Common Organic Laboratory Apparatus

It seems useful to introduce the student to the apparatus which is commonly employed in the organic laboratory.

Various types of **flasks** must be used. Among them there are flat-bottomed flasks with a vial mouth or a ring neck, as well as round-bottomed flasks with a vial mouth or with a short ring neck. There is still a conical flask of the sizes between 25 cm^3 and 6 dm^3. Distilling flasks are equipped with one or more arms.

Beakers of the sizes between 30 cm^3 and 6 dm^3 are widely used.

A typical **condenser** consists of an inner glass tube surrounded by a glass jacket through which water is circulated. The inner jacket is fitted into the outer jacket by means of rubber stoppers.

Various kinds of **funnels** are employed, e.g. filtration funnels, separatory funnels, dropping funnels and hot water funnels.

Spatulas made of stainless steel, nickel and porcelain are available commercially and prove very useful in the laboratory.

Stirrers are usually made of glass, but those of metal or of stainless steel also find application in the laboratory. A wire stirrer is useful because of efficient agitation in round-bottomed vessels. Mercury-sealed stirrers are used in the following operations:

1. simultaneous stirring and refluxing of a reaction mixture
2. stirring the contents of a closed vessel
3. stirring in an inert atmosphere such as nitrogen or hydrogen.

For automatic mixing a mechanical shaking machine is employed. Mention must be made of magnetic stirring.
A rotating field of magnetic force is employed to induce stirring action within either closed or open vessels. The stirring is accomplished with the aid of small half-round permanent magnets, sealed in Pyrex glass.

The high-pressure water supply service is employed for the operation of the ordinary filter **pump** which has many applications in the laboratory. Water pumps are not always satisfactory, particularly in summer or if the pressure on the water mains is not too high; then motor-driven oil pumps are run.

For temperatures up to 100°C, a water bath or steam **bath** is generally employed. The simplest form is a beaker or an enameled iron vessel mounted on a suitable stand; water is placed in the vessel which is heated by means of a flame. For temperatures above 100°C, oil baths are made to operate.

Glossary:

employ *verb*- to make use of -stosować
various *adjective* -of different kinds or sorts –różny, różnorodny
flask *noun* -a container for liquids -kolba
flat-bottomed *adjective* -having a flat base -płaskodenny
vial mouth *noun* - a small neck diameter -wąska szyjka
ring neck *noun* - a big neck diameter -szeroka szyjka
round-bottomed *adjective* – usu. of a glass flask, which has a spherical shape for uniform heating, and one or more long cylindrical necks. -okrągłodenny
conical flask *noun* – a glass vessel, which features a flat bottom, a conical body, also called an Erlenmeyer flask and a cylindrical neck. -kolba stożkowa
distilling flask *noun* – a glass vessel used to separate two liquids with different boiling points, it is a common piece of lab distillation apparatus. The flask typically consists of a sphere-shaped base, a narrow neck, and a side-arm tube, with the top of the flask neck sealed with a cork or rubber stopper. -kolba destylacyjna
equipped *adjective* -fitted with items needed for something to function -wyposażony
widely used *adjective* -Generally known and often employed - powszechnie stosowany
condenser *noun* -an apparatus or container for condensing vapor. -skraplacz
consist of *verb* – to be composed or made up of sth -składać się z
inner *adjective* - situated inside -wewnętrzny
outer *adjective* – situated outside - zewnętrzny
jacket *noun* -protection against something - osłona
funnel *noun* - a utensil that is usually a hollow cone with a tube extending from the smaller end and that is designed to catch and direct a downward flow -lejek
separatory funnel *noun* - in liquid-liquid extractions to separate the components of a mixture into two immiscible solvent phases of different densities**.** -rozdzielacz

dropping funnel *noun* - a type of laboratory glassware used to transfer fluids usually drop by drop. It is fitted with a stopcock which allows the flow to be controlled -wkraplacz
spatula *noun* -small stainless steel utensil, used for scraping, transferring, or applying powders and pastes like chemicals or treatments -szpatułka
stirrer *noun* -a tool used to mix substances -mieszadełko
wire stirrer *noun* - a piece of laboratory equipment used to mix chemicals and liquids for laboratory purposes. It is usually made of a set of metal rods – mieszadło druciane
agitation *noun* - moving back and forth -mieszanie, wirowanie
vessel *noun* -an object for storing, preparing or placing various contents in it -naczynie
mercury *noun* - a silver-white poisonous heavy metallic element that is liquid at ordinary temperatures and is used especially in batteries and in scientific instruments - rtęć
sealed *adjective* – closed so that nothing can get outside or inside, airtight -uszczelniony
simultaneous *adjective* –occurring at the same time -jednoczesny, równoległy (w czasie)
refluxing *noun* **–** flowing back -ponowne napływanie
accomplish *verb* **-** to succeed in doing something **–** osiągnąć, dokonać
satisfactory *adjective* -good enough to please someone or to be accepted in a particular situation -zadowalający
motor-driven *verb*- operated or controlled by an engine -napędzany silnikiem
enameled *adjective* -*c*overed with an enamel (a hard shiny substance used for protecting or decorating glass, metal, or clay) layer -emaliowany
mounted *adjective* – fixed in a particular place or position - zamontowany
suitable *adjective* -right or appropriate for a purpose, or a situation -odpowiedni
arm –*noun* -a long part of an object or piece of equipment - ramię, szyjka
bath *noun* a container full of liquid in which something is placed for a particular purpose- łaźnia, kąpiel

Answer the questions:

1. What types of flasks are used in laboratory work?
2. What are mixers made of?
3. What types of pumps are used in a laboratory?
4. Why / where is a wire stirrer useful?
5. What types of funnels are there?
6. What type of processes are mercury-sealed stirrers used for?
7. What are spatulas made of?
8. How does magnetic stirring work?
9. What sizes are beakers?
10. When are mercury-sealed stirrers used?
11. What are the disadvantages of water pumps?
12. What is the structure of a condenser?

Are the following sentences true or false?

Beakers have sizes between 6 cm^3 and 30 cm^3	T	F
Stirrers are made of glass and rubber	T	F
A rotating field of magnetic force is employed to induce stirring action within either closed or open vessels	T	F
For temperatures above 100 Kelvin, oil baths are used	T	F

I. *Complete the following sentences:*

1. ……-…….. flasks usually have either vial mouths or ring necks.
2. A typical condenser consists of an …….. ……. …… surrounded by a glass jacket.
3. Water pumps are not always ……, especially in summer when water pressure might be too low.
4. For automatic mixing a ……. ……. ……. is employed.
5. For temperatures up to ……., a water bath or steam bath is generally employed.
6. The …….. ……. is fitted into the outer jacket by means of …….. …….. .

II. *Translate the words and phrases into English or Polish:*

a. Stożkowy-
b. sieć wodociągowa
c. płomień-
d. żelazne naczynie-
e. szklana rurka-
f. mercury-sealed-
g. motor-driven-
h. magnetic field-
i. stainless steel-
j. rubber stopper

III. *Label the pictures below:*

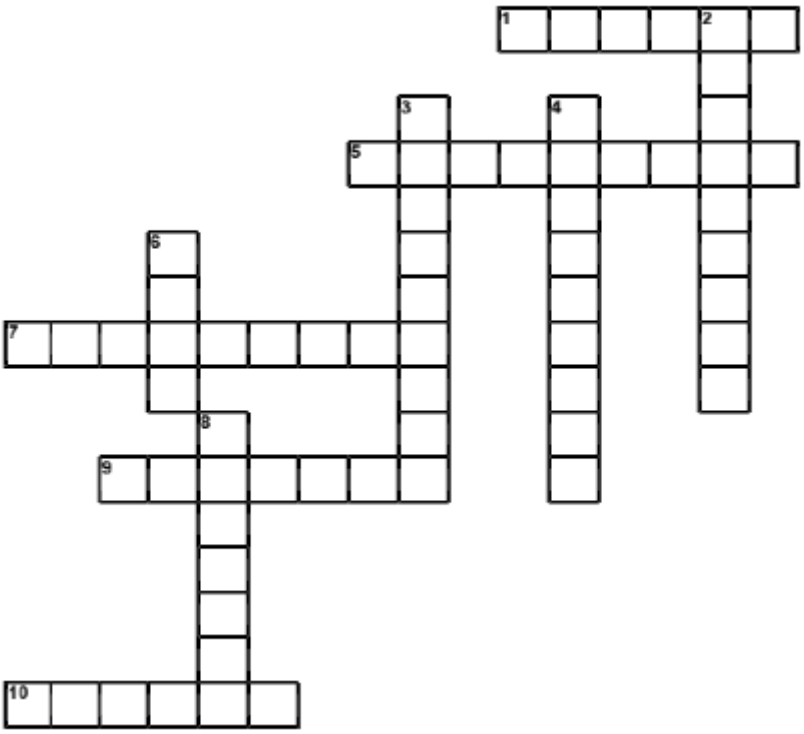





IV. *Match words that are similar in meaning:*

acceptable	COMMONLY
cause	VARIOUS
ordinarily	SATISFACTORY
diverse	PROVE
strength	INDUCE
show, reveal	EMPLOY
use	FLAME
fire, blaze	FORCE

V. *Do the crossword:*



ACROSS:
1. a tube that is wide at the top and narrow at the bottom, used for pouring liquid or powder into a container
5. a hard shiny white substance used for making expensive dishes, cups, decorations etc
7. moving around (usually vigorously)
9. a device used for stirring
10. a container designed for transportation of liquids

DOWN:
2. functioni
3. a piece of equipment that changes gases into liquids
4. the opposite of temporary
6. can be ste
8. the product of blending together

VI. *Choose the right word in the brackets.*

1. A condenser consists of an (outer, inner) tube surrounded by a glass jacket.
2. A (pump, stirrer) is a device for forcing liquid, gas or air into, out of or through something.
3. A tube or pipe wide at the top and narrowing at the bottom, for pouring liquids or powders is a (funnel, spatula).
4. Commercially available spatulas are made of (glass, steel).
5. Distilling flasks are equipped with (lids, arms).
6. Mercury-sealed stirrers are used to stir the contents of (closed, open) vessels.
7. Magnets are sealed in an apparatus for (water pumping, automatic mixing).
8. Water pumps work at (high temperature, high pressure).
9. (water baths, oil baths) are used for temperatures above 100°C
10. Motor-driven oil pumps are (useful, useless) when the pressure on the water mains is low.

Discuss:

1. Is modern and expensive laboratory apparatus important for efficient research? Why?
2. Can you think of new materials that could be used to make better laboratory apparatus?
3. What is in your opinion the most and the least important laboratory equipment? Give your reasons.