



Technology **Research** **Environment** and **School**

TECRAS EDUCATIONAL KITS CATAOGUE



2026
English Edition

INTRODUCTION

WELCOME TO TEC.R.A.S. LABORATORY EDUCATION

Experimental practice is a fundamental pillar of science education. Understanding natural, chemical and biological phenomena through direct observation and hands-on experimentation enables students to develop critical thinking, scientific rigor and a tangible connection between theory and real-world application.

TEC.R.A.S. (Technology for Environmental Research and Education) was founded with this mission: to bring science directly into the classroom through laboratory educational solutions designed to ensure safety, pedagogical clarity and scientific accuracy.

Since its establishment in 2002, TEC.R.A.S. has developed innovative educational materials that integrate scientific knowledge, technology and didactics. These solutions support the teaching of Chemistry, Physics, Biology and Environmental Sciences, from secondary education to university level.

A COMPLETE EDUCATIONAL SOLUTION

TEC.R.A.S. educational kits are conceived as **comprehensive teaching tools**. Each kit includes all materials required to perform the experiments: instruments, reagents, operational manuals, technical datasheets and safety documentation.

Each kit has been designed to:

- Facilitate the **understanding of key scientific concepts**
- Reduce classroom preparation time
- Allow **repeatability of experiments**
- Ensure compliance with **current safety regulations**
- Adapt to different educational levels according to **ISCED classification**

TEC.R.A.S. solutions make it possible to conduct experimental activities **even in schools without fully equipped laboratory facilities**, offering practical, safe and functional alternatives.

SCIENCE, SAFETY AND EDUCATIONAL RIGOR

All TEC.R.A.S. products are intended for **professional educational use** and must always be used under teacher supervision.

Each experiment includes detailed instructions, specific warnings and general safety guidelines, ensuring a controlled and reliable learning experience.

The supplied reagents are pre-measured for educational use and allow multiple experimental sessions, optimizing institutional resources and minimizing waste.

FOR TEACHERS, INSTITUTIONS AND DISTRIBUTORS

This catalogue is addressed to:

- Secondary school, upper secondary (high school), vocational training and university **educators**
- Public and private **educational institutions**
- **Specialized scientific and educational material** distributors

The catalogue is structured to facilitate:

- Product selection by **subject area**
- Quick identification of **educational level and recommended age**
- Lesson planning according to experiment duration
- Efficient commercial and logistical management for distributor



Technology **Research** **Environment** and **School**

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EDUCATIONAL KITS – SERIES 30000

REFERENCE	DESCRIPTION	EDUCATIONAL INSTITUTION	AGE	ISCED*	DISCIPLINARY AREA	DURATION	EXPERIMENTS	ACCESSORIES	RECOMMENDACTONS suitable for demonstration and group work	kit X students
30001	Chromatography	upper secondary, university	14+ years	3-4-5-6	chemistry, biology, environment	60 min	4			1x4
30002	Chemical and Physical Transformations	upper secondary, university	14+ years	3-4-5-6	chemistry	40 min	14			1x3
30003	The Mole and Molecular Mass	upper secondary, university	14+ years	3-4-5-6	chemistry	60 min	4			1x4
30004	Density	secondary education, upper secondary	10+ years	2-3	physics, chemistry	40 min	4			1x3
30005	The World of Chemistry	secondary education, upper secondary, university	14+ years	2-3-4-5-6	chemistry	30 min	9			--
30006	Pressure (discontinued)									--
30007	Changes of State	secondary education, upper secondary, university	14+ years	2-3-4-5-6	physics, chemistry	40 min	5	Tap water		1x3
30007as	Changes of State – Online Version	secondary education, upper secondary, university	14+ years	2-3-4-5-6	physics, chemistry	40 min	5	Tap water 2 temperature sensors, 1 pressure sensor		1x3
30008	Heterogeneous and Homogeneous Systems	upper secondary, university	14+ years	3-4-5-6	chemistry	50 min	6			1x4
30009	Heat	secondary education, upper secondary, university	14+ years	2-3-4-5-6	physics, chemistry	50 min	5	1 temperature sensor, magnetic stirrer		1x3
30009as	Heat – Online Version	secondary education, upper secondary, university	14+ years	2-3-4-5-6	physics, chemistry	50 min	5			1x3
30010	The Laws of Chemical Combination	upper secondary, university	14+ years	3-4-5-6	chemistry	60 min	3	magnetic stirrer, 1 temperature sensor, 1 pressure sensor		1x3
30011	Gas Laws (magnetic stirrer not included)	secondary education, upper secondary, university	12+ years	2-3-4-5-6	physics, chemistry	50 min	3			1x3
30011as	Gas Laws – Online Version (magnetic stirrer not included)	secondary education, upper secondary, university	12+ years	2-3-4-5-6	physics, chemistry	50 min	3			1x3
30012	Diffusion and Osmosis	secondary education, upper secondary, university	14+ years		physics, chemistry, biology					
30013	Staining for Microscopy	secondary education, upper secondary, university	14+ years	2-3-4-5-6	biology	60 min	4	microscope with 100× objective		1x3
30014	Biomolecule Identification	upper secondary, university	14+ years	2-3-4-5-6	biology, food science	60 min	7			1x3
30015	Plant DNA Isolation	secondary education, upper secondary	12+ years	3-4-5-6	biology	40 min	5	ice or refrigerator		1x3
30016	Air Pollutants	secondary education, upper secondary, university	14+ years	2-3	chemistry, environmental science	60 min	1	tap water		4x3
30017	Soil	secondary education, upper secondary, university	14+ years	2-3-4-5-6	chemistry, biology, environment	60 min	4			1x3
30018	Practical Stoichiometry	upper secondary, university	14+ years	2-3-4-5-6	chemistry	40 min	6			1x3
30019	Wine Analysis	upper secondary, university	14+ years	3-4-5-6	chemistry, food science	50 min	1	tap water		1x3
30020as	Electrochemistry – Online Version	upper secondary, university	12+ years	3-4-5-6	chemistry	50 min		1 voltage sensor, 1 current sensor, 1 pH sensor, 1 drop counter sensor,		1x3
30021as	Biology – Online Version	secondary education, upper secondary, university	12+ years	3-4-5-6	biology, industry, food science	50 min	7			1x3
30023	Introduction to Nanotechnologies	secondary education, upper secondary, university	14+ years	2-3-4-5-6	chemistry, physics, industry	60 min	5			1x3
30025	Basic Chemistry	secondary education, upper secondary	12+ years	2-3-4-5-6	chemistry	60 min	12	1 carbon dioxide sensor (CO ₂), 1 dissolved oxygen sensor, 1 temperature sensor		1x3
30026as	Digital Laboratories – Chemistry	secondary education, upper secondary, university	12+ years	2-3	chemistry, industry	30 min	19			1x3
30027as	Digital Laboratories – Biology	secondary education, upper secondary, university	14+ years	2-3-4-5-6	biology, industry, food science	40 min	20			1x3
30028	Food Chemistry	secondary education, upper secondary	14+ years	2-3-4-5-6	biology, chemistry, food science	40 min	6			1x3
			12+ years	2-3		30 min	16			

EDUCATIONAL KITS – SERIES 20000

REFERENCE	DESCRIPTION	EDUCATIONAL INSTITUTION	AGE	ISCED*	DISCIPLINARY AREA	DURATION	EXPERIMENTS	ACCESSORIES	RECOMMENDACTONS suitable for demonstration and group work	kit X students
20001	— The Properties of Air	Primary education, secondary education, upper	9+ years	1-2-3	science	30 min	22	-		1x3
20002	— The Properties of Water	secondary	9+ years	1-2-3	science	30 min	26	-		1x3
20003	— Introduction to Chemistry	Primary education, secondary education, upper	9+ years	1-2-3	chemistry	30 min	22	-		1x3
20005	— Introduction to Biology	secondary	9+ years	1-2-3	biology	30 min	40	-		1x3
20007	— The Plant Kingdom	Primary education, secondary education, upper	9+ years	1-2-3	biology	30 min	29	-		1x3
20008	— Introduction to Ecology	secondary	9+ years	1-2-3	biology	30 min	27	-		1x3

CHEMICAL REAGENT REFILLS

REFERENCE	DESCRIPTION
30.001/R	chemical reagent refill for item 30.001
30.002/R	chemical reagent refill for item 30.002
30.003/R	chemical reagent refill for item 30.003(ampoules excluded)
30.005/R	chemical reagent refill for item 30.005
30.006/R	chemical reagent refill for item 30.006
30.007/R	chemical reagent refill for item 30.007
30.008/R	chemical reagent refill for item 30.008
30.010/R	chemical reagent refill for item 30.010
30.012/R	chemical reagent refill for item 30.012
30.013/R	chemical reagent refill for item 30.013
30.014/R	chemical reagent refill for item 30.014
30.015/R	chemical reagent refill for item 30.015
30.016/R	chemical reagent refill for item 30.016
30.017/R	chemical reagent refill for item 30.017
30.018/R	chemical reagent refill for item 30.018
30.019/R	chemical reagent refill for item 30.019
30.025/R	chemical reagent refill for item 30.025



REFERENCE	DESCRIPTION	EDUCATIONAL INSTITUTION	AGE	ISCED*	DISCIPLINARY AREA	DURATION	EXPERIMENTS	ACCESSORIES	RECOMMENDACTONS	kit X students
10001	Surface tension and viscosity of liquids	secondary education, upper secondary	12+ years	2-3	physics	40 min	2			
10002	Flame tests (without burner)	secondary education, upper secondary	14+ years	2-3	chemistry	40 min	6		 	4 x 3
10.002/b	Flame tests (with burner)	secondary education, upper secondary	14+ years	2-3	chemistry	40 min	6		 	2 x 2
10003	magic chemistry	secondary education, upper secondary	14+ years	2-3	chemistry	30 min	1		 	2 x 2
10004	Boyle’s law	primary, secondary education, upper secondary	10+ years	1-2-3	physics	30 min	1		 	2 x 2
10005	paper chromatography	primary, secondary education, upper secondary	10+ years	1-2-3	chemistry	40 min	1		 	2 x 2
10006	column chromatography	secondary education, upper secondary	12+ years	2-3	chemistry	40 min	1		 	3 x 3
10007	chemical reactions	primary, secondary education, upper secondary	10+ years	1-2-3	chemistry	40 min	1		 	3 x 3
10008	stalactite in a test tube	primary, secondary education, upper secondary	10+ years	1-2-3	chemistry, science	30 min	1		 	2 x 2
10009	distillation	secondary education, upper secondary	12+ years	2-3	chemistry, physics	40 min	1		 	2 x 2
10010	A jar of gemstones (the mini kit does not include denatured alcohol)	primary, secondary education, upper secondary	14+ years	1-2-3	chemistry	40 min	1		 	3 x 3
10011	The crystal chest	primary, secondary education, upper secondary	14+ years	1-2-3	chemistry	60 min	2		 	
10012	PH in colors	primary, secondary education, upper secondary	14+ years	1-2-3	chemistry	40 min	3			
10013	Electrolysis	secondary education, upper secondary	14+ years	1-2-3	chemistry	40 min	2		 	3 x 3
10014	Alcoholic fermentation	primary, secondary education, upper secondary	10+ years	2-3	chemistry	40 min	2		 	3 x 3
10015	Biosynthesis of alcohol	primary, secondary education, upper secondary	10+ years	1-2-3	biology	40 min	1		 	3 x 3
10016	Electric battery	secondary education, upper secondary	10+ years	1-2-3	biology	40 min	1		 	2 x 2
10017	Ammonia fountain	secondary education, upper secondary	10+ years	2-3	chemistry	40 min	1		 	3 x 3
10018	Exothermic and endothermic reactions	secondary education, upper secondary	14+ years	2-3	chemistry	40 min	1		 	3 x 3
10019	Acid–base titration	secondary education, upper secondary	14+ years	2-3	chemistry	20 min	3		 	
10020	Chemical blinker	secondary education, upper secondary	14+ years	2-3	chemistry	40 min	1		 	3 x 3
10021	Osmotic potential	secondary education, upper secondary	14+ years	2-3	chemistry	40 min	1		 	2 x 2
10022	Sedimentation	primary, secondary education, upper secondary	12+ years	1-2-3	biology	40 min	1		 	3 x 3
10023	Photosynthesis	primary, secondary education, upper secondary	10+ years	1-2-3	physics, science	40 min	1		 	3 x 3
10024	Plant transpiration	primary, secondary education, upper secondary	12+ years	1-2-3	biology	30 min	2		 	3 x 3
10025	Energy of respiration	primary, secondary education, upper secondary	12+ years	1-2-3	biology	40 min	1		 	3 x 3
10026	Respirometer	primary, secondary education, upper secondary	12+ years	1-2-3	biology	30 min	1		 	3 x 3
10027	Mitosis	primary, secondary education, upper secondary	14+ years	1-2-3	biology	40 min	1		 	3 x 3
10028	Hofmann voltameter with accessories	secondary education, upper secondary	14+ years	1-2-3	biology	40 min	1		 	3 x 3
10029	Cigarette smoke test	secondary education, upper secondary	14+ years	2-3	chemistry	40 min	1		 	3 x 3
10030	Ionic migration	primary, secondary education	14+ years	1-2-3	biology	40 min	1		 	3 x 3
10031	Water demineralization	secondary education, upper secondary	14+ years	2-3	chemistry	50 min	1		 	3 x 3
10032	Greenhouse effect	secondary education, upper secondary, university	14+ years	1-2-3	chemistry, industry	50 min	1	0–12 V DC power supply, 3A 2 temperature sensors	 	3 x 3
10032as	Greenhouse effect – online version	primary, secondary education, upper secondary	14+ years	1-2-3	biology, environment	50 min	1		 	3 x 3
10034	Combustion produces CO ₂	secondary education, upper secondary	14+ years	2-3	biology, environment	50 min	1		 	3 x 3
10035	Acid rain	secondary education, upper secondary	12+ years	2-3	chemistry, environment	40 min	1		 	3 x 3
10036	Water anomaly (magnetic stirrer not included)	secondary education, upper secondary	12+ years	2-3	chemistry, environment	50 min	1	ice, magnetic stirrer	 	3 x 3
10037	Redox reactions: comparison between metals	secondary education, upper secondary, university	12+ years	1-2-3	physics, chemistry, environment	60 min	1		 	3 x 3
10038	Archimedes’ thrust (discontinued)	university	12+ years	2-3	chemistry, environment	40 min	1		 	3 x 3

APARATOS Y MATERIAL DIDÁCTICO

REFERENCE	DESCRIPTION	EDUCATIONAL INSTITUTION	AGE	ISCED*	DISCIPLINARY AREA	DURATION	EXPERIMENTS	ACCESSORIES	RECOMMENDACTONS	KIT X students
A0002	Newton tube (length 1 m)									
A0005	Bulb for liquid expansion									
A0007	Filtration set	secondary, upper Education	12+ years	2-3	biology, chemistry, nutrition	30 min			 	1 x 3
A0008	Set for TLC and paper chromatography	secondary, upper Education	12+ years	2-3	biology, chemistry, nutrition	30 min			 	1 x 3
A0009	Hydraulic bell jar									
A0011	Kipp apparatus									
A0012	Manometric tube –									
A0013	Graham apparatus (glass parts only)									
A0014	Cell for electrolysis of molten salts									
A0015	Mini distiller									
A0016	Mini Soxhlet extractor 30 ml									
A0017	Mini Kjeldahl apparatus 250 ml									
A0018	Gas sampling bulb									
A0019	Apparatus for liquid pressure									
A0020	Steam turbine									
A0023	Steel suction/pressure pump, high tightness									
A0026	Salt bridge									
A0028	Reactor with head and collar								 	1 x 3
A0030	Chemistry collection (new)	Secondary, upper Education	14+ years	2-3	biology, chemistry, nutrition	30 min				
A0033	Heron’s fountain									
A0034	Apparatus for the study of rectilinear motion								 	1 x 3
A0060	Organic chemistry set	Secondary, upper Education	14+ years	2-3	biology, chemistry, nutrition	30 min				



REFERENCE	DESCRIPTION
TF 1596	Hofmann voltameter complete with stand and platinum and graphite electrodes
VSC1 / VSC2	Communicating vessels
VSC3	Capillary communicating vessels
TBMC30	Tube for convective movements
TBUP16	U-tube with base
CEL400	Electrolytic cell 400 ml
PRCD20	Graduated cylinder with side outlet
CAGR20	Graduated bell jar
GPG20	Gas collection bell jar
CCRS1	Chromatographic column with reservoir and PTFE stopcock, 300 mm



PACKAGING NOTE

The **Series 10 kits**, in their basic version, are supplied in a **white cardboard box**.
Upon request, a **plastic container** is available at an additional cost of **€42.00 (VAT not included)**. Minimum quantity: **10 units**.

ISCED EDUCATIONAL LEVEL DEFINITION

(International Standard Classification of Education)

The **ISCED educational level** is an international classification system developed by **UNESCO** that standardizes educational levels worldwide. In the context of laboratory equipment and educational kits, ISCED is used to clearly indicate the educational level for which a product is designed, ensuring its correct **didactic, technical and safety suitability**.

The reference to the ISCED level facilitates:

- The international comparison of educational products
- The correct selection by schools, teachers and distributors
- Alignment with official curricula, public tenders and European projects



Application of ISCED in laboratory equipment and kits

In the context of educational laboratory equipment, the ISCED level defines:

- The technical complexity of the equipment or kit
- The degree of student autonomy during use
- The scientific depth of the experiments
- Safety requirements and teacher supervision
- The type of expected results (qualitative, quantitative, analytical)



Most common ISCED levels in educational laboratories

ISCED 2 – Lower secondary education

- Robust, safe and easy-to-use equipment
- Demonstration or guided experiments
- Focus on observation and understanding of phenomena
- Use always under teacher supervision

👉 e.g.: introductory kits for chemistry, physics or biology

ISCED 3 – Upper secondary education (High school)

- Equipment with higher experimental precision
- Introduction to the full scientific method
- Collection of quantitative data
- Greater student autonomy

👉 e.g.: stoichiometry, electrochemistry, and chemical analysis kits

ISCED 4–5 – Vocational education and university

- Semi-professional or professional equipment
- Structured experimental procedures
- Use of basic analytical instrumentation
- Preparation for industrial or research environments

👉 e.g.: distillation, chromatography, environmental analysis, basic biotechnology



LABORATORY DIDACTICS



Educational Kit Manufacturing and Finished Product Quality Control



TECHNOLOGICAL INNOVATION FOR EDUCATION

The images illustrate the development of an **educational pilot plant dedicated to petroleum distillation**, featuring **remote control via PC**.

From left to right: the design phase, component development, and system assembly, together with the corresponding control and **management software application**.

OUR PRODUCTS

TEC.R.A.S. kits are specifically designed for educational laboratory experiments and include all materials required for them proper execution. The experiments are straightforward to perform and require only simple assembly equipment. All procedures are structured to ensure user safety. Specific safety instructions are provided in full compliance with current regulatory standards.

The manuals supplied with each kit contain comprehensive operating instructions to guarantee the correct execution of the experiments. The chemicals provided are supplied in quantities sufficient to perform multiple demonstrations, ensuring optimal use within the educational environment.

EDUCATIONAL KIT

The kit is fully compatible with interactive whiteboards (IWB) and tablet-based learning environments in multimedia classrooms.



+

OPERATING MANUAL

Step-by-step demonstration of the experiments.



30.002 CHEMICAL AND PHYSICAL CHANGES



INCLUDED EXPERIMENTS
MELTING AND SOLIDIFICATION
SUBLIMATION AND FROST
FORMATION
CRYSTALLIZATION
DISSOLUTION
PAPER CHROMATOGRAPHY

INCLUDED IN THE KIT
LABORATORY TECHNICAL DATASHEETS
SAFETY DATA SHEETS (SDS)
REAGENTS
SAFETY GUIDELINES

SUPPLIED MATERIAL

1 STOPWATCH	1 LIGHTER
1 TEST TUBE RACK	1 CRUCIBLE
3 GLASS TRAYS	1 METAL DISH
1 × 100 ML BEAKER	1 ELECTRIC HOT PLATE
1 × 250 ML BEAKER	1 BEAKER TONGS
1 CHROMATOGRAPHY TRAY	1 CLEANING BRUSH
1 SPRING CLAMP	2 STIRRING RODS
1 × 100 ML ERLLENMEYER FLASK	1 ALUMINUM ROD
1 STOPPER WITH CONNECTOR	1 NOTEBOOK
5 LARGE TEST TUBES WITH STOPPERS	3 × 1 ML DROPPERS
3 SMALL TEST TUBES WITH STOPPERS	3 × 3 ML DROPPERS
1 TEST TUBE WITH SCREW CAP	1 CONICAL GRADUATED TUBE
1 WASH BOTTLE (SPRAY TYPE)	1 PENCIL
1 PACK OF BALLOONS	3 BALLPOINT PENS (RED, BLUE, BLACK)
1 SUPPORT STAND WITH ALLIGATOR CLIPS	1 STAINLESS STEEL SPATULA
1 BASE WITH ROD AND CLAMP	1 SPOON-TYPE SPATULA
	1 RULER
	1 PACK OF FILTER PAPER
	1 PACK OF PH INDICATOR PAPER
	1 PLASTIC TUBE
	1 PAIR OF DISPOSABLE GLOVES
	1 PAIR OF SAFETY GOGGLES

EXTRACTION
GAS FORMATION
ACID–BASE REACTIONS
FORMATION OF METALLIC COPPER
COMPLEX FORMATION
DECOMPOSITION OF AMMONIUM CARBONATE
DECOMPOSITION OF AMMONIUM CHLORIDE

REAGENTS
VIAL OF POTASSIUM NITRATE
VIAL OF IODINE
ACETONE
SODIUM BICARBONATE
POTASSIUM PERMANGANATE
SODIUM HYDROXIDE SOLUTION
AMMONIA SOLUTION 28%
SODIUM CHLORIDE
IODINE–POTASSIUM IODIDE SOLUTION
ALUMINUM
POTASSIUM SULFATE
FERROUS SULFATE IN ACIDIC SOLUTION
VIAL OF PARADICHLOROBENZENE WITH THERMOMETER
PETROLEUM ETHER
MAGNESIUM RIBBON
NICKEL CHLORIDE SOLUTION
COPPER(II) SULFATE SOLUTION
SULFURIC ACID SOLUTION
PHENOLPHTHALEIN SOLUTION
CITRIC ACID
COPPER(II) CHLORIDE
COPPER(II) SULFATE
AMMONIUM CARBONATE

The educational kit “**chemical and physical transformations**” enables the performance of experiments focused on the **structural changes of matter** during natural phenomena, with particular emphasis on processes in which **new compounds are formed from the original substances**. The kit includes a printed operating manual and a dvd containing a multimedia presentation of the experiments, together with additional content related to the specific educational topics. The provided documentation includes **safety data sheets (sds) for the reagents, general safety guidelines, and specific warnings for each experiment**. The supplied equipment and reagents allow the experiments **to be repeated multiple times**, ensuring optimal use in the educational environment.

30.025 –BASIC CHEMISTRY



INCLUDED EXPERIMENTS

DENSITY OF SOLIDS
THERMAL EXPANSION
SUBLIMATION AND FROST FORMATION
MELTING AND SOLIDIFICATION
SOLVENT EXTRACTION
CRYSTALLIZATION
DISTILLATION

INCLUDED IN THE KIT

LABORATORY
TECHNICAL
DATASHEETS
SAFETY DATA SHEETS
(SDS)
REAGENTS
SAFETY GUIDELINES

SUPPLIED MATERIAL

1 BASE WITH ROD
1 CLAMP
1 SET OF CYLINDRICAL
SAMPLES FOR DENSITY
DETERMINATION
1 10 ML BURETTE
1 ALCOHOL BURNER
3 × 1 ML PLASTIC DROPPERS
3 × 3 ML PLASTIC DROPPERS
1 GLASS STIRRING ROD
1 STAINLESS STEEL SPATULA
1 SPOON-TYPE SPATULA
1 FORCEPS (ANATOMICAL
TWEEZERS)
1 WOODEN CLAMP
1 STAINLESS STEEL BEAKER
TONGS
1 SUPPORT STAND WITH
ALLIGATOR CLIP
1 PORCELAIN CRUCIBLE
1 LIGHTER
5 RUBBER STOPPERS
5 METAL WASHERS
10 TRANSPARENT STRAWS
1 LAMINATED CARD FOR
PROUST'S LAW
1 PACK OF FILTER PAPER
1 ELECTRONIC BALANCE
(CAPACITY 200 G,
READABILITY 0.1 G)
1 STOPWATCH
1 TEST TUBE RACK
6 TEST TUBES 16 × 100 MM
WITH STOPPERS
4 TEST TUBES 16 × 160 MM

CHROMATOGRAPHY

LAVOISIER'S LAW (1)
LAVOISIER'S LAW (2)
PROUST'S LAW
MAGNESIUM COMBUSTION
WATER OF CRYSTALLIZATION
FORMATION OF METALLIC COPPER

WITH STOPPERS

1 PLASTIC POWDER FUNNEL
1 PLASTIC FUNNEL
1 100 ML ERLERMAYER FLASK
2 100 ML BEAKERS
1 WATCH GLASS
1 100 ML PLASTIC BOTTLE
1 SMALL PLASTIC TUBE
1 LARGE PLASTIC TUBE
2 10 ML SYRINGES
1 STOPPER WITH HOLE
1 STOPPER WITH CONNECTOR
1 RUBBER TUBING
1 2 ML PLASTIC PIPETTE
1 PACK OF BALLOONS
1 WASH BOTTLE
5 PLASTIC CUVETTES
1 CLEANING BRUSH
1 PACK OF PH INDICATOR
PAPER

PRECIPITATE FORMATION
COMPLEX FORMATION
GAS FORMATION
ACID-BASE REACTIONS
ACID-BASE TITRATION

1 SILICA GEL COLUMN

1 RUBBER RING
1 VIAL OF IODINE
1 VIAL OF PARADICHLOROBENZENE WITH THERMOMETER
1 NOTEBOOK
SAFETY GOGGLES AND LATEX GLOVES

REAGENTS

HYDROCHLORIC ACID 1 M
SODIUM HYDROXIDE 1 M
COPPER(II) SULFATE PENTAHYDRATE
LEAD NITRATE SOLUTION
POTASSIUM IODIDE SOLUTION
SODIUM CARBONATE
CITRIC ACID
FOOD COLORING
PHENOLPHTHALEIN SOLUTION
ACETONE
PETROLEUM ETHER
IODINE / POTASSIUM IODIDE SOLUTION
SODIUM CHLORIDE
AMMONIA
STEEL WOOL
MAGNESIUM RIBBON

The educational kit **“basic chemistry”** enables the **performance of simple experiments** designed to introduce the fundamental principles of the discipline and **their technological applications**. The contents make lessons more engaging, **stimulating student interest and active participation**.

The kit is linked to the **operating manual** as well the supplied **documentation** includes safety data sheets (sds) for the reagents, general safety guidelines, and specific warnings for each experiment.

The provided equipment and reagents allow the experiments **to be repeated multiple times**, ensuring efficient use within the educational environment.

“THE CHEMISTRY”



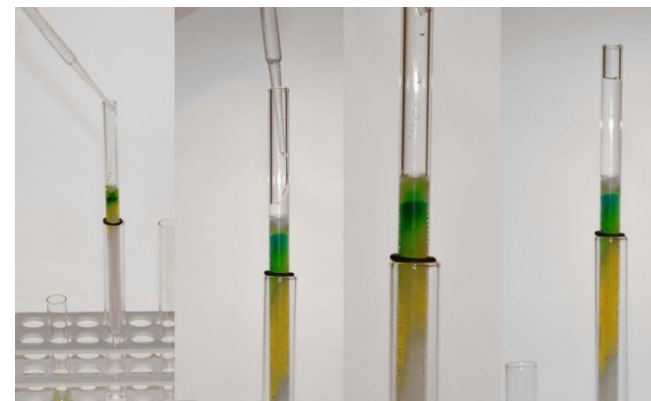
VIDEO LABORATORY

Chemistry experiments performed in the laboratory with students



VIDEOCLIP

Videos dedicated to the experimental worksheets and to the macroscopic manifestations of natural phenomena

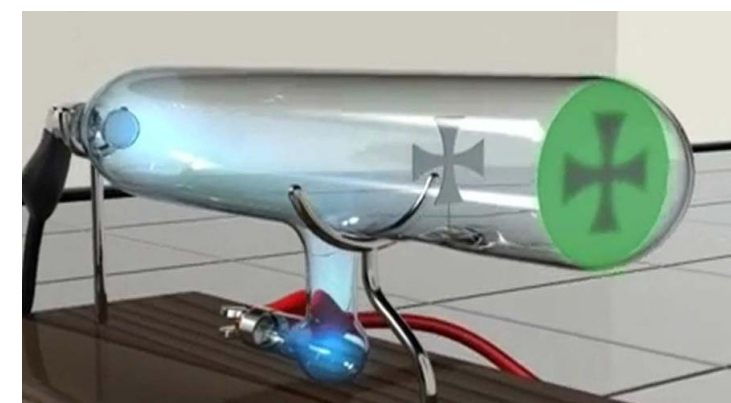


BASIC CHEMISTRY

Column Chromatography

TABLA PERIÓDICA DE LOS ELEMENTOS

MANUAL OPERATIVO



3D ANIMATIONS

Three-dimensional animations designed to support the understanding of the microscopic aspects of matter



BASIC CHEMISTRY

Acid–base titration and iodine sublimation

30.005 – THE WORLD OF CHEMISTRY



INCLUDED EXPERIMENTS

CHEMICAL GARDEN
COMPLEX FORMATION
MAGNESIUM COMBUSTION
A BEATING HEART REACTION
A CHEMICAL MAGIC TRICK
ACID-BASE REACTIONS
PRECIPITATE FORMATION
REVERSIBLE COLOR CHANGE
INVISIBLE INK

INCLUDED IN THE KIT

LABORATORY TECHNICAL DATASHEETS
SAFETY DATA SHEETS (SDS)
REAGENTS
SAFETY GUIDELINES

SUPPLIED MATERIAL

1 WATCH GLASS
5 100 ML BEAKERS
1 50 ML BEAKER
1 100 ML PLASTIC BOTTLE
5 SMALL TEST TUBES WITH STOPPERS
2 STIRRING RODS
1 WASH BOTTLE
1 FUNNEL
3 × 3 ML DROPPERS
3 × 1 ML DROPPERS
1 SPOON-TYPE SPATULA
1 STAINLESS STEEL SPATULA

1 TEST TUBE RACK
1 SUPPORT STAND WITH ALLIGATOR CLIPS
1 METAL DISH
1 PACK OF FILTER PAPER
1 DIP PEN NIB
1 LIGHTER
1 NOTEBOOK
1 PENCIL
1 CLEANING BRUSH
1 PACK OF PH INDICATOR PAPER
1 ABRASIVE PAPER
1 PAIR OF SAFETY GOGGLES
1 PAIR OF LATEX GLOVES

REAGENTS

SODIUM HYDROXIDE SOLUTION
AMMONIA SOLUTION (28%)
NICKEL(II) CHLORIDE SOLUTION
COPPER(II) SULFATE SOLUTION
SULFURIC ACID SOLUTION

PHENOLPHTHALEIN SOLUTION
SODIUM CHLORIDE
SODIUM SILICATE SOLUTION WITH IRON NAILS SET
ANHYDROUS CALCIUM CHLORIDE
FERRIC CHLORIDE
COBALT(II) CHLORIDE
FERRIC CHLORIDE SOLUTION
AMMONIUM THIOCYANATE SOLUTION
POTASSIUM FERROCYANIDE SOLUTION
SODIUM CARBONATE SOLUTION
GLUCOSE
SODIUM HYDROXIDE (SOLID)
METHYLENE BLUE SOLUTION
MERCURY
OXIDIZING SOLUTION
POTASSIUM IODIDE SOLUTION
LEAD NITRATE SOLUTION
MAGNESIUM RIBBON
FERROUS SULFATE
IRON NAILS SET

30.005 MERCURY BEATING HEART EXPERIMENT

MATERIALS AND REAGENTS

Watch glass
Oxidizing solution
Dropper
Mercury
Abrasive paper
Funnel
Spoon-type spatula
Ferrous Sulphate
Iron nails

PROCEDURE



1. Pour the mercury into the watch glass



2. add the oxidizing solution drop by drop until the mercury is completely covered.



3. Gently touch the lateral surface of the mercury droplet with the tip of a clean iron nail and observe the rhythmic pulsations.
4. Once the experiment is completed, perform the following operations:
collect the liquid phase using a dropper and transfer it into a beaker.

Using a small funnel, pour the mercury into a graduated cylinder for reuse in subsequent experiments. before final disposal, add one spoonful of ferrous sulphate to the beaker to reduce the dichromate to trivalent chromium.

The world of chemistry – mercury beating heart in this procedure, the mercury is recovered for reuse in subsequent demonstrations



THE WORLD OF CHEMISTRY – COMPLEX FORMATION

30.005 CHEMICAL GARDEN



5. Pour the crystals into the beaker. if any crystal remains on the surface, push it to the bottom using a stirring rod.

6. Leave the system at rest; within a short time, the formation of luxuriant vegetation-like structures will be observed.



CONCLUSIONS

The crystals of the salts used are highly soluble in water. upon contact with the solution, an aqueous membrane forms on the surface which, under the effect of osmotic pressure, penetrates the membranous envelope, causing it to swell. the protrusions develop preferentially upward, as the hydrostatic pressure is lower in that direction.



THE WORLD OF CHEMISTRY – INVISIBLE INK

The educational kit “the world of chemistry” enables the performance of spectacular experiments that address the main didactic topics of chemistry. the phenomena presented make lessons more engaging and stimulate student interest. The kit includes a printed **operating manual** with additional content related to specific educational topics. The supplied documentation includes **safety data sheets (sds) for the reagents, general safety guidelines**, and specific **warnings for each experiment**.

The provided equipment and reagents allow the experiments to be repeated multiple times, ensuring efficient and cost-effective use within the educational environment.

30.018 – PRACTICAL STOICHIOMETRY



- INCLUDED IN THE KIT**

LABORATORY TECHNICAL DATASHEETS
SAFETY DATA SHEETS (SDS)
REAGENTS
SAFETY GUIDELINES

SUPPLIED MATERIAL
1 TECRAS COROMETER
1 GLASS NAIL
2 HOFFMANN CLAMPS
1 FORCEPS (ANATOMICAL TWEEZERS)
1 THERMOMETER (0–110 °C)
1 100 ML BEAKER
- 1 500 ML BEAKER
1 BASE WITH ROD AND CLAMP
1 WASH BOTTLE
1 PENCIL
1 NOTEBOOK
1 UPPER RUBBER TUBING
1 LOWER RUBBER TUBING
1 PAIR OF SAFETY GOGGLES
1 PAIR OF DISPOSABLE GLOVES

REAGENTS
MAGNESIUM RIBBON
SULFURIC ACID SOLUTION

INCLUDED EXPERIMENTS
Determination of the stoichiometry of the reaction
Determination of the molecular mass of magnesium

The educational kit “**practical stoichiometry**” enables the performance of experiments focused on the verification of stoichiometric coefficients and the concept of the mole.

The kit includes a **printed operating manual**.

The supplied documentation includes **safety data sheets (sds) for the reagents, general safety guidelines, and specific warnings for each experiment**.

The provided equipment and reagents allow the experiments **to be repeated multiple times**, ensuring efficient and cost-effective use within the educational environment.

PRACTICAL STOICHIOMETRY – OPERATING PROCEDURES



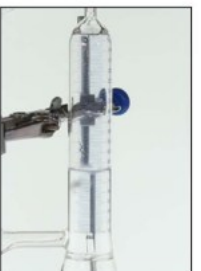
Con ayuda de la pinza anatómica, introducir el clavo con la muestra en la entrada lateral del equipo y cerrar con el tapón de rosca.



Registrar la temperatura (T_{mix}) introduciendo el termómetro en el tubo de carga del equipo.

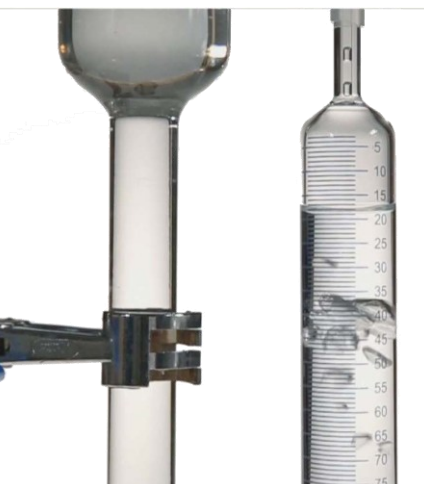


Cerrar la pinza inferior y abrir la pinza de estrangulamiento superior.



Abrir ligeramente la pinza de estrangulamiento inferior y hacer descender el nivel del líquido en el tubo de carga hasta que coincida con el nivel del líquido presente en la campana hidráulica. Leer el volumen (V_{mix}) de hidrógeno en la escala graduada y realizar los cálculos que se describen a continuación.

Una vez finalizado el experimento, vaciar la solución ácida en el vaso de precipitados inferior y lavar el equipo con abundante agua.



Practical stoichiometry – generation and collection of gaseous



30.010 – CHEMICAL LAWS (PONDERAL LAWS)



INCLUDED EXPERIMENTS

LAW OF CONSERVATION OF MASS (LAVOISIER)
LAW OF DEFINITE PROPORTIONS (PROUST)
LAW OF MULTIPLE PROPORTIONS (DALTON)

INCLUDED IN THE KIT

LABORATORY TECHNICAL DATASHEETS
REAGENT SAFETY DATA SHEETS (SDS)
SAFETY GUIDELINES

SUPPLIED MATERIAL

1 SPOON-TYPE SPATULA	1 PACK OF FILTER PAPER	1 50 ML BOTTLE WITH STOPPER
2 × 1 ML DROPPERS	1 ELECTRONIC BALANCE (CAPACITY 200 G, READABILITY 0.01 G)	1 PLASTIC TEST TUBE
2 × 3 ML DROPPERS	1 POWDER FUNNEL	1 WASH BOTTLE
4 STIRRING RODS	4 FUNNELS	1 STAINLESS STEEL SPATULA
5 RUBBER STOPPERS	1 WATCH GLASS	1 STEEL CLAMP
5 METAL WASHERS	4 100 ML ERLLENMEYER FLASKS	1 PACK OF PH INDICATOR PAPER
10 TRANSPARENT STRAWS	4 100 ML BEAKERS	1 NOTEBOOK
1 LAMINATED CARD FOR PROUST'S LAW		1 PAIR OF SAFETY GOGGLES
		1 PAIR OF LATEX GLOVES

The “Laws of Chemical Combination” educational kit explores the fundamental experiments that, at the beginning of the 19th century, led to the birth of modern chemistry. The proposed experiments allow the evaluation of the quantitative ratios by which atoms combine to form molecules. The kit includes an operational manual, as well as additional content related to the specific educational topics. The informational materials provided include safety data sheets for the reagents, general safety regulations, and specific warnings for each experiment. The equipment and reagents supplied allow the experiments to be repeated numerous times.

30.008 – SISTEMAS HETEROGÉNEOS Y HOMOGÉNEOS



EXPERIMENTS INCLUDED

HOMOGENEOUS SYSTEMS
HETEROGENEOUS SYSTEMS
COLLOIDAL SYSTEMS
ELECTRICAL NATURE OF MOLECULES
MISCIBILITY AND SOLUBILITY
SOLUBILIZATION WITH CROWN ETHER

INCLUDED IN THE KIT

LABORATORY TECHNICAL DATA SHEETS
REAGENT SAFETY DATA SHEETS
SAFETY GUIDELINES

MATERIAL SUPPLIED

1 × 10 ML PIPETTE
1 × ELECTRONIC BALANCE (CAPACITY 200 G, SENSITIVITY 0.1 G)
1 × POLARITY COLUMN
1 × FUNNEL
1 × WATCH GLASS
1 × STIRRING ROD
1 × PLASTIC ROD FOR POLARITY EXPERIMENTS
2 × 100 ML BEAKERS
1 × 250 ML BEAKER
2 × 100 ML FLASKS
25 × TEST TUBES WITH STOPPER
1 × TEST TUBE WITH SCREW CAP
1 × SMALL PLASTIC TUBE
1 × MAGNET
1 × PIPETTE FILLER
1 × WASH BOTTLE
1 × ELECTRIFICATION CLOTH

El kit didáctico «Sistemas heterogéneos y homogéneos» permite realizar experimentos dedicados a los **estados de la materia** y a sus **interacciones**. Las metodologías propuestas permiten observar los **efectos de las fuerzas intercambiadas entre las partículas** presentes en la materia. El kit incluye un **manual operativo en formato impreso**. Los materiales informativos proporcionados incluyen **fichas de seguridad de los reactivos, normas generales de seguridad y advertencias específicas para cada experimento**. El equipamiento y los reactivos suministrados permiten **repetir los experimentos en numerosas ocasiones**.

5 × 3 ML DROPPERS
1 × SPOON-TYPE SPATULA
1 × STEEL SPATULA
1 × TEST TUBE RACK
1 × PACK OF PH INDICATOR PAPER
1 × NOTEPAD
1 × PENCIL
1 × CLEANING BRUSH
1 × PAIR OF SAFETY GOGGLES
1 × PAIR OF DISPOSABLE GLOVES

REAGENTS

SODIUM CHLORIDE
SODIUM BICARBONATE
SODIUM PERMANGANATE
ETHYL ALCOHOL
ETHYL ACETATE
PURE PETROLEUM ETHER
SHAVING FOAM
SULFUR (ALCOHOLIC SOLUTION)
CELLULOSE ACETATE
TARTARIC ACID (POWDER)

VASELINE
COPPER SULFATE
CROWN ETHER 18-6 (ALCOHOLIC SOLUTION)
VIAL WITH SILICA SAND AND IRON FILINGS
VIAL WITH SOLID + LIQUID
VIAL WITH TWO IMMISCIBLE LIQUIDS
VIAL CONTAINING EXPANDED POLYMER

30.003 – THE MOLE AND MOLECULAR MASS



EXPERIMENTS INCLUDED

DETERMINATION OF THE MOLECULAR MASS OF A VOLATILE LIQUID
DETERMINATION OF AVOGADRO'S NUMBER
THE MOLE: COMPARISON BETWEEN DIFFERENT SUBSTANCES
AVOGADRO'S NUMBER AND ATOMIC MASS

INCLUDED IN THE KIT
LABORATORY TECHNICAL DATA SHEETS
REAGENT SAFETY DATA SHEETS
REAGENTS
SAFETY GUIDELINES
MATERIAL SUPPLIED
1 × BEAKER TONGS
1 × ROUND METAL TRAY
2 × 1 ML DROPPERS
1 × FORCEPS
1 × SPOON-TYPE SPATULA
1 × ELECTRIC HOT PLATE
1 × ELECTRONIC BALANCE (SENSITIVITY 0.1 G)
1 × 12-CELL TRAY
1 × SET OF ASSORTED 6 MM SPHERES
1 × WASH BOTTLE
1 × 50 ML FLASK
1 × COMPLETE HYDRAULIC BELL JAR WITH TRAY

1 × HOFFMANN CLAMP
1 × FUNNEL
1 × 100 ML BEAKER
3 × CALIBRATED TUBES (CAPACITY 0.1 ML)
1 × PIPETTE FILLER
1 × 0.5 ML PIPETTE
1 × 5 ML GLASS SYRINGE WITH NEEDLE
1 × RUBBER BULB WITH VALVE
1 × GLASS APPARATUS
1 × RUBBER CONNECTION TUBE WITH STOPPER
1 × 50 ML AMBER GLASS BOTTLE
1 × NOTEPAD
1 × PENCIL
1 × RULER
1 × PAIR OF DISPOSABLE GLOVES
1 × PAIR OF SAFETY GOGGLES

REAGENTS
ABSOLUTE ETHYL ALCOHOL
ACETONE
ETHYL ACETATE
SHELLAC POWDER
N-HEXANE
OLEIC ACID 1%
SODIUM CARBONATE
VIAL OF SUCROSE
VIAL OF COPPER SULFATE
VIAL WITH LEAD SHOT
VIAL OF COPPER
VIAL OF MERCURY
VIAL OF SULFUR

30.003 DETERMINATION OF MOLECULAR MASS



OPERATING SEQUENCE

1.Wait until the water in the beaker reaches boiling. Insert the connection tube into the opening of the hydraulic bell jar (previously filled with water). remove the rubber stopper from the apparatus, drop the calibrated tube vertically into place, and immediately close the system.
Wait a few minutes to allow complete volatilization of the liquid. The vapours formed will displace an equivalent



2.Once the formation of gas bubbles in the bell jar has stopped, wait one minute after the last bubble, then read the volume of air collected on the graduated scale and record it in the table.
Remove the tube from the hydraulic bell jar and remove the stopper from the flask without moving it from the boiling water bath. Using the rubber bulb, inject air into the flask to expel the vapours.

DETERMINATION OF MOLECULAR MASS – OPERATING PROCEDURES



VICTOR MEYER METHOD – SAMPLE PREPARATION

30.003 EL NÚMERO DE AVOGADRO



3. Using the pipette filler and the pipette, take 0.5 ml of oleic acid 1:10,000 and dispense 0.1 ml of the solution drop by drop from a height of approximately 1 cm into the center of the tray. pay attention to the hot vapor escaping from the side opening of the apparatus.



4. The oleic acid spot will expand, pushing away the powder. wait a few seconds to allow the ether to evaporate, thus forming an extremely thin monomolecular layer of oleic acid.

If the experiment has been performed correctly, a circular spot should appear in the centre of the tray. measure its diameter with a ruler. record the diameters of 3 or 4 spots, calculate the average value, and enter it in the table.
note (1): if the oily spot does not have the correct shape or size, repeat the procedure. the issue may be caused by greasy residues on the tray. for this reason, it is recommended to clean the tray using sodium carbonate, water, and absorbent paper. do not use soap; rinse only with water to complete the cleaning process.

DETERMINATION OF AVOGADRO'S NUMBER – OPERATING PROCEDURES



THE MOLE – COMPARISON BETWEEN EQUIMOLAR QUANTITIES

30.001 – THE CHROMATOGRAPHY

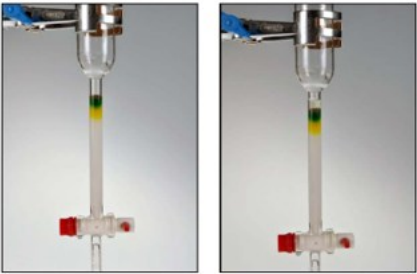


EXPERIMENTS INCLUDED
PAPER CHROMATOGRAPHY FOR THE SEPARATION OF COLORED INK PIGMENTS
THIN LAYER CHROMATOGRAPHY OF CHLOROPHYLL PIGMENTS
COLUMN CHROMATOGRAPHY OF FOOD COLORANT
COLUMN CHROMATOGRAPHY OF CHLOROPHYLLS
INCLUDED IN THE KIT

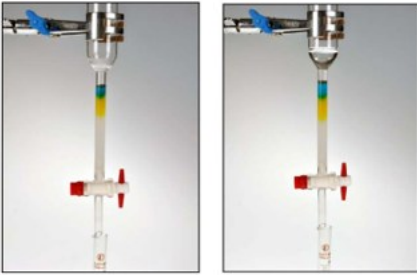
- | | | |
|---|--|----------------------------------|
| LABORATORY TECHNICAL DATA SHEETS | 1 × LONG STEEL ROD | 1 × PENCIL |
| REAGENT | 1 × FUNNEL | 1 × RULER |
| SAFETY DATA SHEETS | 1 × WASH BOTTLE | 1 × PACK OF CHROMATOGRAPHY PAPER |
| REAGENTS | 1 × CLEANING BRUSH | 1 × PACK OF SILICA GEL PLATES |
| SAFETY GUIDELINES | 1 × BEAKER TONGS | 1 × PAIR OF SAFETY GOGGLES |
| MATERIAL SUPPLIED | 2 × STIRRING RODS | 1 × PAIR OF DISPOSABLE GLOVES |
| 1 × CHROMATOGRAPHY TRAY | 1 × FORCEPS | REAGENTS |
| 1 × ELECTRIC HOT PLATE | 1 × SPOON-TYPE SPATULA | PACK OF HYDROPHILIC COTTON |
| 1 × BASE WITH ROD AND CLAMP | 1 × STEEL SPATULA | P ACK OF SYNTHETIC COTTON |
| 1 × 100 ML WASH BOTTLE WITH POURING SPOUT | 3 × 1 ML PLASTIC DROPPERS | SODIUM CHLORIDE |
| 5 × TEST TUBES WITH SCREW CAP | 3 × 3 ML PLASTIC DROPPERS | ANHYDROUS SODIUM SULFATE |
| 5 × TEST TUBES WITH STOPPER | 1 × 10 ML MEASURING CUP | ETHYL ALCOHOL 96° |
| 1 × TEST TUBE RACK | 3 × PASTEUR PIPETTES | ACETONE |
| 1 × WATCH GLASS | 3 × LATEX BULBS | GREEN FOOD COLORING |
| 1 × 10 ML GRADUATED CYLINDER | 1 × WOODEN CLAMP | BROWN FOOD COLORING |
| 1 × 100 ML BEAKER | 1 × CONICAL GRADUATED TUBE | ETHYL ALCOHOL 90° |
| 1 × 250 ML BEAKER | 3 × COVER SLIPS | ETHYL ACETATE |
| 1 × LONG CHROMATOGRAPHY COLUMN | 3 × BALLPOINT PENS (RED, BLUE AND BLACK) | PETROLEUM ETHER |
| 1 × SHORT CHROMATOGRAPHY COLUMN | 1 × SPRING CLAMP | SILICA GEL FOR CHROMATOGRAPHY |
| | 1 × NOTEPAD | CHROMATOGRAPHY SAND |

The educational kit “**chromatography**” allows the rapid extraction and separation of coloured substances using column, thin-layer, and paper chromatographic techniques.
The substances analysed include **chlorophyll pigments**, **pH indicators**, and **coloured inks**.
The kit includes a **printed operating manual** as well as additional content related to specific didactic topics.
The information materials provided include **reagent safety data sheets**, **general safety guidelines**, and **specific warnings for each experiment**.
The equipment and reagents supplied allow the experiments to be repeated many times.

30001 CROMATOGRAFIA EN COLUMNA DE COLORANTES ALIMENTARIOS



5. Open the stopcock and allow the solvent to be absorbed, as previously done with the sample. Repeat the washing until the sample is completely absorbed (colourless solvent); normally one or two washes are sufficient.

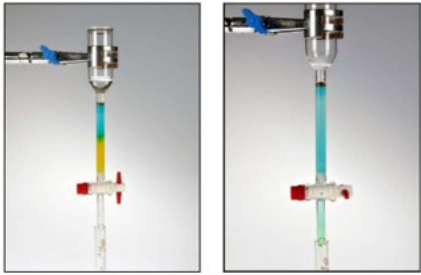


6. Carefully add water until approximately half of the reservoir is filled and allow the system to elute.

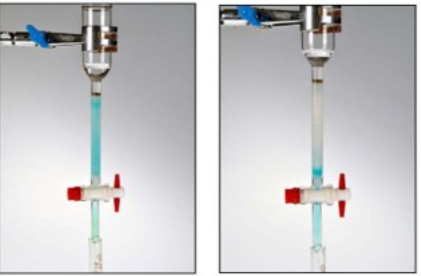
COLUMN CHROMATOGRAPHY OPERATING PROCEDURES



THIN-LAYER CHROMATOGRAPHY



7. A **blue band** will be observed in the upper part, while a **yellow band** will appear in the lower part. Wait until the first eluted substance is collected in the cylinder, close the stopcock, and transfer the fraction into a test tube.



8. Using a pipette, aspirate all the water present above the stationary phase and, using the same pipette, carefully pour acetone into the column. open the stopcock and allow the solvent to flow. If necessary, transfer the intermediate fraction into a test tube; then wait until all the blue substance is collected in the cylinder and transfer the fraction into a new test tube.

SEPARATION OF FOOD COLORANTS – OPERATING PROCEDURES



SEPARATION OF CHLOROPHYLL PIGMENTS – CHLOROPHYLL EXTRACTION



EXPERIMENTS INCLUDED

REDOX POTENTIALS
ELECTROCHEMICAL CELLS
CONCENTRATION CELLS
ELECTROLYSIS WITH THREE TYPES OF CELLS
DETERMINATION OF THE SOLUBILITY PRODUCT
STRONG ACID–BASE TITRATION
WEAK ACID–BASE TITRATION

INCLUDED IN THE KIT

LABORATORY TECHNICAL DATA SHEETS
REAGENT SAFETY DATA SHEETS
REAGENTS
SAFETY GUIDELINES

MATERIAL SUPPLIED

1 × 100 ML BEAKER
1 × 250 ML BEAKER
1 × DOUBLE TUBE WITH BALL JOINTS AND CLAMP
1 × PACK OF ELECTROSMOTIC MEMBRANES
1 × THREE-ARM TUBE
2 × 2.5 ML SYRINGES
2 × 5 ML SYRINGES
1 × WASH BOTTLE
2 × 25 ML FLASKS
1 × BASE WITH SUPPORT
1 × STAINLESS STEEL SUPPORT ROD
1 × ROD CLAMP
1 × UNIVERSAL CLAMP
1 × SMALL FUNNEL
1 × 10 ML BURETTE
2 × GLASS RODS
3 × PLASTIC RODS
1 × NOTEPAD
3 × 1 ML PLASTIC DROPPERS
3 × 3 ML PLASTIC DROPPERS
1 × 100 OHM WIRE RHEOSTAT
3 × PAIRS OF CABLES WITH ALLIGATOR CLIPS
1 × ZINC ELECTRODE

2 × PLATINUM ELECTRODES
2 × COPPER ELECTRODES
1 × SILVER ELECTRODE
1 × AG/AGCL REFERENCE ELECTRODE
2 × METAL CLAMPS
1 × PENCIL
1 × METAL SPATULA
3 × PLASTIC SPATULAS
DISPOSABLE GLOVES AND SAFETY GOGGLES
ABRASIVE PAPER
1 × PACK OF PH INDICATOR PAPER
1 × VOLTAGE SENSOR
1 × CURRENT SENSOR
1 × PH SENSOR
1 × DROP COUNTER SENSOR
1 × PC INTERFACE
1 × NEULOG SOFTWARE

REACTIVOS

REAGENTS

POTASSIUM NITRATE 1 M
SODIUM HYDROXIDE 0.1 N
ACETIC ACID 0.1 N
HYDROCHLORIC ACID 0.1 N
SILVER NITRATE 0.1 M
COPPER SULFATE 1 M
ZINC SULFATE 1 M
POTASSIUM CHLORIDE 1 M
SULFURIC ACID 1 M
SODIUM SULFATE
IRON(II)/IRON(III) REFERENCE SOLUTION

KIT DESCRIPTION

The educational kit “electrochemistry online” allows a wide and comprehensive series of electrochemistry experiments to be performed using sensors interconnected with a pc. the kit includes a printed operating manual as well as additional content related to specific didactic topics.

The information materials provided include reagent safety data sheets, general safety guidelines, and specific warnings for each experiment. the equipment and reagents supplied allow the experiments to be repeated many times

30.007 VALORACIÓN PH-MÉTRICA EN LÍNEA



13. Perform a rinse of the burette by adding, with the aid of a funnel, a few millilitres of 0.1 n sodium hydroxide solution.



14. Wet the internal walls of the burette and remove the liquid using the small beaker.



15. Fill the burette with 10 ml of 0.1 n sodium hydroxide solution.



16. Add distilled water to the beaker until a volume of approximately 100 ml is reached.

VALORACIÓN ÁCIDO–BASE – CURVA PH-MÉTRICA

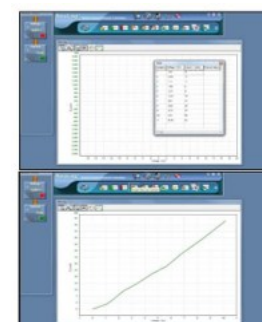
4. Fill the other arm with 1 m zinc sulphate solution.



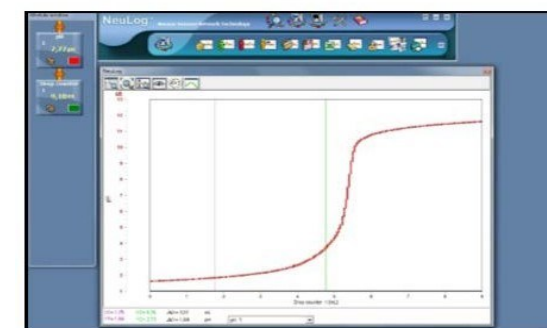
5. Insert a copper electrode into the copper sulphate solution and a zinc electrode into the zinc sulphate solution.



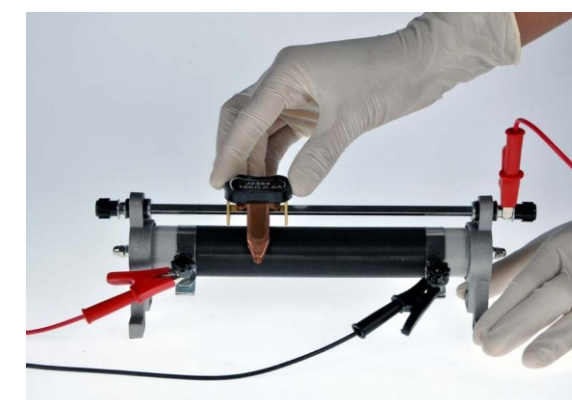
6. Connect the electrodes to the terminals as indicated in the electrical diagram. The positive pole must be connected to the copper electrode.



7. Repeat the same operations performed during electrolysis 1 and observe the new diagram obtained.



Acid–base titration – ph-metric curve. the characteristic inflection point corresponding to the equivalence point is observed.



ELECTROLYSIS – OPERATING PROCEDURES FOR OBTAINING THE CHARACTERISTIC AMPEROMETRIC CURVES.

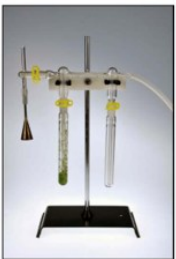
30.016 – AIR POLLUTANTS



EXPERIMENTS INCLUDED	1 × LONG STEEL SPOON	1 × NOTEPAD
IDENTIFICATION OF CARBON DIOXIDE	1 × FORCEPS	1 × PENCIL
IDENTIFICATION OF CARBON MONOXIDE	1 × STEEL SPATULA	1 × SPOON-TYPE SPATULA
IDENTIFICATION OF HYDROCHLORIC ACID	1 × LIGHTER	1 × CLEANING BRUSH
IDENTIFICATION OF SULFUR DIOXIDE	1 × FUNNEL	1 × SMALL CLEANING BRUSH
INCLUDED IN THE KIT	1 × PACK OF FILTER PAPER	1 × VACUUM PUMP
LABORATORY TECHNICAL DATA SHEETS	1 × 250 ML ERLLENMEYER FLASK	1 × PAIR OF SAFETY GOGGLES
REAGENT SAFETY DATA SHEETS	1 × 100 ML BEAKER	1 × PAIR OF DISPOSABLE GLOVES
REAGENTS	1 × WASH BOTTLE	REAGENTS
SAFETY GUIDELINES	1 × STIRRING ROD	CALCIUM HYDROXIDE SOLUTION
MATERIAL SUPPLIED	1 × 10 ML GLASS GRADUATED CYLINDER	SODIUM HYDROXIDE SOLUTION
1 × COMBUSTION GAS APPARATUS	5 × 3 ML DROPPERS	AMMONIACAL SILVER NITRATE SOLUTION
1 × BASE WITH ROD	1 × GAS BURNER WITH SUPPORT	HYDROGEN PEROXIDE
	3 × SMALL SPATULAS	UNIVERSAL INDICATOR
		SULFUR
		SILVER NITRATE
		PVC SAMPLES (POLYVINYL CHLORIDE)

the educational kit “air pollutants” allows **qualitative tests** to be performed on **gases produced by the combustion of different materials**, highlighting the **environmental impact** caused by the **incomplete combustion** of commonly used substances. The kit includes a **printed operating manual** as well as **additional content related** to specific didactic topics. the information materials provided include reagent safety data sheets, general safety guidelines, and specific warnings for each experiment. The equipment and reagents supplied allow the experiments **to be repeated many times**.

30.016 – IDENTIFICATION OF SULFUR DIOXIDE



4. Open the water valve and check for the presence of a flow of air bubbles in the apparatus.



5. Using a spatula, place a small amount of sulphur under the funnel and heat with the gas burner until ignition occurs (attention: the sulphur first melts and then ignites with a bluish flame).



6. Observe the **variation in the PH** of the solution, which changes from **yellow green to red, a colour typical of strong acids**. if the test is performed by burning a small amount of sugar, the carbon dioxide produced does not interfere with the test because, being a weak acid, it produces a characteristic yellow-orange coloration.



30.016 – IDENTIFICACIÓN DEL MONÓXIDO DE CARBONO



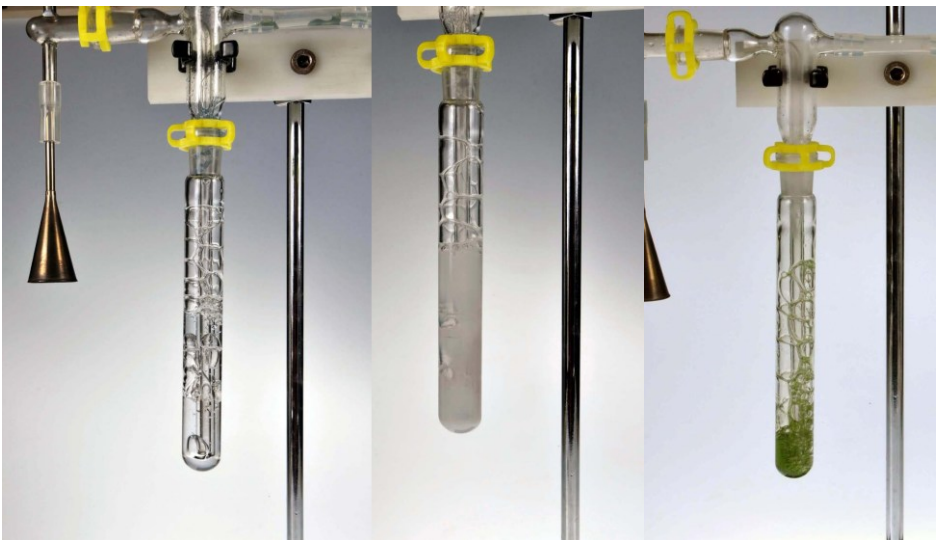
4. Open the water valve and check for the presence of a flow of air bubbles in the apparatus. using forceps, place a small piece of paper under the funnel and ignite it. wait until complete combustion occurs.



5. Rotate the funnel upward and, using the wash bottle, perform a small rinse with a few millilitres of water.



6. Observe the colour change in the solution in the first test tube (darkening), caused by the presence of carbon monoxide.



30.017 – SOIL



EXPERIMENTS INCLUDED

SOIL PH AND TEMPERATURE
DETERMINATION OF CALCIUM CARBONATE
SOIL PERMEABILITY
SOIL TEXTURE
ACID RAIN
DETERMINATION OF POTASSIUM AND NITRATES

INCLUDED IN THE KIT

LABORATORY TECHNICAL DATA SHEETS
REAGENT SAFETY DATA SHEETS
REAGENTS
SAFETY GUIDELINES
MATERIAL SUPPLIED

1 × BASE WITH ROD
1 × 100 ML BOTTLE
1 × 250 ML CYLINDER WITH STOPPER
1 × 400 ML BEAKER
3 × 100 ML BEAKERS
1 × 250 ML ERLLENMEYER FLASK
1 × HYDROMETER (1000–1050 G/L)
1 × 2 MM SIEVE
1 × POWDER FUNNEL
1 × FUNNEL
1 × STIRRING ROD
1 × WASH BOTTLE
5 × 3 ML DROPPERS
5 × 1 ML DROPPERS
5 × RECTANGULAR TRAYS
1 × STOPWATCH
1 × PH METER
1 × SOIL THERMOMETER
2 × COLUMNS
1 × 50 ML GRADUATED CYLINDER
1 × DOUBLE SUPPORT WITH RINGS
1 × CALCIMETER WITH STOPPER AND SYRINGE
2 × PLASTIC TEST TUBES

1 × FORCEPS
1 × PACK OF FILTER PAPER
1 × 20 ML SYRINGE WITH STOPPER
2 × 5 ML SYRINGES
2 × TEST TUBES WITH STOPPER
1 × 2 ML PIPETTE
3 × SMALL SPATULAS
1 × SPOON-TYPE SPATULA
1 × 10 ML MEASURING CUP
1 × POTASSIUM ANALYSIS CARD
1 × NOTEPAD
1 × PENCIL
2 × RUBBER RINGS
1 × PAIR OF DISPOSABLE GLOVES
1 × PAIR OF SAFETY GOGGLES

REAGENTS

SYNTHETIC COTTON
HYDROCHLORIC ACID 20%
INDICATOR
CARBONATE SAND
EDTA
SODIUM HYDROXIDE
SODIUM SILICATE
PH BUFFER SOLUTION 7.00
PH BUFFER SOLUTION 4.00
POTASSIUM
REAGENT A FOR POTASSIUM
REAGENT B FOR POTASSIUM
NITRATE ANALYSIS KIT

The educational kit “soil” allows **various soil analyses** to be performed to compare different samples and evaluate their **interactions with natural phenomena**. It is possible to quantify the corrosive effect that acid rain exerts on soil. The kit includes a **printed operating manual**. The information materials provided include **reagent safety data sheets, general safety guidelines, and specific warnings** for each experiment. The equipment and reagents supplied allow the experiments to be repeated many times.

30.023 – INTRODUCTION TO NANOTECHNOLOGIES



INCLUDED IN THE KIT

LABORATORY TECHNICAL DATA SHEETS
REAGENT SAFETY DATA SHEETS
REAGENTS
SAFETY GUIDELINES

MATERIAL SUPPLIED

1 × BASE WITH STEEL ROD
1 × UNIVERSAL CLAMP WITH HOLDER
1 × LASER POINTER
1 × PLASTIC TRAY
1 × COLORED LIQUID THERMOMETER
1 × FORCEPS
3 × 1 ML DROPPERS
3 × 3 ML DROPPERS
2 × GLASS STIRRING RODS
1 × PACK OF FILTER PAPER
1 × 250 ML BEAKER
2 × FUNNELS
1 × LIQUID CRYSTAL THERMOMETER
1 × LIQUID CRYSTAL MEMBRANE
1 × 100 ML ERLLENMEYER FLASK
2 × 100 ML BEAKERS
6 × 10 ML TEST TUBES WITH STOPPER
3 × 20 ML TEST TUBES WITH STOPPER
1 × 10 ML GRADUATED CYLINDER
1 × WASH BOTTLE
1 × MAGNET
1 × SPOON-TYPE SPATULA
1 × STEEL SPATULA
1 × ALCOHOL LAMP
10 × PLASTIC SPATULAS
1 × PACK OF PH INDICATOR PAPER
1 × NOTEPAD WITH PENCIL
SAFETY GOGGLES
LATEX GLOVES

REAGENTS

HYDROCHLORIC ACID SOLUTION
CALCIUM CARBONATE
SAND
VEGETABLE OIL
LIQUID SOAP
HYDROPHOBIC SAND
SULFUR SOLUTION
FOOD COLORING
TITANIUM OXIDE (20 NM)
NITINOL ALLOY
NANOTEX LIQUID
SHELLAC SOLUTION
HYDROPHOBIC GLASS SHEET
VIAL WITH IRON NANOPARTICLES

EXPERIMENTS INCLUDED

SIZE EFFECT: IS SMALLER BETTER?
HOW SMALL ARE NANOPARTICLES?
TYNDALL EFFECT
COLLOIDAL SYSTEMS
NATURAL NANOPRODUCTS
NANOTECHNOLOGY: FERROFLUID
NANOTECHNOLOGY: FABRIC WATERPROOFING
NANOTECHNOLOGY: SILANIZED SAND
NANOTECHNOLOGY: HYDROPHOBIC GLASS
NANOTECHNOLOGY: SELF-CLEANING SURFACES IN CONSTRUCTION
NANOTECHNOLOGY: SHAPE MEMORY ALLOYS
NANOTECHNOLOGY: LIQUID CRYSTALS

The educational kit “**introduction to nanotechnologies**” addresses a field in which the **international scientific community** introduced the term nanotechnology in the **1970s**, defining it as a technology capable of positioning **atoms in predetermined structures and geometries**, where the particles involved and manipulated have **dimensions between 0.1 nm and 100 nm**. the kit allows **simple experiments** to be performed to understand **fundamental concepts** and some **basic technological applications**. The content makes lessons more engaging and stimulates students’ interest. The kit includes a **printed operating manual**. The information materials provided include **reagent safety data sheets, general safety guidelines, and specific warnings** for each experiment. The equipment and reagents supplied allow the experiments to be repeated many times.

30.019 – ANÁLISIS DE VINOS



EXPERIMENTS INCLUDED

DETERMINATION OF THE PH OF WINE
 DETERMINATION OF ALCOHOL CONTENT BY DISTILLATION
 DETERMINATION OF ALCOHOL CONTENT BY EBULLIOMETRIC METHOD
 DETERMINATION OF TOTAL ACIDITY
 DETERMINATION OF VOLATILE ACIDITY
 DETERMINATION OF REDUCING SUGARS
 DETERMINATION OF TOTAL SUGARS
 DETERMINATION OF SULFUR DIOXIDE

INCLUDED IN THE KIT

LABORATORY TECHNICAL DATA SHEETS
 REAGENT SAFETY DATA SHEETS
 REAGENTS

SAFETY GUIDELINES

MATERIAL SUPPLIED

1 × 100 ML BEAKER
 1 × 250 ML BEAKER
 1 × 100 ML GLASS FLASK
 1 × WASH BOTTLE
 1 × WIRE GAUZE
 1 × BASE WITH SUPPORT
 1 × SUPPORT ROD
 1 × SUPPORT CLAMP
 1 × SMALL FUNNEL
 1 × PLASTIC FUNNEL
 1 × STAINLESS STEEL BEAKER TONGS
 1 × CLEANING BRUSH
 1 × GLASS STIRRING ROD
 3 × 1 ML PLASTIC DROPPERS

3 × 3 ML PLASTIC DROPPERS
 1 × 100 ML VOLUMETRIC FLASK
 1 × METAL SPATULA
 1 × SPOON-TYPE SPATULA
 1 × PACK OF FILTER PAPER
 1 × MAGNETIC STIR BAR
 3 × 10 ML SYRINGES
 2 × 2.5 ML SYRINGES
 1 × 10 ML BURETTE
 1 × PYCNOMETER
 1 × DIGITAL THERMOMETER
 1 × PORTABLE PH METER
 1 × CAZENAVE APPARATUS
 1 × DISTILLATION ACCESSORY SET
 1 × ACCESSORY SET FOR EBULLIOMETRIC
 DETERMINATION OF ALCOHOL CONTENT
 1 × NOTEPAD
 1 × PENCIL
 DISPOSABLE GLOVES
 SAFETY GOGGLES

REAGENTS

BOILING REGULATOR
 IODINE 0.01 M
 SODIUM BICARBONATE
 POTASSIUM IODIDE
 SODIUM HYDROXIDE 0.1 M
 SODIUM HYDROXIDE
 STARCH SOLUTION
 PH BUFFER SOLUTION PH 7
 FEHLING REAGENT A
 FEHLING REAGENT B
 CALCIUM CARBONATE
 METHYLENE BLUE
 DILUTE SULFURIC ACID
 PHENOLPHTHALEIN SOLUTION
 ACTIVATED CARBON

The educational kit “**wine analysis**” allows a **wide range of analyses** to be performed to determine the **main characteristics of wines**. It is possible to determine **PH, alcohol content by distillation** and by the **ebulliometer method, total acidity, volatile acidity**, reducing and **total sugars**, and sulphur dioxide.

The kit includes distillation equipment, a device for determining the boiling point, equipment for steam distillation, a portable **ph meter**, a **digital thermometer**, various accessories, **reagents**, and an **operating manual**.

The information materials provided include reagent safety data sheets, general safety guidelines, and specific warnings for each experiment.

The equipment and reagents supplied allow the experiments to be repeated many times.

20.003 – INTRODUCCIÓN A LA QUÍMICA



EXPERIMENTS INCLUDED

MELTING AND SOLIDIFICATION
 EVAPORATION
 BOILING WATER
 DOES WATER ALWAYS BOIL AT THE SAME
 TEMPERATURE?
 DISTILLATION OF WATER
 SUBLIMATION AND FROST FORMATION
 SOLID MIXTURES
 LIQUID MIXTURES

SOLUTIONS AND SUSPENSIONS

CRYSTALLIZATION
 ELEMENTS AND COMPOUNDS
 FORMATION OF A GAS
 ELEMENT EXCHANGE
 OXIDATION OF GLUCOSE
 COMBUSTION
 DETECTION OF THE PRESENCE
 OF CARBON DIOXIDE
 IDENTIFICATION OF STARCH

FORMATION OF PRECIPITATES

SEPARATION OF A PRECIPITATE
 ACIDITY AND BASICITY
 ACID-BASE REACTIONS
 THE COLOR OF ATOMS

INCLUDED IN THE KIT

LABORATORY TECHNICAL DATA SHEETS
 REAGENT SAFETY DATA SHEETS
 REAGENTS
 SAFETY GUIDELINES

MATERIAL SUPPLIED

1 × SPOON-TYPE SPATULA
 3 × STRAWS
 1 × INDICATOR PAPER
 1 × PACK OF FILTER PAPER
 3 × DROPPERS
 1 × PLASTIC BOTTLE
 1 × PLASTIC TEST TUBE
 2 × CERAMIC RODS
 2 × BEAKERS
 2 × ERLLENMEYER FLASKS
 3 × CUPS
 1 × WASH BOTTLE
 1 × BASE WITH ROD AND CLAMP

1 × ALCOHOL BURNER
 1 × PACK OF BALLOONS
 1 × LARGE RECTANGULAR TRAY
 3 × SMALL RECTANGULAR TRAYS
 1 × LARGE TEST TUBE
 5 × TEST TUBES WITH STOPPER
 1 × PERFORATED STOPPER WITH TUBE
 2 × 50 MM FUNNELS
 1 × WATCH GLASS
 1 × WOODEN CLAMP
 1 × STIRRING ROD
 1 × SYRINGE
 1 × CANDLE
 1 × MAGNET
 1 × PENCIL
 1 × NOTEPAD
 1 × LIGHTER
 2 × CONTAINERS WITH PRESS-FIT CAP
 1 × TEST TUBE WITH THERMOMETER AND STEARIC ACID
 1 × TEST TUBE WITH WATER AND OIL WITH STOPPER
 1 × VIAL OF IODINE
 1 × VIAL WITH SAND AND IRON FILINGS

1 × PACK OF MAGNESIUM RIBBON
 1 × BOTTLE OF METHYLENE BLUE
 1 × BOTTLE OF CITRIC ACID
 1 × BOTTLE OF CALCIUM CARBONATE
 1 × PACK OF IRON WOOL
 1 × BOTTLE OF GLUCOSE
 1 × BOTTLE OF STARCH POWDER
 1 × BOTTLE OF IODINE SOLUTION
 1 × BOTTLE OF CALCIUM CHLORIDE
 1 × BOTTLE OF SODIUM HYDROXIDE SOLUTION
 1 × BOTTLE OF HYDROCHLORIC ACID SOLUTION
 1 × BOTTLE OF PHENOLPHTHALEIN
 1 × BOTTLE OF FOOD COLORING
 1 × BOTTLE OF SODIUM CHLORIDE
 1 × BOTTLE OF POTASSIUM ALUMINUM SULFATE (ALUM)
 1 × BOTTLE OF CALCIUM HYDROXIDE
 1 × BOTTLE OF SODIUM HYDROXIDE PELLETS
 1 × BOTTLE OF COPPER SULFATE
 1 × BOTTLE OF SODIUM CARBONATE

The “**Introduction to Chemistry**” educational kit allows students to perform **25 simple experiments** that illustrate the main chemical phenomena.

The kit includes an **operational manual**. The informational materials provided include **reagent safety data sheets, general safety guidelines, and specific warnings for each experiment**.

The **equipment and reagents supplied allow the experiments to be repeated numerous times**, making the kit suitable for regular classroom laboratory activities.

10.002 FLAME TEST



10.002 – WITHOUT BURNER 10.002/B – WITH BURNER

This kit introduces an analytical technique used to identify the presence of certain elements, such as sodium, potassium, copper, strontium, and lithium.

By using a flame source, it is possible to observe characteristic colours produced by atomic emission. This phenomenon allows for simple qualitative chemical analysis.

The kit includes all necessary materials to repeat the experiments multiple times.

The required procedures are very simple and designed to ensure user safety. The product is supplied complete with instructional materials and operating guidelines.

10.012 COLORIMETRIC pH TEST



This kit uses a mixture of indicators that develop different colorations, allowing the creation of a chromatic scale ranging from pH 1 to pH 14.

The methodology makes it possible to determine the pH of common substances by comparison with the colour scale obtained using the materials supplied.

The kit includes materials that allow the experiments to be repeated multiple times.

The procedures required are very simple and ensure user safety.

The product is supplied complete with informational materials and instructions for use.

10.009 DISTILLATION



With this simple distillation apparatus, it is possible to separate different substances and observe the phase changes involved in the process.

In the experiment, a coloured solution is prepared and distilled, producing a sample of clear distilled water within a few minutes.

The kit includes materials that allow the procedure to be repeated several times.

The required operations are very simple, and the product is supplied complete with informational materials and instructions for use.

10.005 PAPER CHROMATOGRAPHY



With this kit, it is possible to separate the components present in a food dye using the paper chromatography technique.

The kit includes materials to organize students into four working groups and to repeat the experiments several times.

The procedures required are very simple and ensure user safety. The product is supplied complete with informational materials and instructions for use.

10.019 ACID–BASE TITRATION



A simple analytical methodology allows the performance of quantitative chemical analyses using solutions of known concentration and pH indicators.

The technique used makes it possible to determine the amount of substance present in a sample by measuring the volume of reagent consumed during the reaction.

Volumetric analytical techniques, together with instrumental techniques, are among the most widely used methods in analytical laboratories. The kit includes materials and reagents that allow the experiments to be repeated multiple times.

The required procedures are very simple and ensure user safety. The product is supplied complete with informational materials and instructions for use.

10.010 A JAR OF CRYSTALS



Using a **special crystallization technique**, it is possible to **obtain a crystalline solid from its solution without the need for evaporation**.

The kit includes **materials to organize students into four working groups and to repeat the experiments multiple times**.

This **special methodology** allows crystals to be obtained within 24 hours.

The procedures required are **very simple and ensure user safety**.

The product is supplied **complete with informational materials and instructions for use**.

10.011 THE CRYSTAL CHEST



The proposed methodology allows the **observation, within a few minutes, of crystal growth produced by a chemical reaction**.

It is possible to **prepare three different types of crystals**.

The kit includes **materials that allow the experiments to be repeated several times**.

The required procedures are **very simple and ensure user safety**.

The product is supplied **complete with informational materials and instructions for use**.

10.018 EXOTHERMIC AND ENDOTHERMIC REACTIONS



With the proposed kit, it is possible to **measure the effects of heat exchange during chemical reactions**.

Three methodologies are proposed, corresponding to **exothermic, endothermic, and athermic reactions**.

The kit includes materials to **repeat the experiments multiple times**.

The required procedures are **very simple and ensure user safety**.

The product is supplied **complete with informational material and instructions for use**.

10.003 MAGIC CHEMISTRY



An **oxidation–reduction reaction** produces a **sudden and unexpected blue coloration of the liquid**.

The phenomenon occurs through the **simple shaking of the solution**, and the color disappears after a few seconds.

This apparently inexplicable process actually **involves atmospheric oxygen present inside the container**.

The product is supplied **complete with informational materials and instructions for use**.

10.007 CHEMICAL REACTIONS



Matter can undergo transformations that, in most cases, are manifested through **changes in its macroscopic properties**.

A **simple experiment** allows the observation of a **chemical reaction that occurs when two substances are combined**, producing a gas that is collected in a balloon.

The required procedures are **very simple and ensure user safety**.

The product is supplied **complete with informational materials and instructions for use**.

10.020 CHEMICAL FLASHER



A particular **periodic reaction** produces **iodine at regular time intervals**, causing the appearance of an **intermittent blue coloration**.

This is a **spectacular oxidation–reduction process** that stimulates students' interest and curiosity.

The experiment can be **repeated numerous times**.

The required procedures are **very simple and ensure user safety**.

The product is supplied **complete with informational materials and instructions for use**.

10.017 AMMONIA FOUNTAIN



This experiment represents a **classic demonstration in the educational laboratory**. The ammonia produced and used generates **mechanical energy**, creating a **water jet and characteristic colour effects**. The required **gaseous ammonia is generated through a chemical reaction and directed into the apparatus**. The experiment can be **repeated numerous times**. The procedures required are **very simple and ensure user safety**. The product is supplied **ready for use, complete with informational materials and instructions for use**.

10.013 ELECTROLYSIS



The passage of **electric current through the solution contained in the glass tube** produces **chemical reactions**, which are evidenced by the appearance of **characteristic color changes**. The cell operates using **battery power supply**. The kit includes **materials that allow the two described methodologies to be performed repeatedly**. The required procedures are **very simple and easy to carry out**.

10.016 THE ELECTROCHEMICAL CELL



This kit allows the construction of the **simplest and most schematic type of electrochemical cell**. With a **basic cell consisting of two electrodes immersed in a solution**, it is possible to **convert the electron flow generated by an oxidation–reduction process into light energy**. The materials used **ensure a high energy output, sufficient to produce a clearly visible light beam**. The experiment can be **repeated numerous times**. El producto se suministra **completo con material informativo e instrucciones de uso**.

10.028 HOFMANN VOLTAMETER

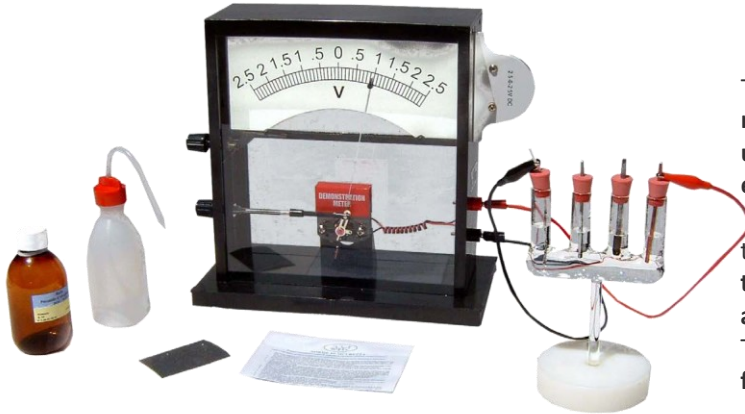


The kit includes a **glass Hofmann voltameter with base, electrodes, a non-corrosive electrolyte, and a battery-powered supply system**. It allows the **rapid electrolysis of water**, enabling the observation of the **volumes of gases produced and their constant ratio over time**. The kit contains **materials for many experiments, as the electrolyte can be recovered and reused**.

The product is supplied **ready for use, complete with informational materials and instructions**.

(AA batteries are not included; they can be replaced by a 12 V DC power supply.)

10.037 REDOX REACTIONS – COMPARISON BETWEEN METALS



This kit compares **electrodes made of different materials used in an electrical circuit to construct simple electrochemical cells**. Using a **large demonstration voltmeter**, the methodology allows **simultaneous visualization of the electromotive force driving the flow of electrons and the direction of the electric current**. The kit includes **electrodes, voltmeter, and instructions for use**.

10.030 ION MIGRATION IN AN ELECTRIC FIELD



This kit allows the **visualization of ion movement in a solution under the influence of an electric field**. **Coloured ions are used, which migrate from the bottom of a U-tube toward platinum electrodes connected to a direct current power supply**. **Average migration time: 20–30 minutes**. The procedures required are **very simple and ensure user safety**. The product is supplied **complete with informational materials and instructions for use**. (A 12 V DC power supply is not included; minimum required current: 1 A.)

A0030 CHEMISTRY GLASSWARE SET



SUPPLIED MATERIALS

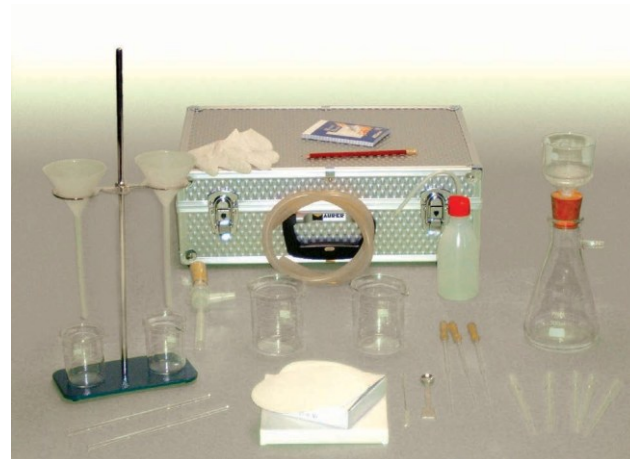
2 × 50 ML GRADUATED CYLINDERS
2 × 100 ML GRADUATED CYLINDERS
2 × 100 ML ERLLENMEYER FLASKS
2 × 250 ML ERLLENMEYER FLASKS
2 × 100 ML BEAKERS
2 × 250 ML BEAKERS
1 × 400 ML BEAKER
2 × 100 ML VOLUMETRIC FLASKS
1 × 250 ML VOLUMETRIC FLASK
12 × TEST TUBES (160 × 16 MM)
1 × TEST TUBE RACK
12 × PRESS-FIT STOPPERS FOR TEST TUBES
2 × FUNNELS
3 × STIRRING RODS
4 × GLASS TUBES
1 × RUBBER TUBING
3 × RUBBER STOPPERS
2 × 5 ML GRADUATED PIPETTES

10 × PASTEUR PIPETTES
10 × PLASTIC SPATULAS
1 × SPOON-TYPE SPATULA
2 × WOODEN CLAMPS
3 × GRADUATED SYRINGES
1 × THERMOMETER
1 × BOTTLE OF UNIVERSAL INDICATOR
1 × PACK OF FILTER PAPER
1 × ALCOHOL BURNER
1 × TRIPOD STAND
1 × METAL WIRE GAUZE WITH CERAMIC CENTER
1 × CRUCIBLE TRIANGLE
1 × CRUCIBLE
2 × PORCELAIN EVAPORATING DISHES
1 × MORTAR
2 × WATCH GLASSES
10 × WEIGHING BOATS
2 × RANVIER BOTTLES
1 × CLEANING BRUSH
1 × CRYSTALLIZING DISH (90 MM)
1 × WASH BOTTLE
1 × MOHR CLAMP

A.0007 SET PARA FILTRACIÓN

MATERIAL INCLUIDO:

2 VASOS DE PRECIPITADOS DE 100 ML
2 VASOS DE PRECIPITADOS DE 250 ML
1 MATRAZ KITASATO DE VACÍO DE 500 ML
1 EMBUDO BÜCHNER DE 90 MM CON TAPÓN DE GOMA PERFORADO
1 BOMBA DE VACÍO POR AGUA CON TUBOS DE CONEXIÓN
2 EMBUDOS DE TALLO LARGO DE 80 MM
2 SOPORTES PARA EMBUDOS
3 PIPETAS PASTEUR
3 PERILLAS DE LÁTEX
5 PIPETAS PASTEUR DE PLÁSTICO
1 FRASCO LAVADOR DE 250 ML
1 ESPÁTULA TIPO CUCHARILLA
1 ESPÁTULA DE ACERO
2 VARILLAS DE VIDRIO
1 ENVASE DE PAPEL DE FILTRO DE 110 MM
1 ENVASE DE PAPEL DE FILTRO DE 90 MM
10 GUANTES DE LÁTEX



A0008 TLC AND PAPER CHROMATOGRAPHY SET

SUPPLIED MATERIALS

2 × 100 ML BEAKERS
2 × 250 ML BEAKERS
2 × CYLINDRICAL CHROMATOGRAPHY CHAMBERS WITH LID
1 × 10 ML GRADUATED CYLINDER
1 × FUNNEL
2 × 100 ML TRAYS
3 × PASTEUR PIPETTES
3 × LATEX BULBS
10 × PLASTIC PASTEUR PIPETTES
4 × 100 ML GLASS BOTTLES
1 × TEST TUBE RACK
10 × TEST TUBES (16 × 100 MM)
1 × 250 ML WASH BOTTLE
1 × SPRAY ATOMIZER WITH RUBBER BULB
1 × STAINLESS STEEL SPATULA
3 × GLASS STIRRING RODS
1 × SCISSORS
1 × CLEANING BRUSH
1 × PACK OF CHROMATOGRAPHY PAPER
1 × NOTEPAD
1 × PENCIL
1 × PACK OF SILICA GEL PLATES (40 × 80 MM)
1 × RULER

10 × LATEX GLOVES
1 BLOCKNOTES



A0011 KIPP APPARATUS

Used in the laboratory for the **generation of various gases.**



A0013 APARATO DE GRAHAM



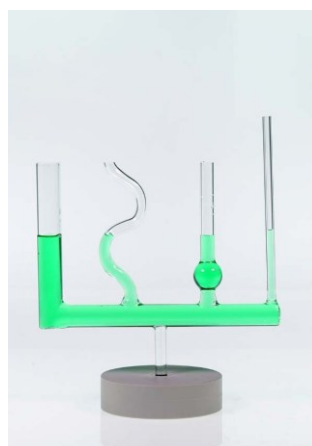
Equipment designed for the **study of gas diffusion**.
Special valves **prevent the dispersion** of the gases
used into the surrounding environment.

A0015 MINI DISTILLER



Simple one-piece apparatus for
distillation.
Includes a 250 ml flask.

WSC1 COMMUNICATING
VESSELS



WSC2 PASCAL APPARATUS



WSC3 CAPILLARY
COMMUNICATING VESSELS



A0033 HERON'S FOUNTAIN



Made of **borosilicate glass**.
After pouring a **small amount of water**, the fountain activates
and produces a **continuous jet** until all the water from the
upper reservoir is transferred to the lower reservoir.



30.004 DENSITY



INCLUDED EXPERIMENTS
DETERMINATION OF THE DENSITY OF DIFFERENT MATERIALS
DETERMINATION OF THE DENSITY OF LIQUIDS
USE OF THE ALCOHOLMETER
CONSTRUCTION OF A HYDROMETER

- INCLUDED IN THE KIT**
LABORATORY TECHNICAL DATA SHEETS
REAGENT SAFETY DATA SHEETS
REAGENTS
SAFETY GUIDELINES
MATERIALS SUPPLIED
2 × 250 ML GRADUATED CYLINDERS
2 × 1 ML DROPPERS
2 × 3 ML DROPPERS
1 × HYDROMETER
1 × BASE WITH SUPPORT ROD
1 × BURETTE CLAMP
1 × ELECTRONIC BALANCE (CAPACITY 200 G, SENSITIVITY 0.1 G)
1 × 2 ML GRADUATED PIPETTE
1 × 5 ML VOLUMETRIC FLASK
1 × 10 ML VOLUMETRIC FLASK
1 × WATCH GLASS
1 × PIPETTE FILLER
2 × STRAWS WITH STOPPER AND RUBBER JOINTS
1 × 250 ML BEAKER
2 × CONICAL TUBES
1 × WASH BOTTLE
1 × ANATOMICAL TWEEZERS
1 × NOTEPAD
1 × PENCIL
1 × RULER
1 × FUNNEL
1 × 10 ML BURETTE

- DISPOSABLE GLOVES
SAFETY GOGGLES
REAGENTS
90% DENATURED ETHYL ALCOHOL
LEAD SPHERES
BRASS SAMPLES
ALUMINUM SAMPLES
STEEL SAMPLES
COPPER SAMPLES
RUBBER SAMPLES

Description

The “Density” educational kit allows the measurement of density in solids and liquids by determining mass and **volume** or by **applying Archimedes’ principle**.
The kit includes a printed operational manual.
The materials and reagents supplied allow the experiments to be repeated numerous times.

30.009 HEAT



EXPERIMENTOS INCLUIDOS:
CAPACIDAD TÉRMICA DEL CALORÍMETRO
TEMPERATURA Y CALOR
CALOR ESPECÍFICO DE LOS SÓLIDOS
DILATACIÓN TÉRMICA DE LOS SÓLIDOS
DILATACIÓN TÉRMICA DE LOS LÍQUIDOS

El kit didáctico “**El calor**” permite experimentar los principales efectos de los **intercambios térmicos**, destacando el significado de la **temperatura** y de la **capacidad térmica** de un cuerpo. Es posible medir el **calor específico de diferentes materiales**.
El calorímetro está equipado con **agitador electromecánico** y **resistencia calefactora**. El kit incluye **manual operativo impreso** y **DVD multimedia**.

EN EL KIT:

- MATERIAL INCLUIDO**
1 × ELECTRIC HOT PLATE
1 × POWER SUPPLY 220 V / 12 V WITH CONNECTORS
1 × 400 ML BEAKER
1 × 100 ML GRADUATED CYLINDER
1 × DIGITAL THERMOMETER
1 × RULER
1 × ROD
1 × STOPWATCH
1 × SPRING CLAMP
1 × BEAKER CLAMP

- 1 × CIRCULAR SUPPORT BASE
1 × SUPPORT ROD
1 × CALORIMETER WITH 12 V ELECTRIC STIRRER AND 12 V HEATING RESISTOR
1 × PERFORATED RUBBER STOPPER
1 × CAPILLARY COLUMN FOR THERMAL EXPANSION
1 × ELECTRONIC BALANCE
1 × FUNNEL
1 × WASH BOTTLE
1 × POLYSTYRENE CONTAINER
1 × STEEL ROD WITH HOOK
1 × SPHERE AND RING APPARATUS FOR THERMAL EXPANSION

- 1 × GAS BURNER WITH STAND
1 × NOTEPAD
1 × PENCIL
SAFETY GOGGLES
DISPOSABLE GLOVES

REAGENTS:
SAMPLES OF KNOWN MASS OF:
ALUMINIUM, BRASS, LEAD STEEL

MATERIALES INCLUIDOS

- MATERIALS INCLUDED**
- 1 × ELECTRIC HOT PLATE
 - 1 × 220 V / 12 V POWER SUPPLY WITH CONNECTORS
 - 1 × 400 ML BEAKER
 - 1 × 100 ML GRADUATED CYLINDER
 - 1 × THERMOMETER (−10 / +110 °C)
 - 1 × DIGITAL THERMOMETER
 - 1 × RULER
 - 1 × STIRRING ROD
 - 1 × STOPWATCH
 - 1 × METAL CLAMP
 - 1 × BEAKER CLAMP
 - 1 × CIRCULAR SUPPORT BASE
 - 1 × SUPPORT ROD
 - 1 × CALORIMETER COMPLETE WITH 12 V ELECTRIC STIRRER AND 12 V HEATING ELEMENT
 - 1 × PERFORATED RUBBER STOPPER
 - 1 × CAPILLARY COLUMN FOR LIQUID EXPANSION
 - SAMPLES OF KNOWN MASS OF ALUMINUM, BRASS, LEAD, AND STEEL
 - 1 × ELECTRONIC BALANCE
 - 1 × FUNNEL
 - 1 × WASH BOTTLE
 - 1 × POLYSTYRENE CUP
 - 1 × STEEL ROD WITH HOOK
 - 1 × SPHERE AND RING APPARATUS FOR SOLID EXPANSION
 - 1 × GAS BURNER WITH BASE
 - 1 × NOTEPAD
 - 1 × PENCIL
 - 1 × SAFETY GOGGLES
 - 1 × PAIR OF DISPOSABLE GLOVES
 - 1 × TEMPERATURE SENSOR
 - 1 × PC INTERFACE WITH CONNECTION CABLE
 - NEULOG SOFTWARE



30.007 PHASE CHANGES



INCLUDED EXPERIMENTS
SUBLIMATION AND DEPOSITION (FROST FORMATION)
BOILING AND CONDENSATION
EVAPORATION AND BOILING
COOLING AND HEATING CURVES
RELATIONSHIP BETWEEN PRESSURE AND BOILING TEMPERATURE

DESCRIPTION
THE “PHASE CHANGES” EDUCATIONAL KIT ALLOWS STUDENTS TO OBSERVE THE MAIN PHASE TRANSITIONS OF MATTER BY CONSTRUCTING TIME–TEMPERATURE DIAGRAMS.
IT ALSO ENABLES THE OBSERVATION OF THE EFFECT OF PRESSURE ON THE BOILING TEMPERATURE.
THE MANOMETER INCLUDED DOES NOT USE MERCURY.
THE KIT INCLUDES AN OPERATIONAL MANUAL.
THE INFORMATIONAL MATERIALS PROVIDED INCLUDE SAFETY DATA SHEETS, GENERAL SAFETY GUIDELINES, AND SPECIFIC WARNINGS FOR EACH EXPERIMENT.
THE EQUIPMENT AND REAGENTS SUPPLIED ALLOW THE EXPERIMENTS TO BE REPEATED NUMEROUS TIMES.

INCLUDED IN THE KIT LABORATORY TECHNICAL DATA SHEETS SAFETY DATA SHEETS REAGENTS SAFETY GUIDELINES MATERIALS SUPPLIED 1 × BASE WITH SUPPORT ROD AND CLAMP 1 × BEAKER CLAMP 1 × STOPWATCH 1 × ELECTRIC STIRRER 1 × CIRCULAR SUPPORT BASE 1 × 400 ML BEAKER 1 × VACUUM GAUGE WITH STAND 1 × VACUUM PUMP 1 × DISTILLATION APPARATUS	1 × PERFORATED RUBBER STOPPER WITH THERMOMETER 1 × LARGE TEST TUBE 1 × SMALL RUBBER RING 1 × LARGE RUBBER RING 2 × HOFFMAN CLAMPS 1 × THERMOMETER (–10 / +110 °C) 1 × ELECTRIC HOT PLATE 1 × SPOON-TYPE SPATULA 1 × PENCIL 1 × NOTEPAD 1 × WASH BOTTLE CONNECTION TUBING 1 × KECK CLIP	1 × 1 ML DROPPER 1 × 3 ML DROPPER 1 × TEST TUBE RACK 1 × RUBBER THERMOMETER HOLDER SAFETY GOGGLES DISPOSABLE GLOVES REAGENTS 1 × AMPOULE OF PARADICHLOROBENZENE WITH THERMOMETER ABSOLUTE ETHYL ALCOHOL ACETONE COPPER SULFATE IODINE AMPOULE BOILING REGULATOR

30.007s PHASE CHANGES (ONLIN VERSION)

MATERIALS INCLUDED 1 × BASE WITH SUPPORT ROD AND CLAMP 1 × BEAKER CLAMP 1 × STOPWATCH 1 × ELECTRIC STIRRER 1 × CIRCULAR SUPPORT BASE 1 × 400 ML BEAKER 1 × VACUUM PUMP 1 × DISTILLATION APPARATUS 1 × RUBBER STOPPER	1 × LARGE TEST TUBE 1 × LARGE RUBBER RING 2 × HOFFMAN CLAMPS 1 × ELECTRIC HOT PLATE1 1 × SPOON-TYPE SPATULA 1 × PENCIL 1 × NOTEPAD 1 × WASH BOTTLE CONNECTION TUBING	1 × KECK CLIP 1 × 1 ML DROPPER 1 × 3 ML DROPPER 1 × TEST TUBE RACK SAFETY GOGGLES DISPOSABLE GLOVES 2 × ELASTIC BANDS 1 × SHEET OF FILTER PAPER 1 × PC INTERFACE	2 × TEMPERATURE SENSORS 1 × AMPOULE OF PARADICHLOROBENZEN NEULOG SOFTWARE REAGENTS 1 × AMPOULE OF PARADICHLOROBENZENE ABSOLUTE ETHYL ALCOHOL ACETONE COPPER SULFATE IODINE AMPOULE BOILING REGULATOR

30.007 SUBLIMATION AND DEPOSITION (FROST FORMATION)
First Part
Equipment and reagents
Base with support rod and clamp
Beaker
Electric hot plate
Wash bottle
Beaker clamp
Iodine ampoule
Procedure
(The procedure is described below according to the operational manual.)



- 1. Assemble the apparatus as shown in the figure and bring the water to a boil.
- 2. Insert the ampoule and observe the formation of violet vapours.

PHASE CHANGES – OPERATING PROCEDURES FOR OBSERVING THE EFFECTS OF PRESSURE ON BOILING TEMPERATURE

30.007 PRESSURE AND BOILING TEMPERATURE
Second part
Once the apparatus has been assembled, switch on the heating plate and open the tap water supply. Loosen the clamp located on the discharge tube of the vacuum gauge and wait until the liquid reaches boiling. Allow the temperature value to stabilize and record the data in the table corresponding to a pressure of 0 atm. Slowly close the valve and adjust the pressure to –0.2 atm. This operation requires continuous control of the valve by the operator. When the temperature value stabilizes (after approximately 30 seconds), take the reading and record it in the table.
Following the same procedure, adjust the pressure to –0.4 atm and take the corresponding reading. Repeat the same operations to determine the boiling temperature corresponding to –0.6 atm. Once the measurements have been completed, switch off the heating plate and allow the apparatus to cool down.
Note: The zero value of the vacuum gauge corresponds to atmospheric pressure.
The relative pressure is the value read on the vacuum gauge; the absolute pressure has been calculated assuming that atmospheric pressure is equal to 1 atm.

Relative Pressure (atm)	0,0	-0,2	-0,4	-0,6
Absolute Pressure (atm)	1,0	0,8	0,6	0,4



PHASE CHANGES – DISTILLATION APPARATUS ONLINE VERSION SHOWN IN THE UPPER SECTION



PHASE CHANGES – APPARATUS FOR MELTING

PHASE CHANGES – OPERATING PROCEDURES FOR OBSERVING THE EFFECTS OF SUBLIMATION AND DEPOSITION (FROST FORMATION).

30.011 – GAS LAWS

30.011s GAS LAW (online)



The educational kit “**Gas Laws**” contains the instruments necessary for demonstrating the three fundamental laws of gases. It allows observation of the dependence of volume on temperature, pressure on temperature, and pressure on volume.
The equipment used does not contain mercury, is easy to use, and allows precise and reproducible results to be obtained.
The kit includes an operating manual.
The informational materials include **safety data sheets for the reagents, general safety regulations, and specific warnings for each experiment**.
The equipment and reagents supplied allow the proposed experiments to be carried out on numerous occasions.

- IN THE KIT:**
LABORATORY TECHNICAL SHEETS
REAGENT SAFETY DATA SHEETS
SAFETY REGULATIONS
- SUPPLIED MATERIAL**
1 CYLINDER 40 × 400 MM
1 STOPPER FOR CYLINDER
1 20 ML GRADUATED PIPETTE WITH CONNECTION TUBE
1 GLASS APPARATUS WITH 100 ML BOTTLE AND

- STOPPERS
1 THERMOMETER –10 / 110 °C
1 METAL CLAMP
1 BEAKER CLAMP
1 MAGNETIC STIRRING BAR
1 APPARATUS FOR BOYLE’S LAW
1 MANOMETER 0–100 MBAR
1 WASH BOTTLE
1 PLASTIC STIRRER
1 PENCIL
1 NOTE PAD
DISPOSABLE GLOVES

- SAFETY GOGGLES
EXPERIMENTS COVERED:
BOYLE’S LAW
CHARLES’S LAW
GAY-LUSSAC’S LAW
- MATERIALS INCLUDED**
1 CYLINDER 40 × 400 MM

- 1 STOPPER FOR CYLINDER
1 20 ML GRADUATED PIPETTE WITH CONNECTION TUBE
1 GLASS APPARATUS WITH 100 ML BOTTLE AND STOPPERS
1 METAL CLAMP
1 BEAKER CLAMP
1 MAGNETIC STIRRING BAR
1 APPARATUS FOR BOYLE’S LAW
1 MANOMETER 0–100 MBAR
1 WASH BOTTLE
1 PLASTIC STIRRER

- 1 PENCIL
1 NOTE PAD
DISPOSABLE GLOVES
SAFETY GOGGLES
1 TEMPERATURE SENSOR
1 PRESSURE SENSOR
1 PC INTERFACE
NEULOG SOFTWARE

The informational materials supplied include the safety data sheets for the reagents, the general safety regulations, and the specific warnings for each experiment. The equipment and reagents included allow the experiments to be carried out.

30.014 BIOMOLECULE IDENTIFICATION

EXPERIMENTS INCLUDED

LIPID TEST
LUGOL TEST
BIURET TEST
FEHLING TEST
MOLISCH TEST

INCLUDED IN THE KIT

DOCUMENTATION
LABORATORY TECHNICAL SHEETS
REAGENT SAFETY DATA SHEETS
SAFETY REGULATIONS

MATERIALS INCLUDED

1 TEST TUBE RACK
1 CIRCULAR RACK
1 400 ML BEAKER
1 ELECTRIC HOT PLATE
2 WOODEN CLAMPS
1 BEAKER CLAMP
10 TEST TUBES WITH STOPPER
5 1 ML DROPPERS
5 3 ML DROPPERS
1 SPATULA
4 SMALL SPATULAS
1 STIRRING ROD
1 WASH BOTTLE
1 CLEANING BRUSH
1 NOTE PAD
1 PENCIL
DISPOSABLE GLOVES
SAFETY GOGGLES

REAGENTS

SULFURIC ACID 97%
GLUCOSE
SUCROSE
STARCH
ALBUMIN
VEGETABLE OIL
MOLISCH REAGENT
FEHLING SOLUTION A
FEHLING SOLUTION B
SUDAN IV
SODIUM HYDROXIDE SOLUTION
COPPER SULFATE SOLUTION
LUGOL REAGENT



The educational kit “**Biomolecule Identification**” allows the rapid identification of the main classes of substances involved in the chemistry of life. The kit includes an operating manual. The informational materials supplied include the safety data sheets for the reagents, the general safety regulations, and the specific warnings for each experiment. The equipment and reagents supplied allow the proposed experiments to be carried out on numerous occasions.

30.012 DIFFUSION AND OSMOSIS



EXPERIMENTS COVERED
DIFFUSION IN LIQUIDS
DIFFUSION IN GASES
DIFFUSION THROUGH SELECTIVE MEMBRANES
OSMOTIC POTENTIAL

KIT CONTENT
DOCUMENTATION
LABORATORY TECHNICAL SHEETS
REAGENT SAFETY DATA SHEETS
SAFETY REGULATIONS

MATERIALS INCLUDED
1 BASE WITH ROD AND CLAMP
1 OSMOMETER (CONNECTOR + GRADUATED TUBE)
1 APPARATUS FOR GAS DIFFUSION

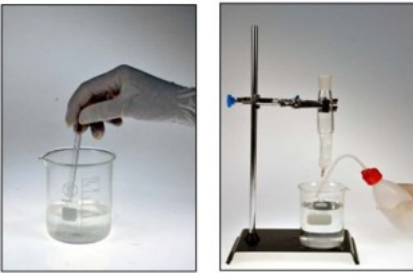
1 400 ML BEAKER
1 250 ML BEAKER
1 100 ML GRADUATED CYLINDER
1 STOPWATCH
1 SPOON-TYPE SPATULA
1 STIRRING ROD
1 WASH BOTTLE
5 3 ML DROPPERS
1 PACK OF OSMOTIC MEMBRANE
2 RUBBER STOPPERS
1 NOTE PAD
1 PENCIL

DISPOSABLE GLOVES
SAFETY GOGGLES

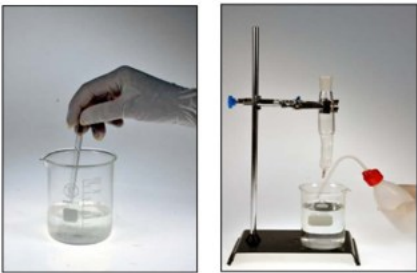
REAGENTS
AMMONIA
HYDROCHLORIC ACID
SUCROSE
FOOD COLORING
LUGOL REAGENT
STARCH PASTE
SODIUM CHLORIDE

The educational kit “Diffusion and Osmosis” allows verification of the fundamental laws of mass transport as a function of concentration gradients and molecular mass. It is possible to observe diffusion through selective membranes and visualize the effects of osmotic pressure. The kit includes an operating manual. The informational materials supplied include the safety data sheets for the reagents, the general safety regulations, and the specific warnings for each experiment. The equipment and reagents supplied allow the proposed experiments to be carried out on numerous occasions.

30.012 OSMOTIC PRESSURE



2. Stir the solution with the rod until it is completely dissolved. Fill the 400 mL beaker with water and place it on the base of the stand. Mount the osmometer on the stand as shown in the figure and adjust the clamp on the rod so that the membrane is not immersed in the water contained in the beaker.



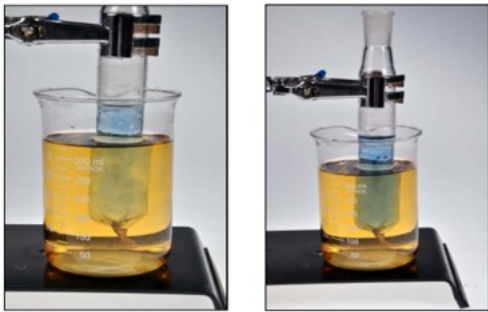
3. Introduce the sugar solution into the glass connector. Place the graduated tube and check the liquid level inside the capillary.

DIFFUSION AND OSMOSIS – OPERATING PROCEDURES FOR THE USE OF THE OSMOMETER.



DIFFUSION AND OSMOSIS – OSMOMETER.

30.012 DIFFUSION THROUGH SELECTIVE MEMBRANES

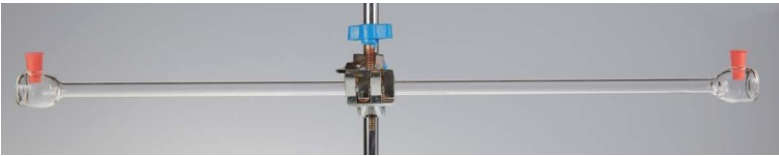


4. Allow the system to rest until the appearance of a dark coloration inside the membrane is observed. In the event of membrane rupture, replace it with a spare one. The new membrane must be immersed in water for a few minutes and then placed on the glass support. Close the lower part with a well-tightened knot and allow it to dry.

CONCLUSIONS

he movement of a solute through a selective membrane is called **dialysis**. In this experiment, a **dialysis tube** is used to demonstrate the selective diffusion of molecules. **The size of the pores** of the membrane determines which substances can pass through it. In this specific case, the passage of small iodine molecules from the external solution to the internal one is observed; when iodine binds to starch, it forms an **intensely coloured complex**. **The macromolecules of starch**, due to their large size, cannot pass through the membrane.

DIFFUSION AND OSMOSIS – OPERATING PROCEDURES TO OBSERVE THE BEHAVIOR OF SEMIPERMEABLE MEMBRANES



DIFFUSION AND OSMOSIS – APPARATUS FOR GAS DIFFUSION.

30.013 MICROSCOPY STAINING



EXPERIMENTS COVERED
BACTERIAL CAPSULE STAINING
GRAM STAINING
SIMPLE STAINING
CHROMOSOME STAINING
FRESH STAINING IN HANGING DROP
OBSERVATION OF PLANT CELLS
OBSERVATION OF STARCH GRANULES

INCLUDED IN THE KIT:
LABORATORY TECHNICAL SHEETS
REAGENT SAFETY DATA SHEETS
SAFETY REGULATIONS

MATERIALS INCLUDED:
1 GAS BURNER WITH STAND
3 STAINING DISHES
2 SCALPELS
1 ANATOMICAL FORCEPS
2 WATCH GLASSES
2 50 ML BEAKERS
1 10 ML GRADUATED CYLINDER
2 SLIDE BOXES
2 COVER SLIP BOXES
1 INOCULATING LOOP WITH RING
3 WOODEN CLAMPS
1 WASH BOTTLE
1 STOPWATCH
3 KOCH SLIDES
1 GLASS ROD
3 TEST TUBES WITH STOPPER
10 3 ML DROPPERS
1 NOTE PAD
1 PENCIL
1 MAGNIFYING GLASS
10 DISPOSABLE GLOVES
1 PAIR OF SAFETY GOGGLES
1 LIGHTER

REAGENTS
ALCOHOLIC SOLUTION OF GENTIAN VIOLET
ALCOHOLIC SOLUTION OF BASIC FUCHSIN
LUGOL SOLUTION
DENATURED ETHYL ALCOHOL

PETROLEUM JELLY
ALCOHOLIC INDIA INK
ALCOHOLIC METHYLENE BLUE
ACETIC ACID
ETHYL ALCOHOL
SCHIFF REAGENT
HYDROCHLORIC ACID
CEDAR OIL

The educational kit “Microscopy Staining” allows the rapid preparation of numerous microscopic specimens and the visualization of chromosomes during mitosis. The kit includes a printed operating manual describing the experiments and additional educational content. The informational materials include safety data sheets, general safety regulations, and specific warnings for each experiment. The equipment and reagents allow the experiments to be carried out repeatedly.

30.015 AISLAMIENTO DE ADN VEGETAL



EXPERIMENTS COVERED
PLANT DNA ISOLATION
DNA IDENTIFICATION TEST

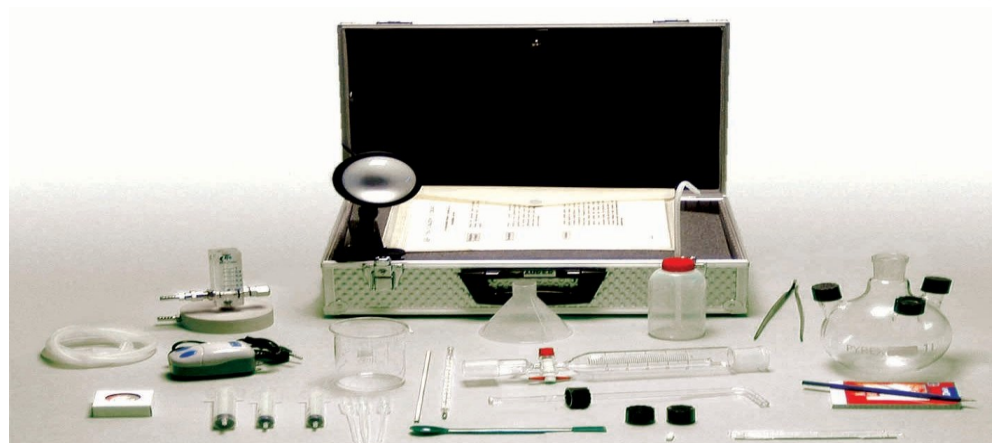
INCLUDED IN THE KIT:
LABORATORY TECHNICAL SHEETS
REAGENT SAFETY DATA SHEETS
SAFETY REGULATIONS

MATERIALS INCLUDED
1 HOMOGENIZER
1 250 ML BEAKER
1 400 ML BEAKER
1 100 ML ERLLENMEYER FLASK
1 FUNNEL
1 HEATING PLATE
1 SPOON-TYPE SPATULA
1 CIRCULAR TEST TUBE HOLDER
1 TEST TUBE RACK
1 WASH BOTTLE
8 TEST TUBES WITH STOPPER
1 PIECE OF WHITE CLOTH
1 THERMOMETER
2 POLYSTYRENE CONTAINERS
4 STEEL RODS
8 DROPPERS
1 CLEANING BRUSH
1 GLASS ROD
1 BEAKER CLAMP
1 PENCIL
1 PAIR OF SAFETY GOGGLES
1 PAIR OF DISPOSABLE GLOVES
1 NOTE PAD

REAGENTS
SODIUM ACETATE SOLUTION
SODIUM LAURYL SULFATE
SCHIFF REAGENT
96% ETHYL ALCOHOL

The educational kit “Plant DNA Isolation” allows the rapid extraction of DNA from plant cells and its precipitation in the form of filaments. The use of plant material ensures maximum safety, avoiding biological risks and issues related to data protection regulations. The kit includes a printed operating manual and a DVD with multimedia content and additional educational materials. The equipment and reagents allow the experiments to be repeated numerous times.

30.021S BIOLOGY (online)



INCLUDED IN THE KIT:
LABORATORY TECHNICAL SHEETS
REAGENT SAFETY DATA SHEETS
SAFETY REGULATIONS

MATERIALS INCLUDED

1 250 ML BEAKER
1 TUBE WITH POROUS SEPTUM
3 CONNECTION TUBES
1 ELECTRIC AERATOR
1 10 ML SYRINGE
1 5 ML SYRINGE
1 20 ML SYRINGE
1 WASH BOTTLE
1 ANATOMICAL FORCEPS
1 POWDER FUNNEL
1 50 ML SELF-BALANCING FUNNEL
1 1 L FLASK WITH CONICAL THREADED NECKS
1 THERMOS
1 STEEL ROD
1 SPOON-TYPE SPATULA
1 MEASURING CUP
1 NOTE PAD
3 PLASTIC DROPPERS
1 PENCIL
1 METAL SPATULA
3 PLASTIC SPATULAS
DISPOSABLE GLOVES
SAFETY GOGGLES
1 BOX OF PH INDICATOR PAPER
4 SVL STOPPERS WITH SILICONE SEPTA
1 THERMOMETER (–10 °C / +110 °C)
1 MAGNETIC STIR BAR
1 CARBON DIOXIDE SENSOR (CO₂)
1 DISSOLVED OXYGEN SENSOR
1 TEMPERATURE SENSOR
1 PC INTERFACE
1 NEULOG SOFTWARE

EXPERIMENTS COVERED:
RESPIRATION
ENERGY OF METABOLISM
ALCOHOLIC FERMENTATION
CHLOROPHYLL PHOTOSYNTHESIS
BIOSYNTHESIS

The educational kit **“Biology online”** allows the execution of a wide and comprehensive series of biology experiments using sensors interfaced with a PC. The kit includes a reactor in which it is possible to monitor chemical parameters and control the inflow of air and liquids. The kit contains an operating manual. The informational materials supplied include the safety data sheets for the reagents, the general safety regulations, and the specific warnings for each individual experiment. The equipment and reagents provided allow the proposed experiments to be carried out numerous times.



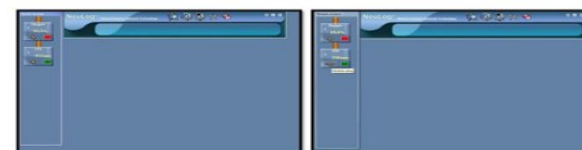
30.021s PHOTOSYNTHESIS online



3. Place the cap on the sensor, making sure that no air remains inside. Clean any excess electrolyte with absorbent paper. The sensor is now ready for use.



Partially fill the reaction chamber with green leaves. The leaves must be cut from the plant immediately before the experiment. Close the chamber and place the oxygen and carbon dioxide sensors. Connect them to the interface and to the PC. Start the **NeuLog** program.



The **Oxygen 1** and **Carbon Dioxide 1** sensors are displayed in the tab of the module window located at the upper left. Press the button on both sensors for at least three seconds.

In the **Carbon Dioxide 1** tab, activate the “Module Options” icon. The sensor options window will appear.

Biology online – Operating procedure to observe photosynthesis by recording oxygen and carbon dioxide values.

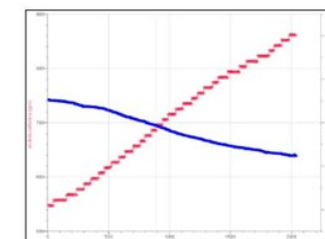


Biology online – Bioreactor.



Biología online – Biorreactor.

30.021s CELLULAR RESPIRATION online



Apparatus and diagram when using plant tissues.

tempo (minuti)	pH/CO ₂	OD/O ₂

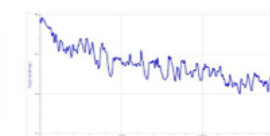


Diagram showing the time evolution of the monitored parameters.

CONCLUSIONS

Many biochemical reactions require a source of energy represented by ATP molecules (adenosine triphosphate), whose main source is ensured by the oxidation of glucose. In many organisms, the reactions involved lead to the absorption of atmospheric or dissolved oxygen and to the production of carbon dioxide. This process is called **cellular respiration**. In aquatic environments, the release of carbon dioxide causes a decrease in pH values. Using the apparatus provided, it is possible to monitor these exchanges over time.

Biology online – Respiration in animal organisms.

The observation lasts a few minutes and the animals used do not suffer any kind of mistreatment.



Biology online – Heat produced by metabolism.

20.005 INTRODUCTION TO BIOLOGY



EXPERIMENTS PERFORMED
THE OSMOMETER
CELLULAR BEHAVIOR
PREPARATION OF LIMEWATER. CO₂ PRODUCED BY HUMANS
CO₂ PRODUCED BY PLANTS
CO₂ PRODUCED BY YEAST
ETHANOL PRODUCED BY YEAST
COMBUSTION PRODUCES CARBON DIOXIDE
DETECTION OF GLUCOSE
DETECTION OF STARCH
DETECTION OF PROTEINS
DETECTION OF VITAMINS
ENZYMES: CATALASE
ENZYMES: PROTEASE
OBSERVATION OF BACTERIA
OBSERVATION OF PROTOZOA
HOW TO PREPARE A MOLD CULTURE

OBSERVATION OF MOLDS
YEAST CELLS
OBSERVATION OF ONION CELLS
STAINING OF PLANT CELLS
PLANT CELLS
TRANSPIRATION OF PLANTS
CAPILLARITY OBSERVATION OF BUCCAL MUCOSA CELLS
THE LUNGS
LUNG CAPACITY
DIGESTION OF STARCH
DIGESTION OF PROTEINS
DIGESTION OF FATS
AN ECOSYSTEM IN A BOTTLE
EFFECT OF EXHAUST GASES
THE GREENHOUSE EFFECT
COMPOST
SOIL PERMEABILITY
SOIL ORGANISMS

1 LUNG MODEL
1 OSMOMETER
1 OSMOTIC MEMBRANE
4 CORK DISCS WITH PINS
3 SMALL PETRI DISHES
3 LARGE PETRI DISHES
2 PERFORATED STOPPERS WITH TUBE
1 STOPPER FOR POTOMETER WITH RUBBER CAPILLARY TUBE
1 SUCTION SYRINGE WITH COMBUSTION CONNECTION
2 RECTANGULAR TRAYS
1 WOODEN CLAMP
1 TEST TUBE RACK
4 SMALL TEST TUBES WITH STOPPER
4 LARGE TEST TUBES WITH STOPPER
1 SLIDE BOX
1 COVER SLIP BOX
1 PACK OF HYDROPHILIC COTTON
10 STICKS
1 LOOP WITH RING
1 SCALPEL
1 PACK OF BLACK CLOTH
1 PACK OF WHITE CLOTH
1 WIRE GAUZE
1 PACK OF FILTER PAPER SHEETS
1 PACK OF FILTER PAPER DISCS
1 PAIR OF SCISSORS AND 1 RULER
1 ADHESIVE TAPE
1 PENCIL AND NOTE PAD
1 LIGHTER

IN THE KIT:
INCLUDED DOCUMENTATION:
LABORATORY TECHNICAL SHEETS
REAGENT SAFETY DATA SHEETS
SAFETY REGULATIONS
SUPPLIED MATERIAL:
2 100 ML BEAKERS
1 250 ML BEAKER
1 FLASK
1 WASH BOTTLE AND 1 STIRRING ROD
1 BASE WITH ROD AND CLAMP
1 ALCOHOL BURNER
1 SPOON-TYPE SPATULA
3 SPATULAS
1 ANATOMICAL FORCEPS
3 STRAWS
3 CUPS
2 ELASTIC BANDS
3 DROPPERS
1 LARGE TEST TUBE
1 THERMOMETER
2 10 ML GRADUATED CYLINDERS
2 50 MM FUNNELS
1 100 ML GRADUATED CYLINDER
1 POWDER FUNNEL

The educational kit “**Introduction to Biology**” allows the performance of **42 simple experiments** illustrating the main biological phenomena.
Some of the proposed methodologies require the use of a **microscope, which is not included in the kit.**
The kit includes an operational manual.
The **informational documentation** includes reagent safety data sheets (SDS), general safety guidelines, and specific warnings for each experiment.
The **supplied equipment and reagents** allow the proposed experiments to be repeated numerous times.

20.001 THE PROPERTIES OF AIR



EXPERIMENTS COVERED
DOES AIR EXIST?
WHERE IS AIR FOUND? AIR IN A ROOM
A BALL SUSPENDED IN THE AIR. THE FORCE OF AIR
ATMOSPHERIC PRESSURE. HOW SUCTION CUPS WORK

IN THE KIT
LABORATORY TECHNICAL SHEETS
SAFETY DATA SHEETS
REAGENTS
SAFETY REGULATIONS
MATERIALS INCLUDED
1 BASE
1 ROD
1 CLAMP
1 RUBBER STOPPER
3 CUPS
1 PLEXIGLAS TUBE
1 WOODEN BALL
1 NOTE PAD
1 PENCIL
1 TAPE MEASURE
10 STRAWS
1 PING-PONG BALL
1 TRAY
1 PACK OF CARDBOARD
1 PAIR OF SCISSORS
1 LARGE BLACK PLATE

DOES AIR HAVE WEIGHT? COMPRESSED AIR
THE JET ENGINE
AIR TRANSMITS FORCE
HOT AIR AND COLD AIR. HOT AIR RISES
THE THRUST OF AIR. AIR IN MOTION

1 SUCTION CUP
1 PACK OF BALLOONS
1 WOODEN ROD
1 PIN
2 SPRING CLAMPS WITH HOOK
3 SPRING CLAMPS
1 CYLINDRICAL STICK
2 FLEXIBLE STRAWS
1 RUBBER RING
1 PACK OF FILTER PAPER
1 SMALL BLACK PLATE
1 RECTANGULAR TRAY
2 THERMOMETERS
1 LIGHTER
1 CANDLE
1 BEAKER
2 CONTAINERS WITH PRESS-FIT LID
4 SACHETS OF EFFERVESCENT MIXTURE
1 PERFORATED STOPPER WITH TUBE
1 WASH BOTTLE (SPRITZ)
1 LARGE GRADUATED CYLINDER
1 TRANSPARENT PLASTIC BOTTLE
1 TUNING FORK

VENTURI EFFECT
AIR HUMIDITY
AIR CONTAINS OXYGEN
CARBON DIOXIDE
EXTINGUISHES THE FLAME.
PHOTOSYNTHESIS
AIR TRANSMITS SOUND
AIR AND HUMAN BEINGS

1 ELECTRIC MOTOR WITH PROPELLER
1 ADHESIVE TAPE
1 PACK OF THREAD
1 50 ML SYRINGE
1 20 ML SYRINGE
1 ALCOHOL BURNER
2 WINDMILLS
1 PACK OF TISSUE PAPER
1 5 G WEIGHT
1 25 G WEIGHT
1 WIND ROSE
1 WIND VANE FLAG
1 METAL ROD WITH STAND
1 SPOON-TYPE SPATULA
1 PACK OF SAND
1 PACK OF SAWDUST
1 BOTTLE OF DYE

The educational kit “**The Properties of Air**” offers simple and effective experiments designed to help students discover the fundamental properties of air.
The kit includes **32 experiments**.
An operational manual is included.
The informational materials provided include **reagent safety data sheets (SDS), general safety guidelines, and specific warnings for each experiment.**
The supplied equipment and reagents allow the proposed **experiments to be repeated multiple times.**

20.002 LAS PROPIEDADES DEL AGUA



EXPERIMENTS COVERED
THE WEIGHT OF WATER
ARCHIMEDES' THRUST
THE DENSITY OF LIQUIDS
WHY DO SHIPS FLOAT?
COMMUNICATING VESSELS
DOES IT FLOAT OR SINK?
SEDIMENTATION
THE CARTESIAN DIVER

INCLUDED IN THE KIT:
LABORATORY TECHNICAL SHEETS
SAFETY DATA SHEETS
REAGENTS
SAFETY REGULATIONS
MATERIALS SUPPLIED:
1 LARGE BLACK PLATE
1 SPOON-TYPE SPATULA
2 STRAWS
3 LARGE CUPS
3 SMALL CUPS
1 PH INDICATOR STRIP
3 DROPPERS
1 BEAKER
1 WASH BOTTLE
1 DROPPER WITH BUILT-IN WEIGHT
1 BASE WITH ROD AND CLAMP
1 ALCOHOL BURNER
1 TANK
1 LARGE TEST TUBE
1 TEST TUBE
2 THERMOMETERS
2 10 ML CYLINDERS

WATER DISAPPEARS
AIR HUMIDITY
ICE
THE ZERO POINT OF THE CENTIGRADE SCALE
BOILING WATER
DOES WATER ALWAYS BOIL AT THE SAME TEMPERATURE?
DISTILLATION OF WATER
EXPANSION OF WATER
THE MOVEMENT OF WATER
DISSOLUTION OF SUBSTANCES

2 FUNNELS 50 MM
1 20 ML SYRINGE
1 APPARATUS WITH "V"-SHAPED ARM
1 COMMUNICATING VESSELS APPARATUS WITH STAND
3 PINS
1 ANATOMICAL FORCEPS
1 PERFORATED STOPPER WITH TUBE
1 GRADUATED TUBE WITH STOPPER
1 GLASS BALL
1 WOODEN BALL
1 COTTON BALL
1 CASE OF 6 MM BALLS (WHITE, YELLOW AND METALLIC)
2 PLASTIC CAPSULES
2 CONTAINERS WITH PRESS-FIT LID
1 MEDIUM TANK
2 SMALL TANKS
1 PERFORATED PLEXIGLAS TUBE WITH STOPPER
1 WOODEN ROD
1 WEIGHT WITH HOOK
1 DYNAMOMETER
1 CASE OF CARDBOARDS
1 CASE OF ABSORBENT FILTER PAPER

THE SURFACE OF WATER
THE SOAP MOTOR
SOAP BUBBLES
WHAT IS IN A DYE?
ACIDITY AND BASICITY OF WATER
WHY DOES WATER RISE IN PLANTS?
WATER AND LIFE
WATER AND SOIL

1 PACK OF HYDROPHILIC COTTON
1 RUBBER RING
1 SMALL BLACK PLATE
2 SPRING CLAMPS
1 PAIR OF SCISSORS
1 RULER
1 PENCIL
1 NOTE PAD
1 LIGHTER
1 GRADUATED CYLINDER WITH WATER
AND OIL WITH STOPPER
1 SEED SET
1 BOTTLE OF LIQUID SOAP
1 BOTTLE OF DYE
1 BOTTLE OF SODIUM CHLORIDE
1 BOTTLE OF ALUMINUM POTASSIUM
SULFATE
1 SET OF SAND
1 SET OF SOIL (SUBSTRATE)

The educational kit **"The Properties of Water"** allows the observation of the main properties of water through simple and effective experiments.
A total of **34 experiments** can be performed.
The kit includes an operating manual.
The informational materials include safety data sheets for the reagents, general safety regulations, and specific warnings for each experiment. The equipment and reagents supplied allow the proposed experiments to be carried out on multiple occasions.

20.007 IL REGNO VEGETALE



EXPERIMENTS COVERED
OSMOSIS
TRANSPIRATION OF PLANTS
CAPILLARITY
ROOTS
THE TRUNK
CELLULAR RESPIRATION
IDENTIFICATION OF STARCH
FERMENTATION
THE LEAF
INCLUDED IN THE KIT:

LABORATORY TECHNICAL SHEETS
REAGENT SAFETY DATA SHEETS
SAFETY REGULATIONS
MATERIALS INCLUDED
2 100 ML BEAKERS
1 250 ML BEAKER
1 100 ML ERLNMEYER FLASK
1 250 ML ERLNMEYER FLASK
1 WASH BOTTLE AND STIRRING ROD
1 BASE, ROD AND RINGS
1 SPOON-TYPE SPATULA
3 SMALL SPATULAS
1 ANATOMICAL FORCEPS
10 CUPS
2 ELASTIC BANDS
3 DROPPERS
1 100 ML GRADUATED CYLINDER
1 POWDER FUNNEL
4 CORK DISCS WITH PINS
4 LARGE PETRI DISHES

SEPARATION OF LEAF PIGMENTS
LEAF PIGMENTS
CHLOROPHYLL PHOTOSYNTHESIS
THE PRODUCTS OF PHOTOSYNTHESIS: OXYGEN
PLANT PRODUCTS: STARCH
PLANT KINGDOM: OBSERVATION OF PLANT CELLS
MICROSCOPE OBSERVATIONS: STOMATA
THE FLOWER
REPRODUCTION

1 PERFORATED STOPPER WITH CAPILLARY TUBE AND RUBBER
1 STOPPER FOR POTOMETER WITH CAPILLARY TUBE AND RUBBER
1 RUBBER STOPPER
1 RUBBER TUBE
1 HOFMANN CLAMP
2 LARGE RECTANGULAR TRAYS
5 SMALL RECTANGULAR TRAYS
8 PLASTIC TEST TUBES
1 PERFORATED TEST TUBE WITH STOPPER
1 PACK OF SLIDES
1 PACK OF COVER SLIPS
1 PACK OF HYDROPHILIC COTTON
1 LOOP WITH RING
1 SCALPEL
1 WIRE GAUZE
1 PACK OF FILTER PAPER
1 PAIR OF SCISSORS

THE FRUIT
THE MORPHOLOGY OF THE SEED
GERMINATION OF THE BEAN
CONDITIONS FAVORING GERMINATION
EFFECT OF GRAVITY
SOIL COMPOSITION (THE SOIL)
SOIL PERMEABILITY
SOIL ORGANISMS
PLANTS AND HUMAN BEINGS
NATURAL PH INDICATORS

1 MAGNIFYING GLASS
1 SCOOP (SESOLA)
1 PENCIL AND NOTE PAD
1 RULER
1 STEM SECTION
1 5 ML SYRINGE WITHOUT PLUNGER
2 TRANSPARENT GLASS BELLS
2 LARGE RUBBER RINGS
1 PACK OF PLASTICINE
5 THEMATIC CARDS
1 PACK OF SAND
1 PACK OF PLANT SUBSTRATE
1 PACK OF BEANS
1 PACK OF LENTILS
REAGENTS
1 BOTTLE OF SODIUM HYDROXIDE
1 BOTTLE OF IODINE-IODIDE SOLUTION
1 BOTTLE OF DENATURED ETHYL ALCOHOL
1 BOTTLE OF METHYLENE BLUE
1 BOTTLE OF FOOD COLORING
1 BOTTLE OF CHROMATOGRAPHY SOLVENT
1 BOTTLE OF SODIUM CHLORIDE
1 BOTTLE OF STARCH

The educational kit **"The Plant Kingdom"** allows the performance of **29 simple experiments** that illustrate the main phenomena regulating the plant kingdom.
The kit includes an operating manual.
The informational materials include safety data sheets for the reagents, general safety regulations, and specific warnings for each experiment.
The equipment and reagents supplied allow the proposed experiments to be carried out on multiple occasions.

10.026 · THE RESPIROMETER



The proposed instrumentation makes it possible to **measure the oxygen consumed** by plant tissues **during cellular respiration**.

The measurement is carried out through the **variation in gas volume**, which displaces the column of water in a capillary tube. The double instrumentation allows a **control test to be carried out simultaneously**, compensating for variations in atmospheric pressure and ambient temperature.

The case contains materials to perform the described experiments on multiple occasions. The required operations are very simple and ensure the safety of the user. The product is supplied complete with informational material and instructions for use.

10.021 · OSMOTIC POTENTIAL



The proposed apparatus allows the **visualization and measurement of the osmotic pressure** of a solution.

The **average time** required to obtain liquid columns of 30 cm is 10–20 minutes when using sugar solutions. The response speed is very high thanks to the arrangement of the osmotic membrane, which provides a large exchange surface.

The **experiment** can be repeated numerous times.

The **required operations** are very simple and ensure the safety of the user. The **product is supplied complete** with informational material and instructions for use.

10.027 · THE MITOSIS



Using cells from the **onion apex**, the kit allows the **preparation of slides in which the chromosomes and the main phases of mitosis can be clearly observed**.

The case contains materials to carry out the described experiments numerous times. The required operations are very simple and ensure the safety of the user.

The **product is supplied complete with informational material and instructions for use** (a microscope is required to observe the slides).

10.023 · PHOTOSYNTHESIS



The kit includes **two methodologies**: In the first, it is possible to detect through a chemical test **the production of carbohydrates in the tissues responsible for photosynthesis**. The second methodology allows **the collection of the oxygen produced during photosynthesis**.

The case contains materials to perform the described experiments on multiple occasions.

The **required operations** are very simple and ensure the safety of the user.

The **product is supplied complete with informational material and instructions for use**.

10.024 · PLANT TRANSPIRATION



The kit allows the measurement of the **rate at which plants absorb water as an effect of transpiration**.

It is possible to observe the variations caused by **environmental conditions**.

Using a single plant, measurements can be carried out over several days.

The case **contains materials to carry out the described methodology on numerous occasions**.

The required operations are very simple and ensure the safety of the user.

The product is supplied complete with informational material and instructions for use.

10.025 · THE ENERGY OF RESPIRATION



The kit allows the observation of the heat produced **by cellular respiration in plant tissues**.

The case contains materials to perform the described experiments on multiple occasions.

The **required operations** are very simple and ensure the safety of the user.

The **product is supplied complete with informational material and instructions for use**.

10.031 · WATER DEMINERALIZATION



In the proposed methodology, the **demineralization of a water sample is carried out using ion exchange resins that remove the salts present.** The process used is widely applied in civil and industrial fields for **water purification.**

Demineralization is carried out in two distinct stages, and the kit allows, through a specific test, **the detection of the saline content present in natural waters.** The kit includes **the reagents necessary to analyse and verify the ionic content of the treated samples.** The required operations are very simple and ensure the safety of the user. **The product is supplied complete with informational material and instructions for use.**

10.014 · LA FERMENTACIÓN ALCOHÓLICA



The educational kit **“Introduction to Biology”** enables students to perform 42 simple experiments illustrating the main biological phenomena.

Some of the proposed methodologies require the use of a **microscope, which is not included in the kit.**

The kit includes an operational manual.

The accompanying documentation contains **reagent Safety Data Sheets (SDS), general laboratory safety guidelines, and specific warnings for each experiment.**

10.015 · BIOSYNTHESIS OF ETHYL ALCOHOL



The operating principle of the proposed apparatus is **the same as that used in winemaking practice.** The **small glass “barrel”** allows direct observation of the phenomenon thanks to the stopper with a special bubbler, **which highlights the simultaneous production of carbon dioxide.**

The case contains materials to perform the described experiments on numerous occasions. The required operations are very simple and ensure the safety of the user. **The product is supplied complete with informational material and instructions for use.**

10.032 · THE GREENHOUSE EFFECT



The proposed experiment allows **the visualization of the greenhouse effect produced by carbon dioxide.**

In one of the two containers, **carbon dioxide generated through a chemical reaction is introduced, and the resulting increase in temperature can be observed.**

The kit includes the complete equipment with lamp, carbon dioxide generator, reagents and instructions.

10.032s – online version

The kit includes the complete equipment with lamp, carbon dioxide generator, reagents, sensors.

10.034 · COMBUSTION PRODUCES CO₂



The combustion of organic substances containing carbon mainly produces **water and carbon dioxide.**

The apparatus allows **the qualitative analysis of the gas produced during the experiment.** The kit includes all the materials necessary to perform the experiment on numerous occasions.

The required operations are very simple and ensure the safety of the user. **The product is supplied complete with informational material and instructions for use.**

10.035 · ACID RAIN



In the **proposed methodology, the corrosive effect of carbon dioxide on carbonate rock is demonstrated.**

The effect is verified through the analysis of a sample of **“aggressive” water, before and after contact with carbonate sand,** to determine the amount of dissolved rock.

The kit includes all the materials necessary to perform the experiment on multiple occasions. The required operations are very simple and ensure the safety of the user.

The product is supplied complete with informational material and instructions for use.



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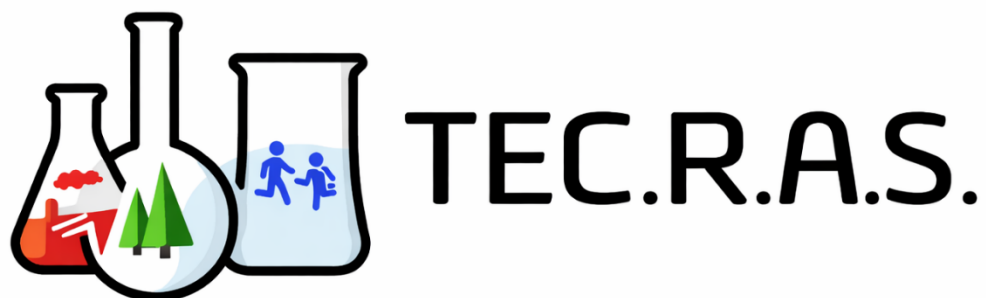
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