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Periodic table

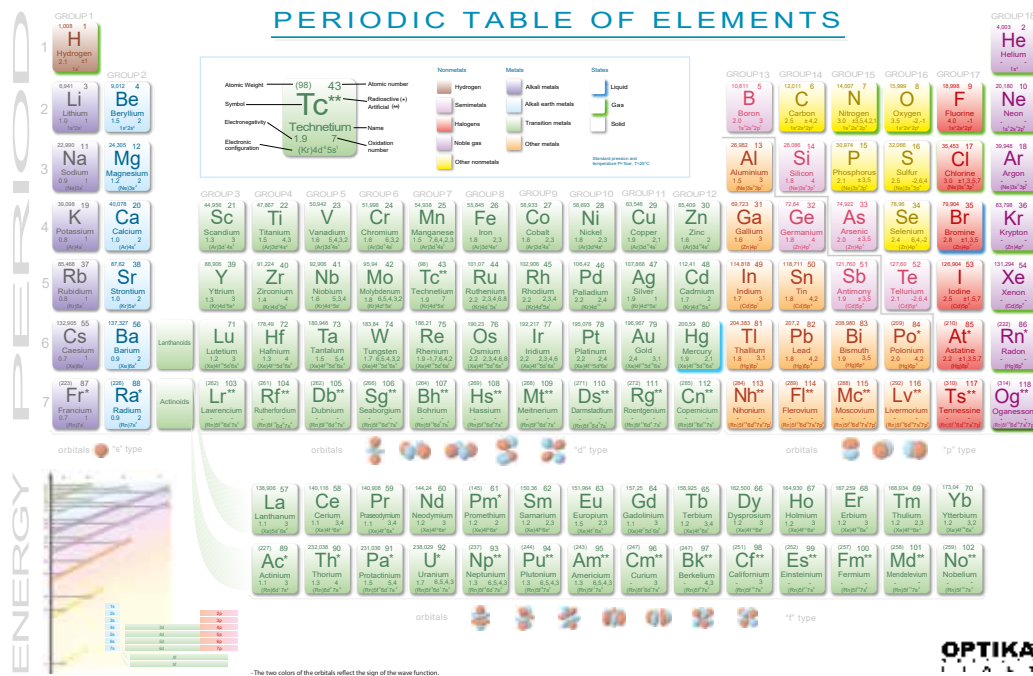
6300.2

Updated periodic table, laminated and fitted with support bars. The main physical and chemical features of every element are mentioned, essential for every laboratory. A graphic illustrates the energetic level of the orbitals which determines the sequence of the periodic table's blocks. It is very interesting to notice the mathematically correct representation of the orbitals s, p, d and f. Even the recent chemical elements are present. The numerical data are updated according to the IUPAC recommendations. Size 100 x 70 cm.

Periodic table for students

6301.2

Periodic table, graphically the same as code 6300.2, but with A3 (42x29,7 cm) format. This model is not fitted with support bars.



6300.2 - 6301.2

Atom model

5716

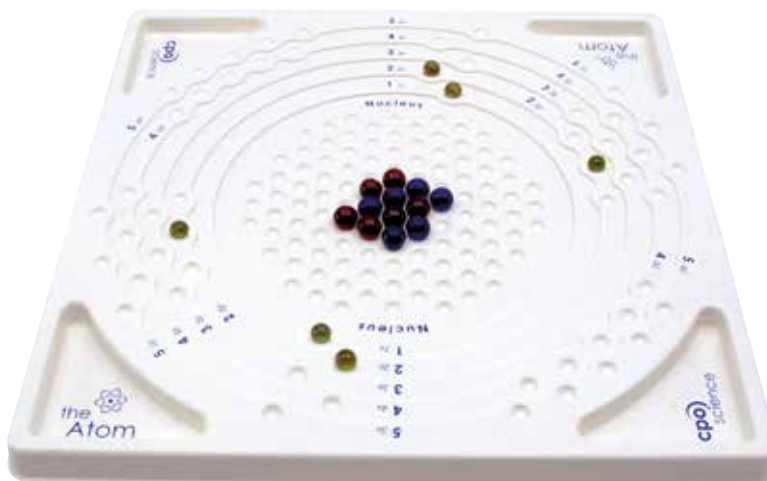
This model helps the students to understand the atom, because it permits them to create different atoms using coloured spheres which represent the protons, the neutrons and the electrons. The holes on the plate are ordered according to the different energetic levels of the orbit. In this way it is possible to understand the chemical links, the isotopes, the emission spectra and other matters concerning the atom. Size: 475x475 mm.

Topics

- Periodic table of elements
- When an atom has no charge
- Energy levels and principal quantum number (n)
- Energy levels and secondary quantum number
- Orbitals and magnetic quantum number (m)
- Electronics configurations
- How energy levels vary
- Electronics configuration at fundamental state
- Interaction between atoms
- Natural radioactivity
- Natural radioactivity transformations
- Nuclear reactions

Equipment supplied

- 1 Atom model (table)
- 48 Electrons (yellow spheres)
- 57 Protons (red or green spheres)
- 57 Neutrons (black spheres)
- 48 Cards regarding photons absorption
- 48 Cards regarding nuclear reactions
- 2 Periodic table of elements



5716

**Organic chemistry (teachers)**

MM003

In this box you can find: 40 Hydrogen atoms, 38 Carbon atoms, 12 Oxygen atoms, 4 Nitrogen atoms, 2 Sulfur atoms, 4 Phosphorous atoms, 8 Chlorine atoms, 3 Metal atoms, 55 simple bond, 25 complex bonds, 60 bonds, 1 key for bonds.



MM003

**Organic chemistry (students)**

MM051

This kit is recommended for group of students: 30 Hydrogen atoms, 20 Carbon atoms, 6 Oxygen atoms, 8 Chlorine atoms, 2 Bromine atoms, 2 Iodine atoms, 2 Metal atoms, 4 Nitrogen atoms, 12 orbitals, 40 simple bonds, 12 complex bonds, 50 tie points, 1 key for bonds.



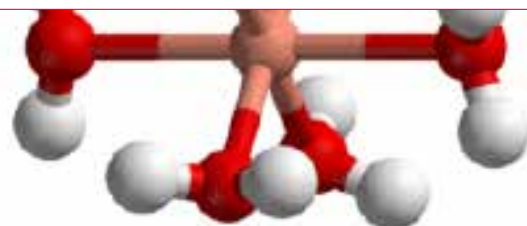
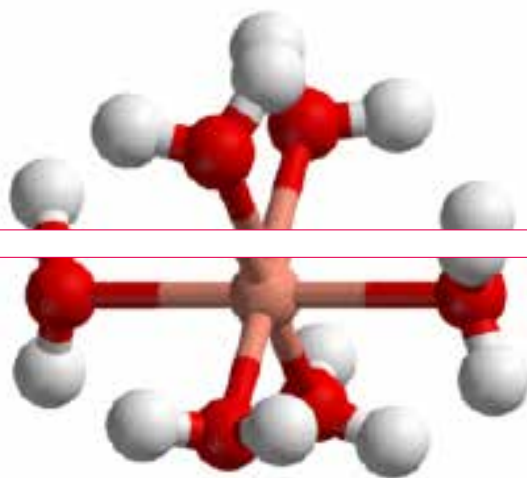
MM051

**Organic and inorganic chemistry**

MM004

Fitted with organic and inorganic molecules, complex ions and covalent hydrogen.

The package consists of: 14 metal atoms; 14 hydrogen atoms; 8 halogen atoms; 22 oxygen atoms; 13 sulphur atoms; 10 nitrogen atoms; 12 carbon; 7 phosphorus; 38 medium bridges; 50 bridges for simple connection; 38 bridges for double and triple connection.



MM004

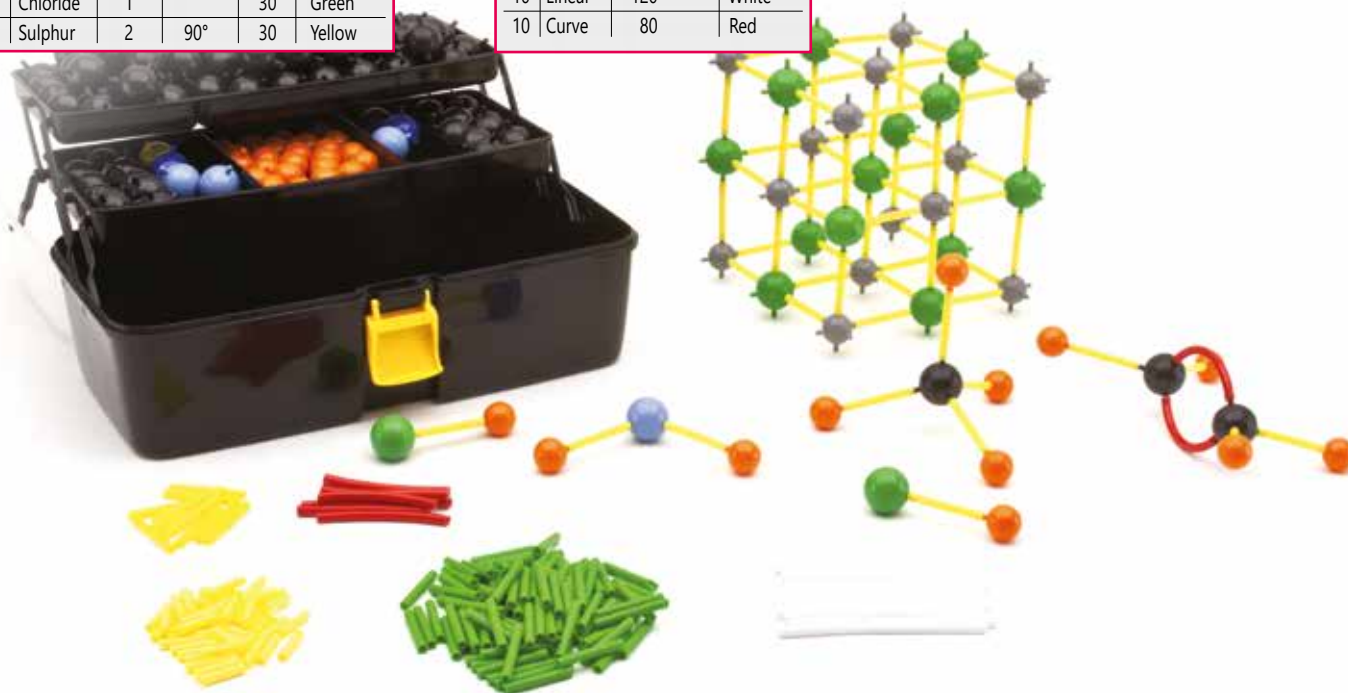
## Organic and inorganic chemistry

7041

The different components of this set allow creation of a wide range of inorganic and organic compounds' molecules and crystalline structures. The size of the components allows both the teacher to use them for desk demonstration and the students to perform group practical experiments. The components contained in a wooden box are as follows:

| ATOMS |          |      |          |      |         |
|-------|----------|------|----------|------|---------|
| N.    | Descrip. | Bond | Angles   | (mm) | Colour  |
| 50    | Carbon   | 4    | 109°     | 30   | Black   |
| 48    | Carbon   | 5    | 120°,90° | 30   | Black   |
| 40    | Hydrogen | 1    |          | 23   | Orange  |
| 14    | Sodium   | 6    | 90°      | 23   | Grey    |
| 13    | Chlorine | 6    | 90°      | 30   | Green   |
| 4     | Oxygen   | 2    | 105°     | 30   | Sky-blu |
| 2     | Nitrogen | 4    | 109°     | 30   | Blue    |
| 2     | Chloride | 1    |          | 30   | Green   |
| 1     | Sulphur  | 2    | 90°      | 30   | Yellow  |

| LEGAMI |        |             |        |
|--------|--------|-------------|--------|
| N.     | Bond   | Lenght (mm) | Colour |
| 100    | Linear | 40          | Green  |
| 75     | Linear | 50          | Yellow |
| 40     | Linear | 25          | Yellow |
| 10     | Linear | 120         | White  |
| 10     | Curve  | 80          | Red    |



7041

## Replacement plates for chromatography on thin layer

6237

Pack of 10 plates, 100x100 mm.



6237

## Paper for chromatography

6261

Pack of 100 pieces, 110x140 mm sheets.



6261

## Roll paper indicator

|                   |        |
|-------------------|--------|
| Blue litmus       | RA2001 |
| Red litmus        | RA2002 |
| Neutral litmus    | RA2003 |
| Universal pH 1-10 | RA2004 |



RA2001 - RA2002 - RA2003 - RA2004

**Pocket pH Tester**

**PH-2**

Suitable for measuring water's and soil's pH. To perform the measurement, just immerse the electrode in the sample to be examined. At the cost of a few litmus papers, you can have the most convenient pocket pH meter available on the market. This tool allows you to perform fast and accurate measurements from 0 to 14 pH with a resolution of 0.01, immediately reading the measurement on the liquid crystal display. The instrument can be manually calibrated on 2 points: a fast, accurate, practical and light instrument; It works with batteries of common type for over 3000 hours of work.



| Parameter             | pH               |
|-----------------------|------------------|
| pH range              | 0.00 to 14.00 pH |
| pH resolution         | 0.01 pH          |
| pH accuracy (at 20°C) | ±0.2 pH          |
| pH calibration        | manual, 2 points |

**PH-2**

**Electrode for PH-2**

**HI1271**

Replacement electrode for PH-2.



**HI1271**

**pH Electrode with Bluetooth**

**HI12302**

Flexibility and simplicity of use, no cables, no tools. Simply download the free app to turn your compatible Apple or Android device (not included) into a full-featured pH meter. HI12302 is equipped with a combined pH electrode with plastic body (PEI), double junction, gel filling, for general use. The high quality electrode is equipped with a built-in temperature sensor that ensures automatic temperature compensation both during measurement and during calibration. HI12302 is able to perform pH measurements on a scale ranging from 0.00 to 13.00 pH, measurements in mV and temperature measurements on a scale ranging from -5.0 to 70.0 °C. It can be used almost anywhere: in the laboratory, on the field, in production or in the classroom.

|                       |  |
|-----------------------|--|
| Reference system      | Double, Ag/AgCl                        |
| Junction              | Ceramic                                |
| Electrolyte           | gel                                    |
| pH range              | 0.00 to 13.00 pH                       |
| mV range              | ±420 mV                                |
| Temperature scale     | -5.0 to 70.0°C                         |
| Operating temperature | -5.0 to 70.0°C                         |
| Tip                   | spherical                              |
| Temperature sensor    | yes                                    |
| Body                  | PEI                                    |
| Probe dimensions      | Tip diameter 12 mm                     |
| Power supply          | CR2032 3V Lithium ion/ about 500 hours |
| Connection            | Bluetooth 4.0, 10 m                    |



Tablet and stand are not included

**HI12302**

**pH Tester**

**HI98107**

The pocket tester is robust and reliable and is ideal for both laboratory and field use. This new tester has a thickness of less than 2 cm and is extremely ergonomic, comfortable to hold in your hand. The instrument is simple to use because it is equipped with only 2 buttons: one dedicated to switching on and off; the other dedicated to calibration.

|                                |   |
|--------------------------------|---|
| Range                          | 0.0 to 14.0 pH                                |
| pH resolution                  | 0.1 pH  |
| pH accuracy (at 20°C)          | ±0.1 pH                                       |
| Temperature range              | 0.0 to 50.0°C / 32.0 to 122.0°F               |
| Temperature resolution         | 0.1°C / 0.1°F                                 |
| Temperature accuracy (at 20°C) | ±0.5°C / ±1.0°F                               |
| pH calibration                 | automatic with 1 or 2 points                  |
| Temperature compensation       | automatic 0 to 50°C (32 to 122°F)             |
| Power supply                   | 1x3V CR2032/about 800 hours of continuous use |
| Automatic shut off             | after 8 or 60 minutes. It can be disabled     |
| Operational conditions         | 0 to 50°C; U.R. max 100%                      |



**HI98107**

**pH Meter with Electrode and Temperature Probe**

**PH-4**

pH / ORP / °C measurement with automatic temperature compensation.

Manual 2-point calibration is performed using the trimmers on the front of the instrument; the set values remain in memory even after switching off.

|                     |  |
|---------------------|--|
| Parameters          | pH/ORP/Temperature   |
| Range - pH          | da 0.00 a 14.00 pH   |
| Resolution - pH     | 0.01 pH  |
| Accuracy - pH @20°C | ±0.01 pH   |
| Range - mV          | ±1999 mV   |
| Resolution - mV     | 1 mV   |
| Accuracy - mV @20°C | ±1 mV  |
| pH Calibration      | 2-points manual  |
| Supplied:           | pH / mV electrode, temperature probe and 2 single-dose buffer solutions for calibration at pH 4.01 and 7.01. |



**PH-4**

**Edge pH Bluetooth Meter**

**HI2002**

Modern, thin and light design - pH electrode monitoring technology

Temperature sensor integrated in all electrodes - Data storage -

Large, easy-to-read LCD - Capacitive Keypad - Two USB ports - GLP functions

Rechargeable battery.

|                       |  |
|-----------------------|--|
| pH resolution         | 0.01 pH, 0.001 pH, 0.1 mV  |
| Accuracy pH (a 20°C): | ±0.01 pH; ±0.002 pH; ±   |
| ORP Range:            | ±1000.0 mV; ±2000.0 mV   |
| ORP Resolution:       | 0.1 mV   |
| Temperature Range     | -20.0 to 120.0°C; -4.0 to 248.0°F  |
| pH Calibration:       | 2-points manual  |
| Memorizzazione:       | Up to 1000 records in total, between:<br>- Sample storage (max 200 log)<br>- Manual log on Stability (max 200 log)<br>- Automatic storage at programmable intervals up to 100 batches (max 600 logs/lot) |



**HI2002**

**Storage solution for electrodes**

HI70300M

Bottle, 230 ml.

HI70300M

**Buffer solutions for pH meters calibration**

Buffer solution pH 4,01; 500 ml.

HI7004L

Buffer solution pH 7,01; 500 ml.

HI7007L

Buffer solution pH 10,01; 500 ml.

HI7010L

**Solutions for conductivity meter calibration**12880  $\mu\text{S}/\text{cm}$ ; 230 ml.

HI7030M

111800  $\mu\text{S}/\text{cm}$ ; 230 ml.

HI7035M

**Solution for cleaning electrodes of pH meters**

HI7061M

230 ml bottle to clean the junction of the electrodes.

HI7004L - HI7007L - HI7010L - HI7030M - HI7035M - HI7061M

**Portable conductivity meter**

HI8033

Very practical item for measuring by using three different scales of conductivity: from 0,0 to 199,9  $\mu\text{S}/\text{cm}$ ; from 0 to 1999  $\mu\text{S}/\text{cm}$  and from 0,00 to 19,99  $\text{mS}/\text{cm}$ . It is fitted with TDS scale (Total Dissolved Solids), from 0 to 19990  $\text{mg}/\text{l CaCO}_3$ . Fitted with conductivity probe.



HI8033

## Refractometry - CHEMISTRY

The operation mode of refractometers is based on the principle that the refractive index of a solution is proportional to the concentration of a solute. Thanks to a few drops of the sample, it is easy to define the concentration of the substances. This simple and accurate method is usually used to measure the concentration of sugar solutions (Brix). The refractometers are also used in food field for products such as marmalades, fruit juices, syrups, wine, honey and so on.

**Hand refractometer, 0-32% ATC**

HR-130N

Built in illuminator LED type. Measuring range: 0-32% Brix. Resolution: 0.2% Brix.

**Hand refractometer, 0-80%**

HR-150N

Built in illuminator LED type. Measuring range: 0-80% Brix. Resolution: 1% Brix. Without ATC.



HR130N - HR150N

**Abbe bench refractometer**

2WAJ

|                        |                                 |
|------------------------|---------------------------------|
| Main prism             | horizontal                      |
| Secondary prism        | hinge mounted                   |
| Refraction index range | $n_D$ 1,300 - 1,700             |
| Precision              | $n_D \pm 0,0003$                |
| Division               | $n_D$ 0,0005                    |
| Sugar range            | 0-95% from $n_D$ 1,300 - 1,530. |
| Precision              | 0-50% = 0,2%; 51-95% = 0,1%     |
| Division               | 0,25%                           |
| Weight                 | 4                               |
| Dimensions             | 140x100x235 mm                  |



2WAJ

**Bench polarimeter with monochromatic LED light source**

POL-X

Used for measuring the concentration of optically active substances (for example sugars) in a solution.  
 Measuring range of optical rotation:  $\pm 180^\circ$   
 Resolution:  $1^\circ$   
 Accuracy:  $0.05^\circ$   
 Magnification factor of the magnifying glass: 4x  
 Light source: Monochromatic LED, 1.2 W,  $\lambda_d = 590 \text{ nm}$  (equivalent to sodium lamp)  
 Length of test tubes: 100mm and 200mm.  
 Power Supply: Input 100/240V ac, 50/60 Hz; Output 5V dc 500 mA  
 Weight: 1,7kg



POL-X

**Simple spectroscope 4126**

The item can test the emission and the absorption of spectral radiations.  
 Model for direct vision.



4126

**Kirchoff-Bunsen's spectroscope 4028**

4028

The item is mounted on a circular metal platform, it is composed of: 1 collector with adjustable slit, 1 collector with graduated scale and 1 collimator with 2 interchangeable eyepieces. The slit of the collector is supplied with a small prism which allows you to compare the spectrum of two different sources. While the collector, equipped with achromatic objective, is fixed to the platform, the collimator can rotate on an alidade, keeping the directional axis in the centre of the apparatus. The collector with graduated scale requires a small white light source to project the image of the scale in the eyepiece of the collimator by means of the reflection on a face of the prism. The equilateral prism made of highly dispersive material. With this device you can study the spectrum of a source of monochromatic or polychromatic light. We recommend the use of interferential filters to the check of the wavelength.



4028

**Spectrometer 4209**

4209

This instrument has very good optic and mechanical features which allow the exact measurement of the optical ray deviation angles; therefore it can determine the refractive index of solids and liquids and the wavelength of monochromatic sources. Base: made of firevarnished cast-iron. Goniometer:  $\varnothing 17.5 \text{ cm}$  and divided in  $360^\circ$  with a precision of  $1^\circ$ . It is equipped with a vernier, which allows to measure with an accuracy of  $1/10^\circ$ . Telescope: it has achromatic objectives with an 178 mm focal length and an eyepiece 15x. Focusing allows fine regulation. Collimator: endowed with achromatic objective with 178mm focal length and with a steady adjustable slit up to 6 mm. Plane of the prism: it can be adjusted both vertically and horizontally and it is supplied with boss-heads for the fixing of the diffraction grating. Diameter: 80 mm. Equipment: 1 Crown glass equilateral prism 32x32 mm; 1 diffraction grating 500 lines/mm; 1 magnifying lens. Dimensions: 48x33x33h cm. Weight: 12 Kg. The purchase of the diffraction gratings 80 lines/mm and 1000 lines/mm is suggested to verify the variation of the spectral resolution.



4209



**Volta's battery, column type**

5124

It is made of copper and zinc parts, separated by felt disks soaked in an acid solution. It is supplied with a bottle of acid solution.



5124

**Volta's battery, cups type**

5167

It is composed of 4 voltmeters in series. It is supplied with copper and zinc electrodes, acid solution, cables and an LED assembled on a panel.



5167

**Apparatus for the electrical conductivity of liquids**

5113

Comprised of 4 bulbs in parallel. The electrolytic liquids must be poured into the four glasses, in which the electrodes are immersed. With this simple device, the electrolyte solutions can be recognised and the variation of conductivity as a function of the concentration can be studied.



5113

**Human battery**

5287

Placing your hand on two of the four metal plates (zinc, lead, aluminium and copper), you create a potential difference between the plates because of the electrical conduction properties of the human body. This potential difference can be measured through the use of a millimetric voltmeter (not included)

Trying all possible combinations between metals, it is possible to guess the existence of the electrochemical series.

Plates dimensions: 15x23 cm.

Board dimensions: 23x65 cm.



5287

**Electrolytic cell**

**Topics**

- Electrical conductivity in liquids
- Volta's battery
- Electricity accumulator
- Electroplating

**Equipment supplied**

- |                              |  |
|------------------------------|--|
| 1 Base for electrolytic cell | 1 Brass electrode                      |
| 2 Supports for electrolytes  | 1 Sulphuric acid bottle, 10% solution  |
| 2 Coal electrodes            | 1 Bottle of copper sulphate's solution |
| 2 Copper electrodes          | 1 Glass beaker                         |
| 2 Zinc electrodes            | 3 Electrical leads                     |
| 2 Lead electrodes            |  |

**Equipment required not supplied**

- |                  |                      |
|------------------|----------------------|
| 1 Battery holder | 1 Digital multimeter |
| 4 1,5V Battery   |                      |



**Replacements for electrolytic cell**

|                                     |               |
|-------------------------------------|---------------|
| All electrodes kit for cod. 5415    | <b>5415.1</b> |
| Brass electrodes (couple)           | <b>5043.1</b> |
| Lead electrodes (couple)            | <b>5043.2</b> |
| Copper and zinc electrodes (couple) | <b>5043.3</b> |

5415.1 - 5043.1 - 5043.2 - 5043.3

5415

**Hofmann's voltmeters**

With graduated tubes and their metal stands. Height: 70 cm. Power supply unit (suggested code 5011) and connecting wires requested.

With carbon electrodes      **5102**

With platinum electrodes      **5103**



**Replacements for Hofmann's voltmeter**

Glass part only      **5102.1**



Carbon electrodes (couple)      **5165**



Platinum electrodes (couple)      **5166**



5102 - 5103 - 5102.1 - 5165 - 5166