

# Information for mentors at the International Chemistry Olympiad

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## 1. Introduction

The Steering Committee of the International Chemistry Olympiad has decided to provide a short informational material for the mentors participating in the event. As the Olympiad is growing, the number of people participating in the work has also grown. They can not be expected to gather all this information by experience and word of mouth.

Hopefully this document will show new mentors what they can expect and what is expected from them at the Olympiad. The contents just give a description of the current practice of the Olympiads. The formal and official rules are the regulations of the IChO available from the Information Centre ([www.icho.sk](http://www.icho.sk)). All mentors should be familiar with these as well.

This document should be edited and updated regularly by each Olympiad organizer and the Steering Committee. This document should be distributed by the organizers along with the application forms so that future mentors can use it.

This version was compiled by Gábor Magyarfalvi for the Steering Committee in 2004 and updated in 2007.

## **2. General expectations**

The selection of the two mentors accompanying a team to the IChO is a national responsibility. The regulations ask for a good command of English. This should not be taken easily, as the proceedings of the Jury would require that the delegations participate in the discussion, or at least follow them closely.

Many countries can afford to have up to two scientific observers to assist in the professional duties of the mentors.

Ideally the members of the team are professionals involved in the preparation and selection of the respective national teams. They are familiar with the preparatory problems and the Olympiad regulations including the syllabi. Ideally there is one or more secondary school teacher and one or more person with previous Olympiad experience among them. Split Jury sessions are usually divided between synthetic and physical chemistry problems. In an ideal case this should fit the competence of the individual mentors.

Basic computer and word processing skills (Windows and Word) are also expected from the mentors.

## **3. Day by day organization of an IChO**

### **Pre-olympiad**

Registration is organized through the head mentor for each country.

The country receives the formal invitation by December. The registration data should be provided on time. If deadlines can not be adhered to, mentors should inform the organizers in time. The host countries usually assist the teams to meet visa requirements.

The preparatory problems are published on the web in January without the worked solutions. Hard copies with solutions are sent to each head mentor. Solutions are not made available to the general public before June, since several nations use these problems in national exams.

It has become a custom at the Olympiads that many countries make the problems of their respective national olympiads or selection exams available to mentors of other countries (translated or in the original language). This has been done via printouts, CD-ROMs or websites.

### **Day 1.**

#### **Arrival**

The organizing committee is responsible for the transport of participants from the international airport to the venue of the IChO.

Hotel accommodation (not complimentary) is available for delegations that arrive early or leave late.

During the registration procedure the identity of the team members and their health insurance is checked.

The delegations are expected to sign an academic code that includes a voluntary communication ban (no use of phones, internet, not meeting with guests) on students, mentors and observers during the critical part of the competition. Checking compliance should be at the discretion of the organisers.

It has become customary to give all participants a handbag or rucksack, containing general information, the program for the Olympiad, a T-shirt, a notepad, writing equipment, and a calculator. The latter are to be used during the exams.

All participants receive a name tag, with their country and their function (student, mentor etc) indicated. These labels are expected to be worn throughout the event.

The teams meet the guides who stay with the students during the Olympiad. Most often the guides are university students who can speak the native tongue of the students or English.

A welcome dinner is customary on this evening.

## **Day 2**

The Olympiad has a newspaper, the Catalyzer appearing daily during the Olympiad. It may contain news about the student participants and their excursions, articles relevant to chemistry in the host country (famous chemists), jokes, etc. Hosts usually welcome contributions from participants!

The opening and closing session is usually a formal event with lots of high-ranking officials present. The formality also extends to clothing. Some nations arrive in a special team uniform instead of the (suit/tie – dress) standard.

During the opening session the teams are presented. In some Olympiads the students have carried their country's flag or had an image of the flag projected on the screen. In Bangkok photographs from each country were used.

Students are separated from the mentors soon after the opening ceremony until both exams are completed.

## **The work of the International Jury**

The mentors are taken to the laboratory where the practical examination will take place. They carefully check and acknowledge that the equipment at each workspace of their team members is in good order. The head mentor receives 2 copies of the exam and the mentors are transported to the venue where the jury will meet.

Jury sessions can be very arduous and lengthy. These are conducted in English and the command of English of some of the participants is not sufficient to effectively present, argue, and debate the relevant points. The Jury sessions may be exhausting, but it is critical that the correctness of the competition tasks be open for discussion and modifications by the Jury.

The discussion can be shortened considerably if the delegations study the problems and discuss them individually with the authors before the full jury meeting. Many of the issues that mentors may have with the tasks may be resolved in one-on-one discussion with the authors before the task is discussed in the entire international jury.

Correction of phrasing and English spelling should be raised in a Jury meeting only if it can affect meaning.

After the scientific committee has had a chance to discuss the changes suggested by the mentors, the first jury session can begin.

It is important that all delegations are represented at the sessions so that they are aware of all issues concerning the exams. Moreover, the regulations require 75% presence for a valid voting procedure.

The final text of the exams, marking scheme (blue points) and red points are all introduced for formal acceptance during the meeting.

Once the final text is agreed upon, it is made available in printed (duplicate) and electronic form to the mentors of all of the participating countries.

The final versions of the translated exams must be handed in by the head mentor.

### **Practical exam**

Some issues quite often arise in the jury meeting regarding the practical exam. The following suggestions were accepted several times previously.

It is possible to have split laboratory sessions. That is, a morning session and an afternoon session can be held. Alternatively, laboratories can also be rotated in two sessions. Students obviously must be strictly separated and the organizers must ensure that the equipment has been properly cleaned and dried if it is being reused.

Theoretical questions in the practical, if any, should pertain to the essence of the experiment.

The following scheme for the grading of experimental measurement results has worked well in the past:

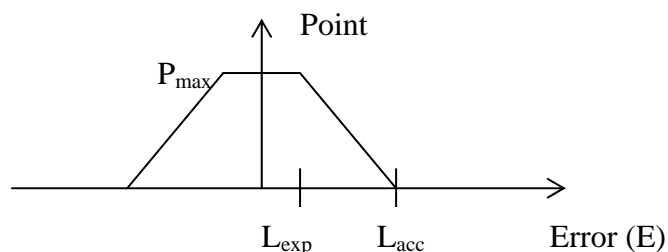
- Full marks should be awarded if the result is in a range that reflects the values expected by the examiners. The expected master

value must come from the analytical procedure performed on the exam day.

- No marks should be given to results outside the limits of acceptable values.  
Both ranges, expected and acceptable should reflect the examiners experiences.
- Between these two, a linear scale should be applied.

Numerically:  $P_{\max}$  points, if  $0 \leq |E| \leq L_{\text{expected}}$   
 0 points if  $L_{\text{accepted}} \leq |E|$   
 $P_{\max} \left( 1 - \frac{|E| - L_{\text{exp}}}{L_{\text{acc}} - L_{\text{exp}}} \right)$  if  $L_{\text{expected}} \leq |E| < L_{\text{accepted}}$   
 ( $P_{\max}$  – maximum points, E – error, L – range limits)

Graphically:



Typical values for a titration would be

$L_{\text{expected}} = 0.5\%$  relative error in the volume.

$L_{\text{accepted}} = 3\%$  relative error in the volume.

Ranges need not necessarily be symmetrical. The accepted range above the true melting point should be rather narrow for example.

Students should be allowed to decide on the number of parallel measurements (titrations) they make. Only the final value (probably a mean) as reported by the student should be graded. Marks should depend on experimental values, but not on precision. (This is based on the fact that students may make up concordant results.) The emphasis should be on marking practical work, therefore the results should be recalculated uniformly.

Errors in the calculations should invoke a minor penalty, the magnitude of which should be suggested by the organisers and approved by the International Jury.

Serious mistakes in applying the rules of evaluation of experimental errors can be penalised (e.g. number of significant figures differs in more than two digits from the correct, rounding errors exceeding accuracy). The magnitude of the penalty should be suggested by the organisers and approved by the International Jury.

Students can be penalized for asking replacement samples or additional reagent or broken labware.

### **Day 3**

This is the day set aside for translation. If the Olympiad is shorter by one day, this day is usually missing and the translation takes place during the night.

Computers are available for each country to translate the final text of each exam into the language used by the students.

Teams using a common language usually cooperate. It might be useful to let the organizers know about the cooperation beforehand so that they can distribute computers accordingly. It is up to the organizer whether to allow the use of laptop computers.

Computers generally use Windows and Microsoft Word. If a country has special requirements, like a special keyboard, they have to bring them.

Because a number of countries are finished fairly soon, it is possible to organize a small excursion.

### **Day 4.**

This is a day of excursion for mentors and guests and the day of the practical exam for the students.

The mentors receive the copies of the theoretical exam (2 per nation). It is even more important for manageable jury meetings that the mentors have time to study the exam for several hours and to meet with the authors individually.

For the theoretical exams a split session has become the norm, i. e., half of the problems are considered in one room and the other half in another. Both mentors participate – one in each session.

### **Day 5.**

The translation session usually starts around 09.00. Most countries are finished by 17.00.

### **Day 6**

The mentors are free while the students take the theoretical exam. Quite often they are taken on an extensive excursion with the guests.

### **Day 7**

After the examinations, the answer sheets are copied. One is marked by the authors, the other by the mentors who receive their copy this day. Even though they are required to mark, there is time for an excursion. This would be the first day when students and mentors can meet again.

### **Marking**

A detailed marking scheme should be presented with the exam to the International Jury. Points for partial solutions are best decided by the organisers using common sense during correction, and they should be

awarded uniformly as all possible errors can not be pointed out beforehand.

E.g.: If the question is to provide a balanced chemical equation, then partial credit should be awarded to those who know the reaction partners, but fail to balance correctly.

The Jury should only discuss partial marks in the most critical cases. Students are asked and are expected to show their work. This will help to award partial marks. If a student omits simple or trivial steps from his line of reasoning, or uses a different solution, he should receive full marks, if the results explicitly asked for are correct and his work is shown. However, if just the result of a complicated problem is given without any explanation, no points are due.

Full marks should be awarded for a question, if the student solves it correctly and consistently using a faulty result from another question (consequential marking). There is no double penalty.

The grading is usually done so that the marks are integer (blue points). The final (red) points (60 for theory and 40 for practical) are divided between the tasks using to the predetermined weights.

## **Day 8**

During arbitration the grading of the student exams by the scientific committee and the mentors is compared. The practice is to have a number of sessions, each involving 12 to 18 countries. The sequence of countries in the discussion is randomly drawn.

The members of the scientific committee handle the arbitration for their own question. There is a time limit put on the discussion. In difficult cases, the delegation should be asked to return later. In cases where no agreement can be reached the chair of the scientific committee has the final decision. If a delegation still disagrees, appeal to the jury is possible. This appeal will be decided upon before allocation of the medals. (There is no precedent for this possibility.)

Discussion during arbitration is usually unavoidable and sometimes can become quite heated. The situation should be handled tactfully, as usually quite competent professionals are involved.

The final scores of their students must be made available for the mentors for a final check.

In the evening the fourth jury session is planned. The first item on the agenda is the allocation of the medals. This is done on the basis of a merit list presented on screen in a form, which makes it impossible to correlate the numbers on the screen with individual student marks.

This practice at the Olympiads usually keeps even mentors in suspense about the final results and medals until the awards ceremony. Most countries also keep the students uninformed about their performance until the Olympiad is over.

Extra prizes could be given for the best theoretical work and for the best practical work, but an extra prize for the best female student is not recommended.

The agenda for the meeting is extended by the steering committee to discuss general questions concerning future Olympiads and regulation or any other business of interest to the Jury. The general discussion can also take place on the previous evening.

## **Day 9**

The closing ceremony usually takes place at a special venue. See the remarks on the opening sessions.

The program of the closing ceremony has a number of set items.

- Discussion of the results by the chair of the scientific committee
- Awarding of the medals. The medal ceremony starts with the honorary mentions, the bronze, silver and gold medals. The best three are mentioned separately.
- Handing the IChO flag to the next organizer. This is done at the end of the ceremony. The representative of the next Olympiad is also allotted some speaking time.

In addition to the above there are usually some cultural items. The ceremony is usually followed by a party.

The last Catalyzer contains the allocation of the medals and is available at the closing ceremony. The Olympiad is a competition between individuals, not countries, so country rankings are not included. One of the Catalyzers has the addresses of mentors, observers and students.

## **Day 10**

The delegations leave.

# **4. Sample documents**

Some parts of the exams do not change much from year to year, such as the instructions accompanying the exams and the safety regulations. Here we include relevant samples that can be translated beforehand to save time in the translation sessions. Team members can also become aware of the rules before the Olympiad.



- At all times while you are in the laboratory you must wear safety eye glasses or your own glasses if they have been approved, and use the pipette filler bulb provided. You will receive only ONE WARNING from the laboratory supervisor if you remove your glasses or fill a pipette by mouth. A second infringement will be considered a major fault incompatible with further experimental work, and you will be dismissed from the laboratory with a resultant zero score for the entire experimental examination.
- Do not hesitate to ask a demonstrator if you have any questions concerning safety issues.
- Please carefully read the text of each experimental task and study the layout of the answer forms before you begin your experimental work.
- Work must begin only when the START command is given.
- Write your name and personal identification code (posted at your workstation) on each answer sheet.
- You have 5 hours to complete all of the experimental tasks, and record your results on the answer sheets. You must stop your work immediately after the STOP command is given. A delay in doing this by 3 minutes will lead to cancellation of the current task and will result in zero points for that task.
- All results must be written in the appropriate areas on the answer sheets. Anything written elsewhere will not be marked. Do not write anything on the back of your answer sheets. If you need more paper for working or a replacement answer sheet, request it from the supervisor.
- When you have finished the examination, you must put all of your papers into the envelope provided. Only papers in the envelope will be marked.
- Do not leave the examination room until you are directed to do so
- Use only the pen and calculator provided.
- Use only the distilled water, and use the appropriate waste containers for disposal of chemical and other waste materials.
- The number of significant figures in numerical answers must conform to the rules of evaluation of experimental errors. The inability to perform calculations correctly will result in penalty points, even if your experimental technique is flawless.
- This examination has **xx** pages and **xx** pages of answer sheets.
- Chemicals and/or laboratory ware can be purchased if used up or broken. The cost of each purchase will be the loss of **xx** point.
- The official English version of this examination is available if you wish to see it.

- Write your name and personal identification code (posted at your workstation) in the upper corner of the first page of each problem's answer sheet. Write your name and code on all remaining answer sheets.
- You have 5 hours to complete all of the tasks, and record your results on the answer sheets. You must stop your work immediately after the STOP command is given. A delay in doing this by 3 minutes will lead to cancellation of the current task and will result in zero points for that task.
- All results must be written in the appropriate areas on the answer sheets. Anything written elsewhere will not be marked. Do not write anything on the back of your answer sheets. If you need more paper for working or a replacement answer sheet, request it from the supervisor.
- Write relevant calculations in the appropriate boxes when necessary. If you provide only correct end results for complicated problems, you receive no score.
- When you have finished the examination, you must put all of your papers into the envelope provided. Only papers in the envelope will be marked.
- Do not leave the examination room until you are directed to do so.
- Use only the pen and calculator provided.
- A Periodic Table and a table of constants will be provided for your use. Take all atomic masses and physical constants from there.
- This examination has **xx** pages and **xx** pages of answer sheets.
- Total points for this examination is **xx**.
- An official English language version is available if you wish to see it.