

# Syllabus for the IChO experimental part

- Level 1:** is assigned to the basic experimental activities which are supposed to be mastered by competitors very well
- Level 2:** is assigned to the activities which are parts of school experimental exercises in developed countries and the authors of IChO tasks may incorporate them into the tasks without being bounded to mention it in advance
- Level 3:** is assigned to such activities which are not in the chemistry syllabus in the majority of participating countries and the authors are obliged to mention them in the set of preparatory tasks

If the organizer wants to apply a technique which is not mentioned in the above syllabus, this technique is set to level 3 automatically.

## 1. Synthesis of inorganic and organic compounds

1.1.	Heating with burners and hotplates	1
1.2.	Heating of liquids	1
1.3.	Handling the work with inflammable substances and materials	1
1.4.	Measuring of masses (analytical balance)	1
1.5.	Measuring of volumes of liquids (measuring cylinder, pipette, burette)	1
1.6.	Preparation of solutions from a solid compound and solvent	1
1.7.	Mixing and dilution of solutions	1
1.8.	Mixing and stirring of liquids	1
1.9.	Using mixer and magnetic stirrer	2
1.10.	Using a dropping funnel	1
1.11.	Syntheses in flat bottom vessels " general principles	1
1.12.	Syntheses in round bottom vessels " general principles	1
1.13.	Syntheses in a closed apparatus " general principles	1
1.14.	Using microscale equipment for synthesis	3
1.15.	Apparatus for heating of reaction mixture under reflux	2
1.16.	Apparatus for distillation of liquids at normal pressure	2
1.17.	Apparatus for distillation of liquids at reduced pressure	2
1.18.	Apparatus for steam distillation	3
1.19.	Filtration through flat paper filter	1
1.20.	Filtration through a folded paper filter	1
1.21.	Handling a water vacuum pump	1
1.22.	Filtration through a Büchner funnel	1
1.23.	Suction through a glass filter	1
1.24.	Washing of precipitates by decantation	1
1.25.	Washing of precipitates on a filter	2
1.26.	Drying of precipitates on a filter with appropriate solvents	2
1.27.	Recrystallization of substances from aqueous solution	1
1.28.	Recrystallization of substances from a known organic solvent	2
1.29.	Practical choice of an appropriate solvent for recrystallization of a substance	3
1.30.	Drying of substances in a drying box	2
1.31.	Drying of substances in a desiccator	2
1.32.	Connecting and using of a gas washing bottle	2
1.33.	Extraction with an immiscible solvent	1

## **2. Identification of inorganic and organic compounds: general principles**

2.1.	Test-tube reactions	1
2.2.	Technique of reactions performed in a dot dish and on a filter paper	1
2.3.	Group reactions of some cations and anions specified by the organizer	2
2.4.	Selective reactions of some cations and anions specified by the organizer	2
2.5.	Specific reactions of some cations and anions specified by the organizer	3
2.6.	Identification of elements by flame coloration (using a platinum wire/MgO rod, Co-glass)	2
2.7.	Using a hand spectroscope/Bunsen spectroscope	3
2.8.	Melting point determination with Koffler or similar type of apparatus	3
2.9.	Qualitative evidence of basic functional groups of organic substances specified by the organizer	2
2.10.	Exploitation of some specific reactions for identification of organic compounds (specified by the organizer)	3

## **3. Determination of some inorganic and organic compounds: general principles**

3.1.	Quantitative determinations using precipitation reactions	2
3.2.	Igniting of a precipitate in a crucible	1
3.3.	Quantitative volumetric determinations	1
3.4.	Rules at titrating	1
3.5.	Use of a pipetting ball	1
3.6.	Preparation of a standard solution	2
3.7.	Alkalimetric and acidimetric determinations	2
3.8.	Color transitions of indicators at alkalimetric and acidimetric determinations	2
3.9.	Direct and indirect determinations (back titration)	3
3.10.	Manganometric determinations	3
3.11.	Iodometric determinations	3
3.12.	Other types of determinations on basis of redox reactions	3
3.13.	Complexometric determinations	3
3.14.	Color transitions of solutions at complexometric determinations	3
3.15.	Volumetric determinations on basis of precipitation reactions	3
3.16.	Thermometric titration	3

## **4. Special measurements and procedures**

4.1.	Measuring with a pH-meter	2
4.2.	Chromatography on thin layers	3
4.3.	Column chromatography	3
4.4.	Separation on ion exchanger	3
4.5.	Measuring of UV-VIS absorbances with a spectral photometer	3
4.6.	Performing of conductivity measurements	3

## **5. Evaluation of results**

5.1.	Estimation of experimental errors (significant figures, plots scales)	1
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