	India	Anton Topchiy	Ukraine
Daniil Khokhlov	Russia	Deniz Caglin	Turkey	Surendra Kotra	India
Pilkeun Jang	Korea	Pavel Svec	Czech Republic	Kengo Kataoka	Japan
Robert Pollice	Austria	Constantin Giurgiu	Romania	Brian Bi	Canada
Seyed Amirhossein Nasser	Iran	Florian Berger	Germany	Dominik Štefanko	Slovakia
Qilei Zhu	China	Hiroki Uratani	Japan	Leonard Hasenclever	Germany
Alif Noikham	Thailand	Binh Nguyen Duc	Viet Nam	Khu Boon Hou Derek	Singapore
Ruth Franklin	United Kingdom	Mehmet Cem Sahiner	Turkey	Áron Szigetvári	Hungary
Khetpakorn Chakarawet	Thailand	Levindo Jose Garcia Quarto	Brazil	Alexander Kochnev	Russia
Yu-Chi Kuo	Chinese Taipei	Jiraborrirak Charoenpattarapreeda	Thailand	Kirill Sukhovetkov	Russia
Zhiyao Zhou	China	Wei-Che Tsai	Chinese Taipei	Rémi Olivier Patin	France
Assaf Mauda	Israel	Attila Sveicz	Hungary	Cyril Tang	Australia
Manoel Manuputty	Indonesia	Tng Jia Hao Barry	Singapore	Richard Liu	Canada
Ruyi Wang	China	Witold Hoffmann	Poland	Joshua Stedman	United Kingdom
Rafael Angel Rodriguez Arguedas	Costa Rica	Bo-Yun Gu	Chinese Taipei	Quang Luu Nguyen Hong	Viet Nam
Pinnaree Tea-Mangkornpan	Thailand	Manuel Eberl	Germany	Dzianis Kuliomin	Belarus
Hayate Saitoh	Japan	Connie Zhao	Canada	Dominykas Sedleckas	Lithuania
Eszter Najbauer	Hungary	Kornel Ocytko	Poland	Jarkko Timo Olavi Järvelä	Finland
Ken-Ichi Endo	Japan	Luca Zucchini	Italy	Roberts Bluķis	Latvia
Gleb Široki	Estonia	Richard Li	United States	Hossein Dadashazar	Iran
Colin Lu	United States	Won Jae Kim	Korea	Vidmantas Bieliunas	Lithuania
Alexander Siegenfeld	United States	Vranješević Filip	Croatia	Alimatun Nashira	Indonesia
Máté Somlyay	Hungary	Marek Buchman	Slovakia	Sergiy Shyshkanov	Ukraine
Hyeonjae Lee	Korea	Ladislav Hovan	Slovakia	Yeoh Keat Hor	Malaysia
Ondrej Hak	Czech Republic	Nikunj Saunshi	India	David Edey	United Kingdom
Fong Jie Ming Nigel	Singapore	Mads Bøttger Hansen	Denmark	Baptiste Couet	France
Lum Jian Yang	Singapore	Mohammadreza Amirmoshiri	Iran	Hanieh Safari	Iran
Frantisek Petrous	Czech Republic	Ondrej Henych	Czech Republic	Kucanda Kristina	Croatia
Nicolas Villagran Dos Santos	Argentina	Fatih Alcicek	Turkey	Sebastian Gogg	Austria
Jaehyun Lim	Korea				
Vladimiras Oleinikovas	Lithuania				
Ming-Ko Cho	Chinese Taipei				

## Design of the medals

### Obverse



#### Mt. Fuji (*Fujisan*)

Mount Fuji is the highest mountain (3776 m) in Japan. It is frequently depicted in drawings and photographs as a symbol of Japan.

#### Japanese Wisteria Flower (*Fuji*)

Japanese wisteria is one of the most popular flowers in Japan. It blooms in early summer. The purple flowers have been a favorite motif for *kimonos* and a subject for art and doll-making.

### Reverse



#### The Logo

The round-bottom flask symbolizes chemistry, while a cherry blossoms represents Japan. The petals are drawn in different colors and their connections represent peace and corporation in international communities of chemistry.





## Bronze

Stewart Alexander	New Zealand	Tuan Le Anh	Viet Nam	Rashad Yusifov	Azerbaijan
Stuart Ferrie	Australia	Cuc Mai Thu	Viet Nam	Matias Lanus Mendez Elizalde	Argentina
Kelvin Cheung	Australia	Lukas Wagner	Germany	Vladyslav Panarin	Ukraine
Utsarga Sikder	United States	Alan Carrasco-Carballo	Mexico	Jari Tapio Huisman	Finland
Maciej Gryszel	Poland	Michael Michelachvili	Israel	Suvi Kaarina Klapuri	Finland
Pablo Giomi	Spain	Yannick Suter	Switzerland	Kristian Holten Møller	Denmark
Tudor Balan	Romania	Konstantin Krautgasser	Austria	Raymundo Esquer-Rodriguez	Mexico
Maksim Mišin	Estonia	Markovic Igor	Croatia	Manuel Van Rijn	Netherlands
Lujia Xu	New Zealand	Christos Anastassiades	Cyprus	Jaimin Choi	New Zealand
Emilis Bruzas	Lithuania	Makbule Esen	Turkey	Fani Georgieva Madzharova	Bulgaria
David Bellamy	New Zealand	Alexander Blokhuis	Netherlands	Alberto Branchi	Italy
Alexandru Sava	Romania	Andre Silva Franco	Brazil	Luciano Barluzzi	Italy
Ablyay Shakhizadayev	Kazakhstan	Jessica Kazumi Okuma	Brazil	Oscar Salomon Kivinen	Finland
Alain Vaucher	Switzerland	Mario Rugiero	Argentina	Raul Bruno Machado Da Silva	Brazil
Ilya Skripin	Kazakhstan	Agil Azimzada	Azerbaijan		
Amarsanaa Davaasuren	Mongolia	Vasil Vasilev	Bulgaria		
Wepa Roziyev	Turkmenistan	Kadi Liis Saar	Estonia		
Žiga Perko	Slovenia	David Wade	United Kingdom	Saidali Kholzoda	Tajikistan
Marcin Malinowski	Poland	Eviatar Degani	Israel	Ulugbek Barotov	Tajikistan
Árni Johnsen	Iceland	Daniel Quill	Ireland	Philip Sohn	Canada
Viktors Pozņaks	Latvia	Ingrid Eidsvaag Andersen	Norway	Oscar Garcia Montero	Costa Rica
Ioana Moga	Romania	Anatolij Babič	Netherlands	Jorge Pedro Martins Nogueiro	Portugal
Stephen Yuwono	Indonesia	Antton Curutchet	France	Marek Vician	Slovakia
Lizaveta Durovich	Belarus	Cédric Martin	France	Panayiota Katsamba	Cyprus
Nejc Petek	Slovenia	Istvan Kleijn	Netherlands	Božidar Aničić	Slovenia
David Ahlstrand	Sweden	Rahym Ashirov	Turkmenistan	Tania Lizeth Lopez-Silva	Mexico
Maxim Kozlov	Russia	Andreu Tortajada Navarro	Spain		
Agung Hartoko	Indonesia	Buiucli Serafim	Moldova		
Dmytro Frolov	Ukraine	Allan Chau	Australia		
Valter Bergant	Slovenia	Ivan Bojidarov Dimov	Bulgaria		
Johannes Hellwagner	Austria	Miras Bekbergenov	Kazakhstan		
Zhargas Serimbetov	Kazakhstan	Jesús Alvaro Gómez Iregui	Spain		
Anandagopal Srinivasan	Ireland	Niels Christian Holm Sanden	Denmark		
Ezequiel Maidanik	Argentina	Natallia Yelavik	Belarus		
Ivan Jakovlev	Estonia	Amit Panghal	India		
Mikhail Kavalchuk	Belarus	Edvard Sargsyan	Armenia		

## Honourable Mention

Saidali Kholzoda	Tajikistan
Ulugbek Barotov	Tajikistan
Philip Sohn	Canada
Oscar Garcia Montero	Costa Rica
Jorge Pedro Martins Nogueiro	Portugal
Marek Vician	Slovakia
Panayiota Katsamba	Cyprus
Božidar Aničić	Slovenia
Tania Lizeth Lopez-Silva	Mexico

### IUPAC Prize

Best performance in practical exam

Daniil Khokhlov  
Russia

Best performance in theoretical exam

Pinnaree Tea-Mangkornpan  
Thailand



# SAYONARA!!

Our Friendship Forever!!



## 42nd International Chemistry Olympiad

*Catalyzer*



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("Today's photo" is available on this site.)

See you in July 9-18,  
2011 in Turkey!