

PST-Labo - chemical objects*

version 2.04

Denis Girou[†], Christophe Jorssen[‡], Manuel Luque[§] and Herbert Voß[¶]

December 10, 2015

Abstract

`pst-labo` provides macros for a variety of devices used mainly for chemical applications. Since most of these devices have a standardised design `pst-labo` spares you the trouble of having to create them manually. Besides the usage of the package `pst-osci` this document also describes how to create “high-level” objects using the command `PSTricks`. All basic objects are included in the file `pst-laboObj.tex` and are loaded during the start of `pst-labo`. These objects can be used for personal extensions. Section 4 gives an overview of all objects.

Contents

1	Parameter	3
1.1	<code>glassType</code>	4
1.2	<code>bouchon</code>	4
1.3	<code>pince</code>	5
1.4	<code>tubeDroit</code>	5
1.5	<code>tubeCoude</code>	5
1.6	<code>tubeCoudeU</code>	6
1.7	<code>tubeCoudeUB</code>	6
1.8	<code>etiquette</code> and <code>Numero</code>	6
1.9	<code>tubePenche</code>	7
1.10	<code>tubeSeul</code>	7
1.11	<code>becBunsen</code>	7
1.12	<code>barbotage</code>	8
1.13	<code>substance</code>	8
1.14	<code>solide</code>	10

*The english translation was done by Patrick Drechsler

[†]Denis.Girou@idris.fr

[‡]Christophe.Jorssen@wanadoo.fr

[§]ManuelLuque27@gmail.com

[¶]hvoss@tug.org

1.15	tubeRecourbe	10
1.16	tubeRecourbeCourt	11
1.17	doubletube	11
1.18	refrigerantBouille	12
1.19	recuperationGaz	12
1.20	burette	13
1.21	niveauReactifBurette and couleurReactifBurette	13
1.22	AspectMelange and CouleurDistillat	14
1.23	phmetre	15
1.24	agitateurMagnetique	15
1.25	niveauLiquide1, niveauLiquide2, niveauLiquide3 and aspectLiquide1, aspectLiquide2, aspectLiquide3	15
2	Predefined colours and styles	17
3	Macros	18
3.1	\pstTubeEssais	18
3.2	\pstChauffageTube	18
3.3	\pstBallon	19
3.4	\pstChauffageBallon	19
3.5	\pstEntonnoir	21
3.6	\pstEprovette	21
3.7	\pstpipette	21
3.8	\pstDosage	22
3.9	\pstDistillation	22
4	Basic objects	23
5	Examples	23

1 Parameter

Table 1 describes all parameters unique to `pst-labo`.

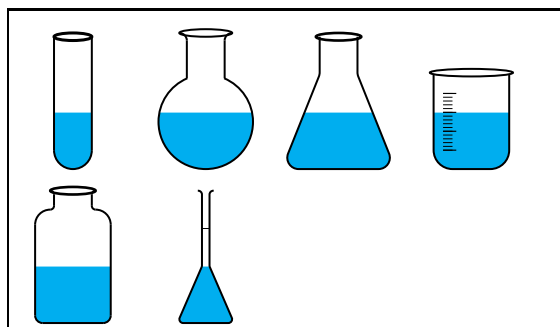
Table 1: Summary of all parameters available with `pst-labo`

<i>Name</i>	<i>values</i>	<i>default</i>	<i>comments</i>
<code>glassType</code>	<code>tube ballon becher erlen flacon fioleJauge</code>	<code>tube</code>	defines type of glass cylinder
<code>bouchon</code>	$\langle false/true \rangle$	<code>false</code>	Container is sealed with a plug.
<code>pince</code>	$\langle false/true \rangle$	<code>false</code>	wooden clamp
<code>tubeDroit</code>	$\langle false/true \rangle$	<code>false</code>	glass tube
<code>tubeCoude</code>	$\langle false/true \rangle$	<code>false</code>	glass tube with 90 degree twist
<code>tubeCoudeU</code>	$\langle false/true \rangle$	<code>false</code>	U-shaped glass tube
<code>tubeCoudeUB</code>	$\langle false/true \rangle$	<code>false</code>	extended version, only applies to glass containers of type <code>ballon</code> and <code>erlen</code>
<code>tubeRecourbe</code>	$\langle false/true \rangle$	<code>false</code>	
<code>tubeRecourbeCourt</code>	$\langle false/true \rangle$	<code>false</code>	setup without Bunsen burner
<code>tubePenche</code>	$\langle -65 \dots 65 \rangle$	<code>0</code>	tilting angle
<code>doubletube</code>	$\langle false/true \rangle$	<code>false</code>	pour dégagement gazeux sans chauffage
<code>etiquette</code>	$\langle false/true \rangle$	<code>false</code>	
<code>Numero</code>	$\langle Text \rangle$	<code>{}</code>	number for the option <code>etiquette</code>
<code>tubeSeul</code>	$\langle false/true \rangle$	<code>false</code>	wide/narrow <code>pspicture</code> box
<code>becBunsen</code>	$\langle false/true \rangle$	<code>true</code>	with/without Bunsen burner
<code>barbotage</code>	$\langle false/true \rangle$	<code>false</code>	attaches an additional glass tube to the original glass container
<code>substance</code>	$\langle Makro \rangle$	<code>\relax</code>	<code>\pstBullesChampagne</code> , <code>\pstFilaments</code> , <code>\pstBilles</code> , <code>\pstBULLES</code> , <code>\pstClous</code> , <code>\pstCuivre</code>

<i>Name</i>	<i>values</i>	<i>default</i>	<i>comments</i>
solide	$\langle \text{Makro} \rangle$	<code>\relax</code>	<code>\pstTournureCuivre,</code> <code>\pstClouFer,</code> <code>\pstGrenailleZinc</code>
refrigerantBouille	$\langle \text{false/true} \rangle$	false	pour chauffage à reflux
recuperationGaz	$\langle \text{false/true} \rangle$	false	setup for collecting gas
couleurReactifBurette	$\langle \text{Farbe} \rangle$	OrangePale	
niveauReactifBurette	20	$\langle 0 \dots 25 \rangle$	restriction of 25mL
AspectMelange	$\langle \text{Stil} \rangle$	DiffusionBleue	
CouleurDistillat	$\langle \text{Farbe} \rangle$	yellow	
phmetre	$\langle \text{false/true} \rangle$	false	display pH-meter
agitateurMagnetique	$\langle \text{false/true} \rangle$	true	
aspectLiquide1	$\langle \text{Stil} \rangle$	cyan	defined as part of <code>\newsstyle. . .</code>
aspectLiquide2	$\langle \text{Stil} \rangle$	yellow	dito
aspectLiquide3	$\langle \text{Stil} \rangle$	magenta	dito
niveauLiquide1	$\langle 0 \dots 100 \rangle$	50	
niveauliquide2	$\langle 0 \dots 100 \rangle$	0	< niveauLiquide1
niveauliquide3	$\langle 0 \dots 100 \rangle$	0	< niveauLiquide2

1.1 glassType

`glassType` describes the type of glass container. A normal test tube is used by default.



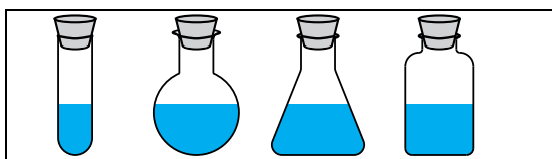
```

1 \psset{unit=0.5cm}
2 \pstTubeEssais
3 \pstTubeEssais[glassType=ballon]
4 \pstTubeEssais[glassType=erlen]
5 \pstTubeEssais[glassType=becher]
6 \pstTubeEssais[glassType=flacon]
7 \pstTubeEssais[glassType=fiolle.Jauge]

```

1.2 bouchon

The option `bouchon` seals the respective glass container with a plug.



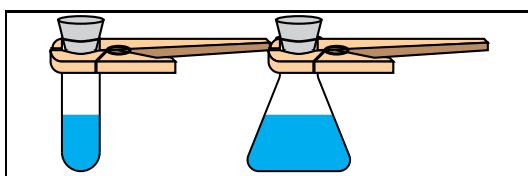
```

1 \psset{unit=0.45cm}
2 \psset{bouchon=true}
3 \pstTubeEssais[glassType=tube]
4 \pstTubeEssais[glassType=ballon]
5 \pstTubeEssais[glassType=erlen]
6 \pstTubeEssais[glassType=flacon]

```

1.3 pince

The option `pince` attaches a wooden test tub clamp to the glass container.



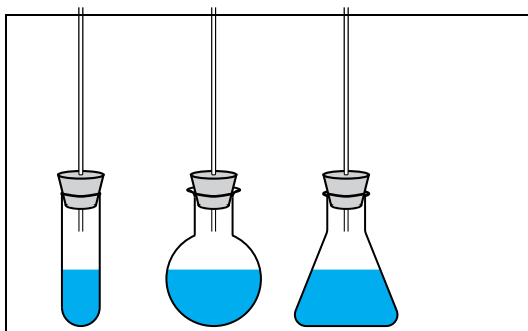
```

1 \psset{unit=0.5cm}
2 \psset{bouchon=true,pince=true}
3 \pstTubeEssais[glassType=tube]\hspace{1cm}
4 \pstTubeEssais[glassType=erlen]

```

1.4 tubeDroit

The option `tubeDroit` inserts a narrow glass tube into the glass container. Since this combination is only useful in combination with the option `bouchon=true` it is set to this value by default internally. It is to be noted that there is no vertical spacing of the narrow glass tube inserted by default, so the user has to take care of this manually, f. ex. using `\rule{0pt}{4cm}`.



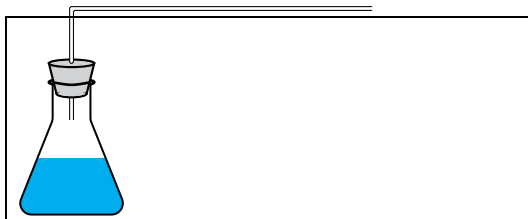
```

1 \psset{unit=0.5cm}
2 \psset{tubeDroit=true}
3 \rule{0pt}{4cm}%
4 \pstTubeEssais
5 \pstTubeEssais[glassType=ballon]
6 \pstTubeEssais[glassType=erlen]

```

1.5 tubeCoude

The option `tubeCoude` is basically identical to the previous one, except for the fact that a right-angled glass tube is drawn. Therefore the extra space needed in the vertical direction is less.



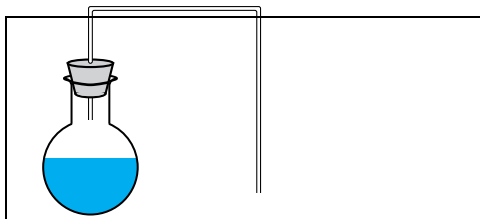
```

1 \psset{unit=0.5cm}
2 \psset{tubeCoude=true}
3 \rule{0pt}{2.5cm}%
4 \pstTubeEssais[glassType=erlen]

```

1.6 tubeCoudeU

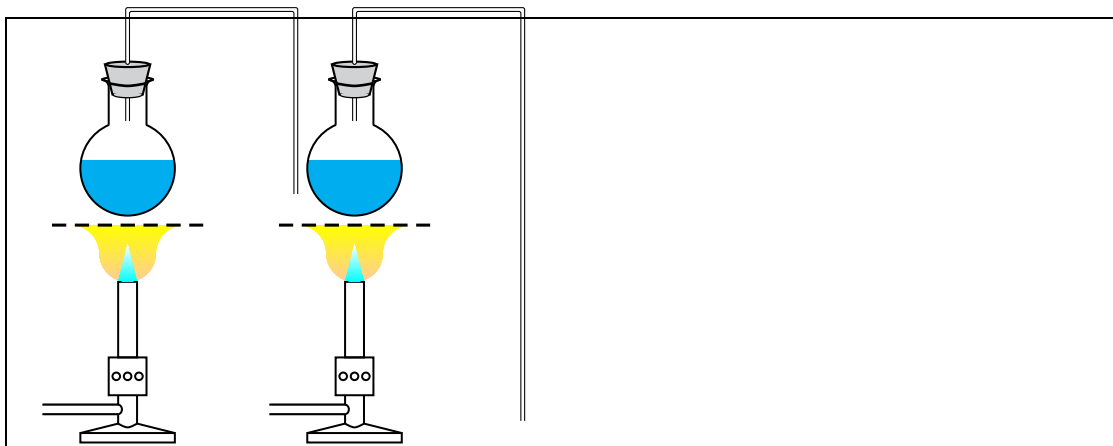
The option `tubeCoude` is basically identical to the previous one, except for the fact that a U-shaped glass tube is drawn. Therefore there is less space needed in the vertical direction.



```
1 \psset{unit=0.5cm}
2 \psset{tubeCoudeU=true}
3 \rule{0pt}{2.5cm}%
4 \pstTubeEssais[glassType=ballon]
```

1.7 tubeCoudeUB

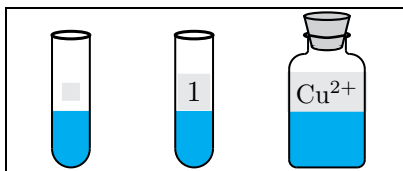
The option `tubeCoudeUB` is an extension of the U-shaped glass tube which is only useful if extending the tube to the bottom makes sense, as shown for instance in the macro `\pstChauffageBallon`.



```
1 \psset{unit=0.5cm,glassType=ballon}
2 \pstChauffageBallon[tubeCoudeU] \pstChauffageBallon[tubeCoudeUB]
```

1.8 etiquette and Numero

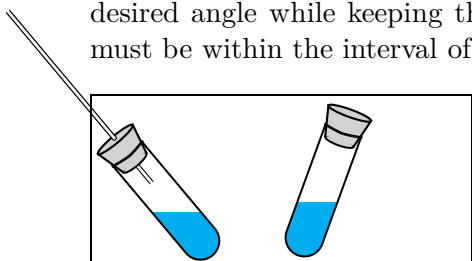
The option `etiquette` is a switch displaying labels defined using the option `Numero`.



```
1 \psset{unit=0.5cm}
2 \pstTubeEssais[etiquette]
3 \pstTubeEssais[etiquette,Numero=1]
4 \pstTubeEssais[glassType=flacon,bouchon,%
5 etiquette,Numero={\small Cu^{2+}}]
```

1.9 tubePenche

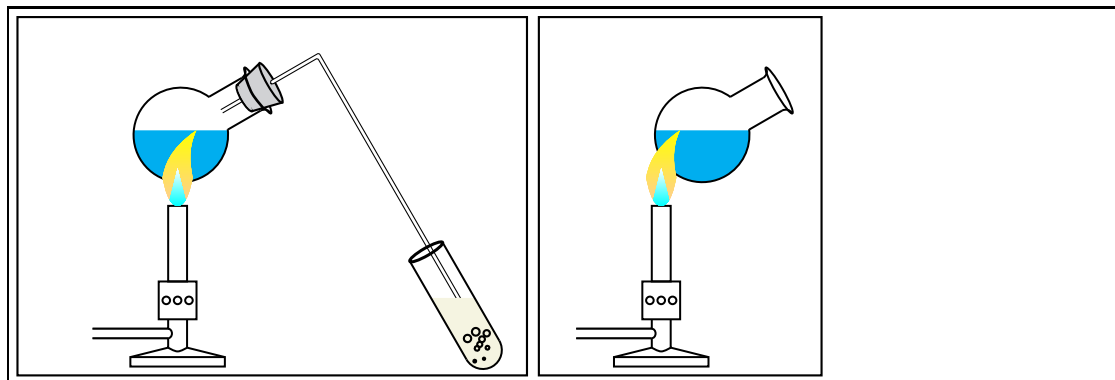
The option `tubePenche` allows tilting the chemical devices to almost any desired angle while keeping the the air-water level horizontal. The angles must be within the interval of $-65 \dots +65$.



```
1 \psset{unit=0.5cm}
2 \pstTubeEssais[tubeDroit=true,tubePenche=40]
3 \pstTubeEssais[tubePenche=-20,bouchon]
```

1.10 tubeSeul

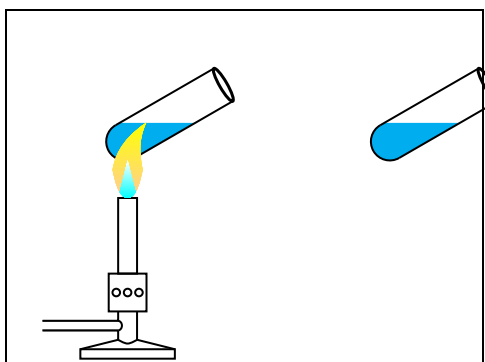
`tubeSeul` influences the size of the chosen box. This can be advantageous as the following example using `\psframebox` shows: If you do not wish to add a further container to the box on the right hand side the box would still have the same size as the one on the left. The option `tubeSeul=true` prevents this from happening. This option only has effects in combination with the macro `\pstChauffageTube` and glass containers of the type `ballon` and `tube`.



```
1 \psset{unit=0.5cm,glassType=ballon,becBunsen}
2 \psframebox{\pstChauffageTube[becBunsen,barbotage]}
3 \psframebox{\pstChauffageTube[tubeSeul=true]}
```

1.11 becBunsen

The option `becbunsen` toggles the drawing of a Bunsen burner. `becbunsen` is set to `true` by default for the macro `\pstChauffeTube` and to `false` for the macro `\pstChauffageBallon`.



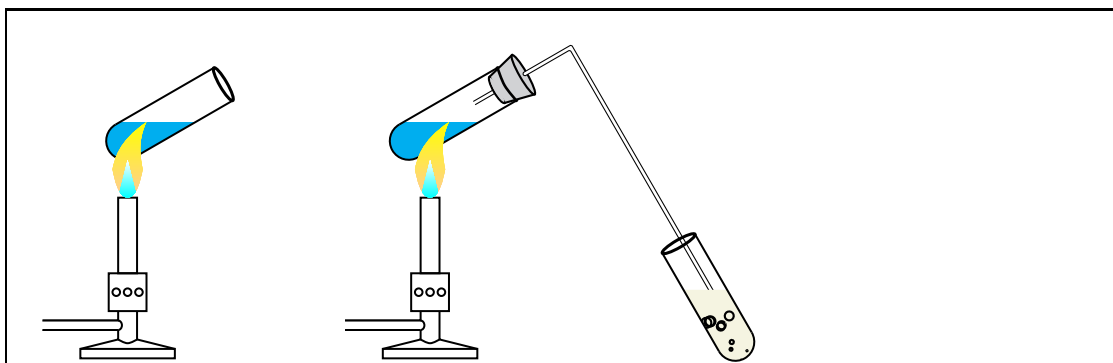
```

1 \psset{unit=0.5cm,tubeSeul=true}
2 \pstChauffageTube
3 \pstChauffageTube[becBunsen=false]

```

1.12 barbotage

The option **barbotage** creates an additional test tube which is connected via a narrow glass tube to the original glass container. To supply the necessary space the option **tubeSeul** should not be activated (see section 1.10 on the preceding page)



```

1 \psset{unit=0.5cm}
2 \pstChauffageTube[tubeSeul=true]
3 \pstChauffageTube[barbotage]

```

1.13 substance

The type of substance within the glass container can be selected by the option **substance**. The default value is a blue fluid (`\pstBullesChampagne`). The available macros are summarised in table 2. It should be pointed out that `\pstFilaments` and `\pstBULLES` are required parameters.

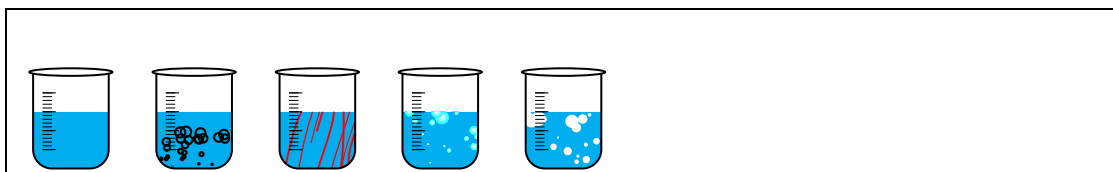
The optional value describes the number of passes for the internal `\multido`-loop. It is basically unlimited although values larger than 80 can lead to problems with T_EX's defined memory. The later can be modified in the T_EX configuration file. The location of this file can be acquired using `kpsewhich texmf.cnf`.

Table 2: Summary of macros for the option `substance`

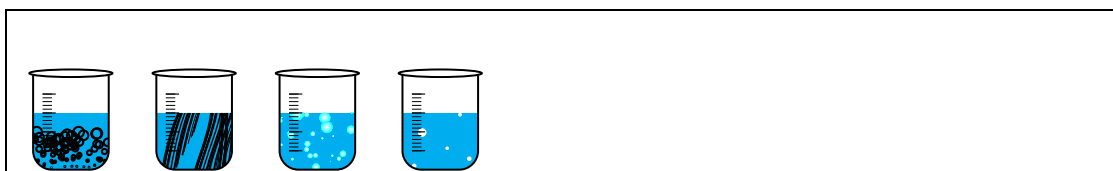
<i>macro</i>	<i>default</i>	<i>comment</i>
<code>\pstBullesChampagne[⟨value⟩]</code>	25	standard
<code>\pstFilaments[⟨value⟩]{⟨color⟩}</code>	5	
<code>\pstBilles[⟨value⟩]</code>	50	two dimensional
<code>\pstBULLES[⟨value⟩]{⟨color⟩}</code>	20	three dimensional

```
voss@shania:~> kpsewhich texmf.cnf
/usr/local/texlive/2005/texmf/web2c/texmf.cnf
```

The first example shows the default values using two random colours. The second example demonstrates the use of optional arguments. Basically the macros `substance` and `solide` can be mixed randomly.



```
1 \psset{unit=0.5cm,glassType=becher}
2 \pstTubeEssais
3 \pstTubeEssais[substance=\pstBullesChampagne]
4 \pstTubeEssais[substance=\pstFilaments{red}]
5 \pstTubeEssais[substance=\pstBilles]
6 \pstTubeEssais[substance=\pstBULLES{white}]
```



```
1 \psset{unit=0.5cm,glassType=becher}
2 \pstTubeEssais[substance={\pstBullesChampagne[80]}]
3 \pstTubeEssais[substance={\pstFilaments[20]{black}}]
4 \pstTubeEssais[substance={\pstBilles[80]}]
5 \pstTubeEssais[substance={\pstBULLES[20]{white}}]
```

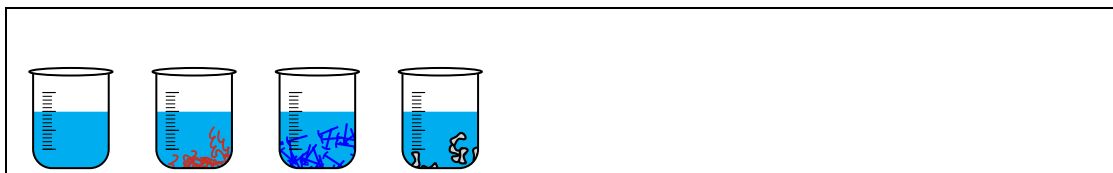
When using the optional parameters for internal looping it has to be noted that this parameter itself is used as part of another optional parameter and therefore has to be set in curly braces as the above example illustrates.

1.14 solide

The option `solide` describes the type of substance within the glass containers. Table 3 summarises all available values. The same rules apply as described in section 1.13.

Table 3: Summary of macros for the option `solide`

<i>macro</i>	<i>default</i>
<code>\pstTournureCuivre[⟨value⟩]</code>	30
<code>\pstClouFer[⟨value⟩]</code>	60
<code>\pstGrenailleZinc[⟨value⟩]</code>	25



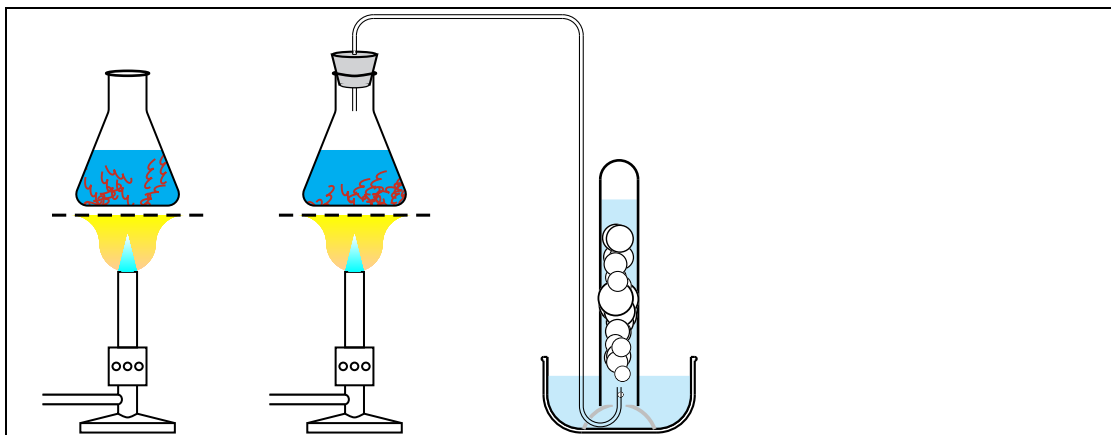
```
1 \psset{unit=0.5cm,glassType=becher}
2 \pstTubeEssais
3 \pstTubeEssais[solide=\pstTournureCuivre]
4 \pstTubeEssais[solide=\pstClouFer]
5 \pstTubeEssais[solide=\pstGrenailleZinc]
```



```
1 \psset{unit=0.5cm,glassType=becher}
2 \pstTubeEssais[solide={\pstTournureCuivre[50]}]
3 \pstTubeEssais[solide={\pstGrenailleZinc[80]}]
4 \pstTubeEssais[glassType=ballon,solide={\pstClouFer[50]}]
```

1.15 tubeRecourbe

The option `tubeRecourbe` creates a device to collect exhausting gas from the glass container, including a Bunsen burner.



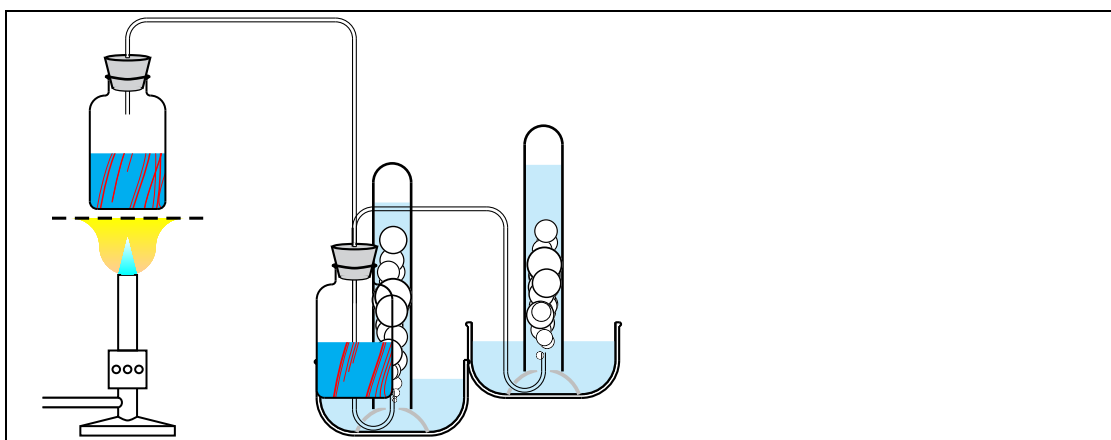
```

1 \psset{unit=0.5cm,glassType=erlen,recuperationGaz,substance=\pstTournureCuivre}
2 \pstChauffageBallon
3 \pstChauffageBallon[tubeRecourbe]

```

1.16 tubeRecourbeCourt

The option `tubeRecourbe` creates a device to collect exhausting gas from the glass container, excluding a Bunsen burner.



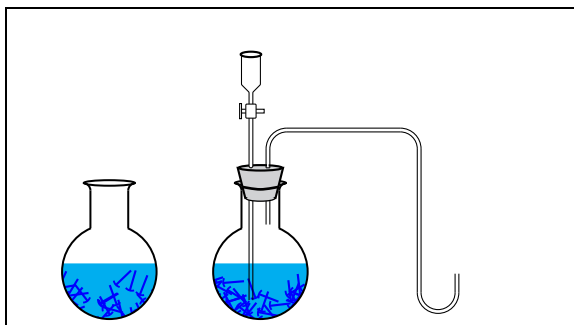
```

1 \psset{unit=0.5cm,glassType=flacon,recuperationGaz,substance=\pstFilaments{red}}
2 \pstChauffageBallon[tubeRecourbe]
3 \pstChauffageBallon[tubeRecourbeCourt]

```

1.17 doubletube

`doubletube` enables arranging two narrow glass tubes, one of which has a stopcock.



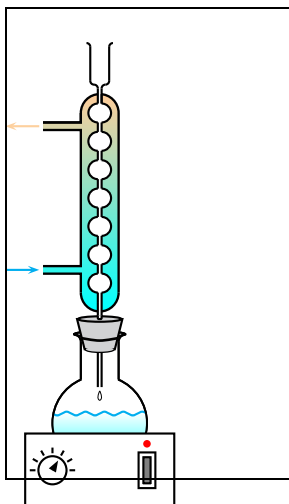
```

1 \rule{0pt}{4cm}
2 \psset{unit=0.5cm,glassType=ballon,%
3   substance=\pstClouFer}
4 \pstBallon
5 \pstBallon[doubletube]

```

1.18 refrigerantBouille

`refrigerantBouille` is one of the options for outputting a more complex setup. When adding further devices it should be noted that the geometrical origin is located in the centre of the setup.



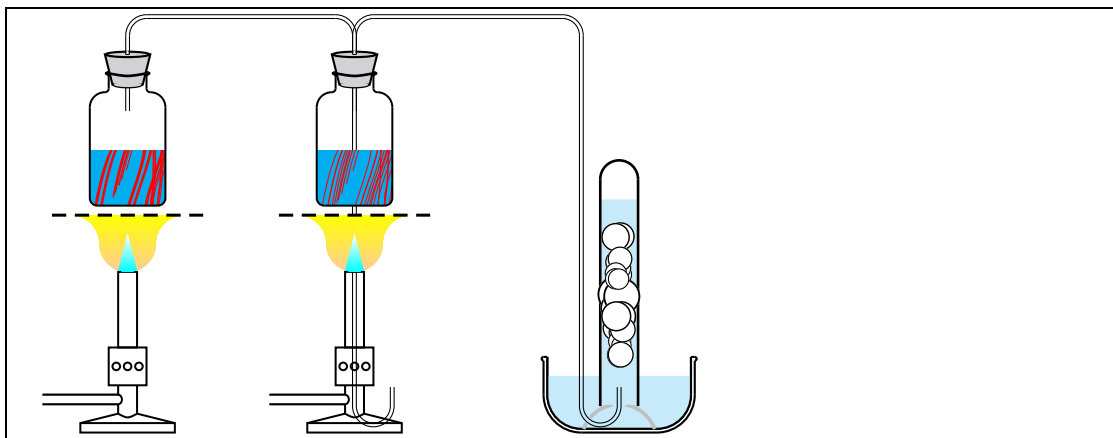
```

1 \psset{unit=0.5cm}
2 \pstBallon[refrigerantBouilles ,glassType=ballon,%
3   substance=\pstClouFer]

```

1.19 recuperationGaz

`recuperationGaz` describes the device collecting expanded gases.



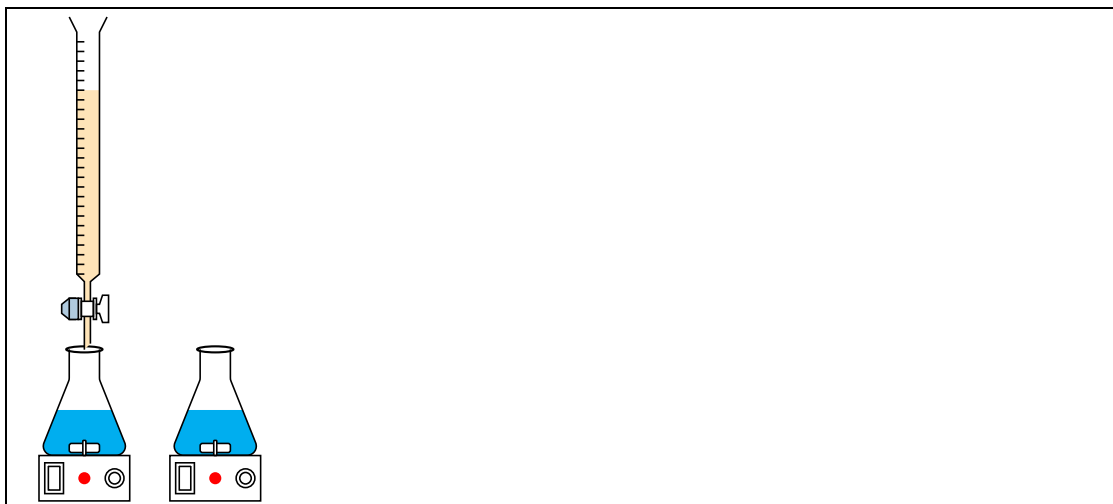
```

1 \psset{unit=0.5cm,glassType=flacon,tubeRecourbe,substance={\pstFilaments[10]{red}}}
2 \pstChauffageBallon
3 \pstChauffageBallon[recuperationGaz]

```

1.20 burette

The macro `\pstDosage` displays a buret by default. This option suppresses its display.



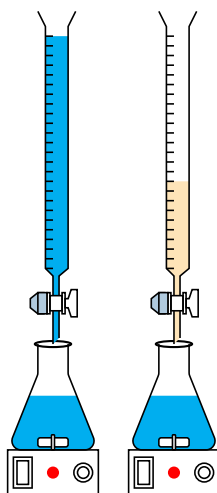
```

1 \psset{unit=0.4cm}
2 \pstDosage[glassType=erlen]
3 \pstDosage[glassType=erlen,burette=false]

```

1.21 niveauReactifBurette and couleurReactifBurette

`niveauReactifBurette` and `couleurReactifBurette` control amount and color of the fluid in the buret.



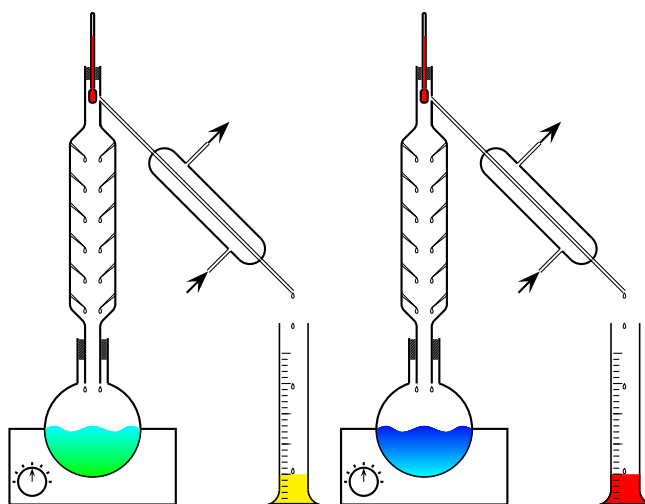
```

\psset { unit=0.4cm, glassType=erlen , niveauLiquide1=60}
\pstDosage [ niveauReactifBurette=25, couleurReactifBurette=cyan ]
\pstDosage [ niveauReactifBurette=10]

```

1.22 AspectMelange and CouleurDistillat

`AspectMelange` defines the color of a chemical substance and must comply to a predefined style to ensure the creation of a color gradient. `CouleurDistillat` defines the color of the distillate without this restriction.



```

\psset { unit=0.4cm}
\pstDistillation (-3, -10)(7,6)\quad
\pstDistillation [ AspectMelange=Diffusion , CouleurDistillat=red](-3, -10)(7,

```

1.23 phmetre

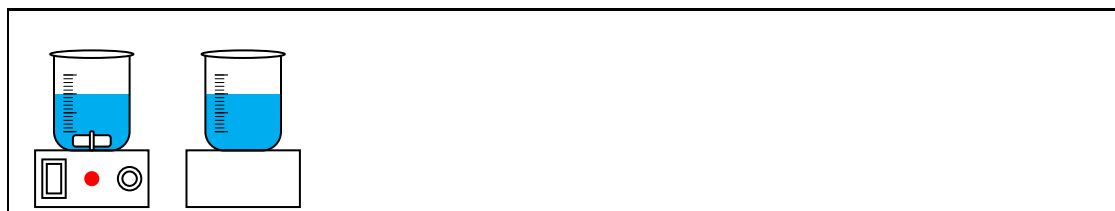
`phmetre` displays a pH-meter. Note that this option is only available with the macro `\pstDosage`.



```
1 \psset{unit=0.5cm,glassType=becher,burette=false}  
2 \pstDosage  
3 \pstDosage[phmetre]
```

1.24 agitateurMagnetique

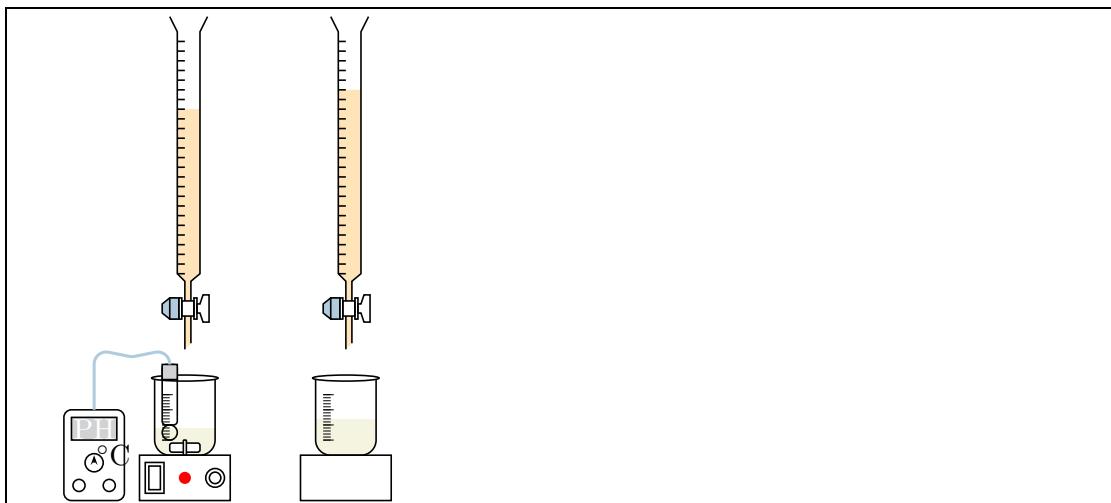
`agitateurMagnetique` is activated by default and displays a heat block. When deactivated this option only the symbols are suppressed, the rectangle is still displayed.



```
1 \psset{unit=0.5cm,burette=false,glassType=becher}  
2 \pstDosage  
3 \pstDosage[agitateurMagnetique=false]
```

1.25 niveauLiquide1, niveauLiquide2, niveauLiquide3 and aspectLiquide1, aspectLiquide2, aspectLiquide3

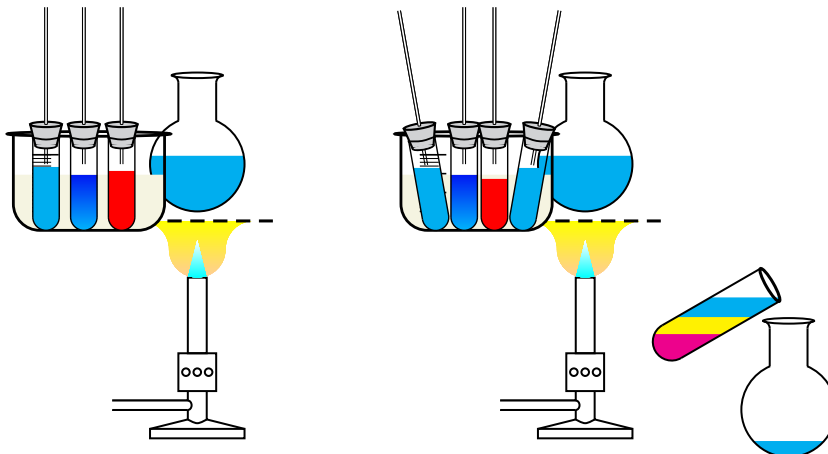
These options define fluid level and style of the liquids 1, 2 and 3 respectively. The style can either be one of the default values or a newly defined one as described in section 1.13. Depending on the macro used not all possible options can be used.



```

1 \psset{unit=0.4cm,glassType=becher}
2 \rule{0pt}{6cm}
3 \pstDosage[niveauReactifBurette=18,niveauLiquide1=30,aspectLiquide1=Champagne,%
4   glassType=becher,phmetre=true]
5 \pstDosage[niveauReactifBurette=20,niveauLiquide1=40,aspectLiquide1=Champagne,%
6   glassType=becher,phmetre=false,agitateurMagnetique=false]

```



```

\begin{pspicture}(0,0)(5,6)
  \rput(4,3){\pstChauffageBallon[becBunsen=true,unit=0.5]}
  \rput(2.5,4){\pstBallon[glassType=becher,xunit=1,yunit=0.5,aspectLiquid
  \psset{glassType=tube}
  \rput(2.5,3.7){\pstTubeEssais[tubeDroit=true,unit=0.35,niveauLiquide1=7
  \rput(3,3.7){\pstTubeEssais[tubeDroit=true,unit=0.35,niveauLiquide1=75,
  \rput(2,3.7){\pstTubeEssais[tubeDroit=true,unit=0.35,niveauLiquide1=80]
\end{pspicture}
\begin{pspicture}(0,0)(5,6)

```



```

\rput (4,3){\pstChauffageBallon [ becBunsen=true , unit=0.5]}
\rput (2.5,4){\pstBallon [ glassType=becher , xunit=1,yunit=0.5, aspectLiquid
\rput (2.4,3.7){\pstTubeEssais [ tubeDroit=true , unit=0.35, niveauLiquide1=7
\rput (2.8,3.7){\pstTubeEssais [ tubeDroit=true , unit=0.35, niveauLiquide1=6
\rput (1.7,3.7){\pstTubeEssais [ tubeDroit=true , unit=0.35, niveauLiquide1=8
\rput (3.5,3.7){\pstTubeEssais [ tubeDroit=true , unit=0.35, niveauLiquide1=8
\end{pspicture}
\begin{pspicture} (1,3)(5,6)
\rput (2.5,4){\pstBallon [ glassType=ballon , unit=0.5, niveauLiquide1=15]}
\rput (1.3,5.4){\pstTubeEssais [ unit=0.5, niveauLiquide1=95,
niveauLiquide2=60, niveauLiquide3=30, tubePenche=-60]}
\end{pspicture}

```

2 Predefined colours and styles

The following summary shows all predefined colours and styles provided by the package `pst-labo`, all of which all can be adapted by the user.

```

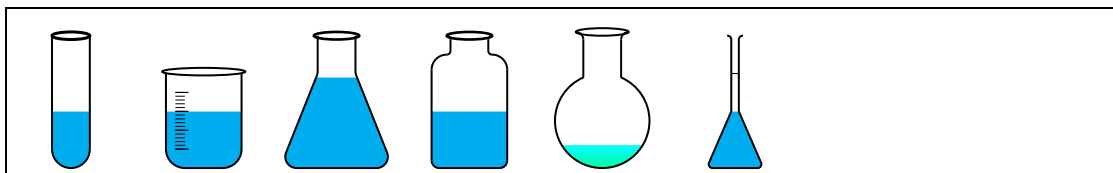
\definecolor {Beige}           {rgb} {0.96,0.96,0.86}
\definecolor {GrisClair}       {rgb} {0.8,0.8,0.8}
\definecolor {GrisTresClair}   {rgb} {0.9,0.9,0.9}
\definecolor {OrangeTresPale}  {cmyk} {0,0.1,0.3,0}
\definecolor {OrangePale}      {cmyk} {0,0.2,0.4,0}
\definecolor {BleuClair}       {cmyk} {0.2,0,0,0}
\definecolor {LightBlue}       {rgb} {.68,.85,.9}
\definecolor {Copper}          {cmyk} {0,0.9,0.9,0.2}
\definecolor {Marron}          {cmyk} {0,0.3,0.5,.3}
%
\newpsstyle{aspectLiquide1}    {linestyle=none, fillstyle=solid, fillcolor=c
\newpsstyle{aspectLiquide2}    {linestyle=none, fillstyle=solid, fillcolor=y
\newpsstyle{aspectLiquide3}    {linestyle=none, fillstyle=solid, fillcolor=n
\newpsstyle{Champagne}         {linestyle=none, fillstyle=solid, fillcolor=E
\newpsstyle{BilleThreeD}       {linestyle=none, fillstyle=gradient, gradmidp
\newpsstyle{Sang}              {linestyle=none, fillstyle=solid, fillcolor=r
\newpsstyle{Cobalt}            {linewidth=0.2, fillstyle=solid, fillcolor=bl
\newpsstyle{Huile}             {linestyle=none, fillstyle=solid, fillcolor=y
\newpsstyle{Vinaigre}          {linestyle=none, fillstyle=solid, fillcolor=n
\newpsstyle{Diffusion}         {linestyle=none, fillstyle=gradient, gradmidp
\newpsstyle{DiffusionMelange2} {fillstyle=gradient, gradbegin=white, gradend
\newpsstyle{flammeEtGrille}    {linestyle=none, fillstyle=gradient, gradmidp
\newpsstyle{rayuresJaunes}     {fillstyle=hlines, linecolor=yellow, hatchcol
\newpsstyle{DiffusionBleue}    {fillstyle=gradient, gradmidpoint=0, linestyl

```

3 Macros

3.1 `\pstTubeEssais`

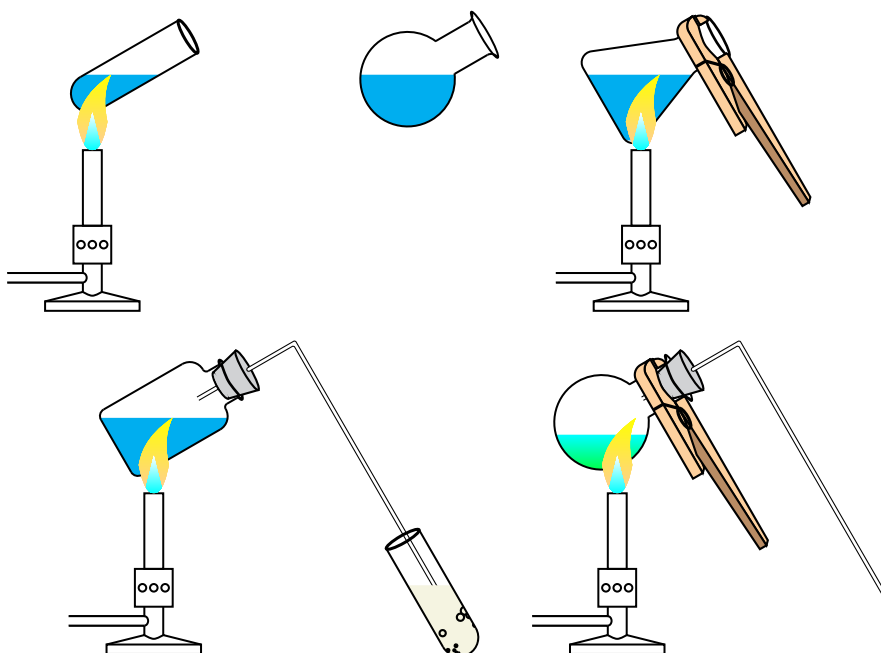
This macro displays the simplest type of glass container and has already been used numerous times in previous examples. The default value when used without further parameters is a normal test tube (`glassType=tube`).



```
1 \psset{unit=0.5}
2 \pstTubeEssais
3 \pstTubeEssais[glassType=becher]
4 \pstTubeEssais[glassType=erlen,niveauLiquide1=80]
5 \pstTubeEssais[glassType=flacon]
6 \pstTubeEssais[glassType=ballon,niveauLiquide1=20,aspectLiquide1=DiffusionBleue]
7 \pstTubeEssais[glassType=fiolleJauge]
```

3.2 `\pstChauffageTube`

`\pstChauffageTube` enhances the previous macro to include either a heat block, a Bunsen burner or a second narrow glass tube respectively.



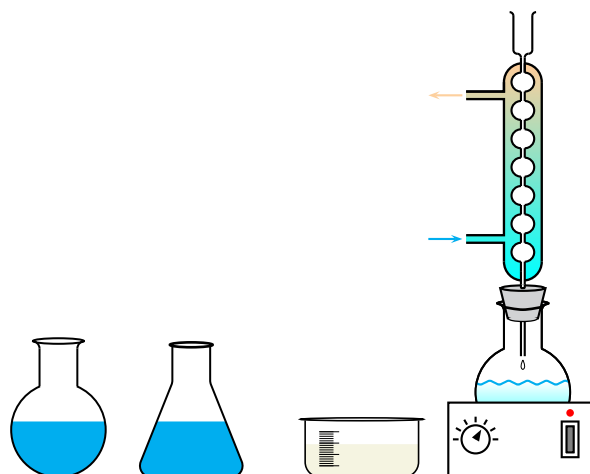
```

\psset {unit=0.5}
\pstChauffageTube [tubeSeul]
\pstChauffageTube [glassType=ballon , becBunsen=false , tubeSeul]
\pstChauffageTube [glassType=erlen , becBunsen , pince , tubeSeul]
\pstChauffageTube [becBunsen , barbotage , glassType=flacon ]
\pstChauffageTube [becBunsen , tubeCoude , glassType=ballon , niveauLiquide1=20,9
    aspectLiquide1=DiffusionBleue , tubeSeul , pince ]

```

3.3 \pstBallon

\pstBallon is basically identical to \pstTubeEssais with more possible options.



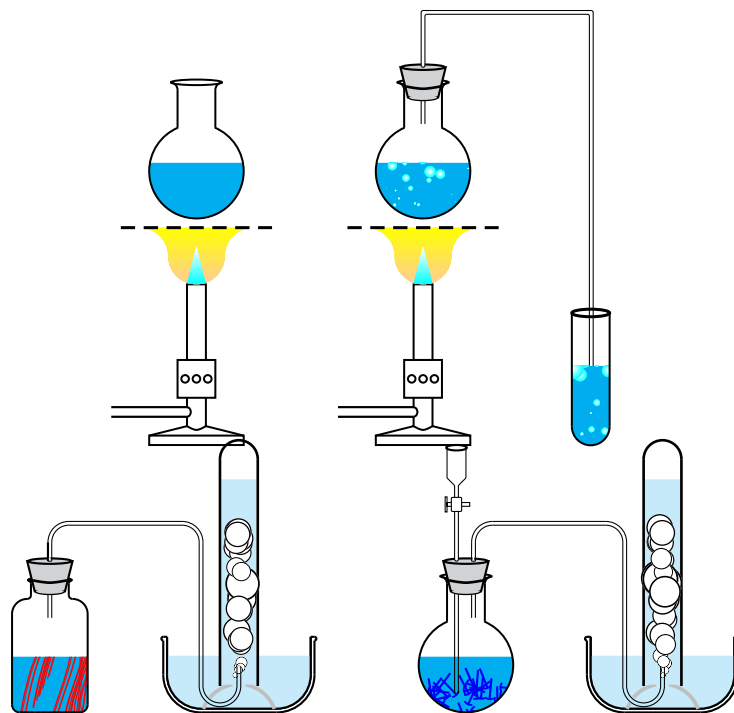
```

\psset {unit=0.5cm}
\pstBallon \hspace{-0.5cm}
\pstBallon [glassType=erlen] \hspace{-0.5cm}
\pstBallon [glassType=becher , xunit=0.75cm , yunit=0.25cm , aspectLiquide1=Chan
\raisebox {1cm} {\pstBallon [refrigerantBoules=true]}

```

3.4 \pstChauffageBallon

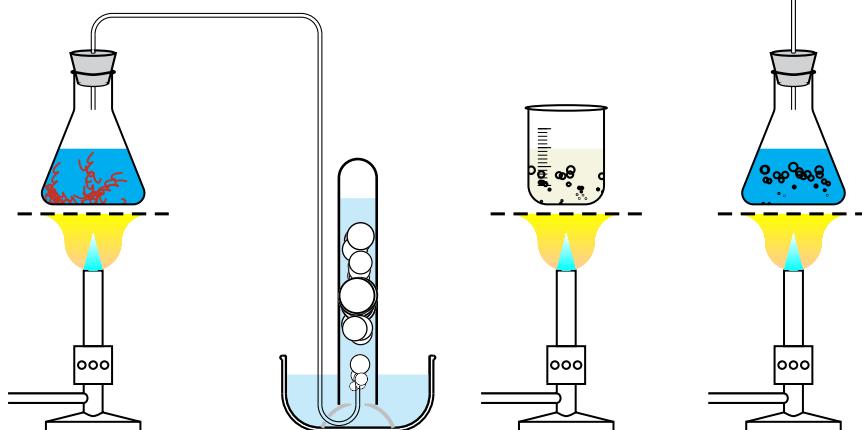
\pstChauffageBallon enhances the previous macro by displaying a Bunsen burner by default.



```

\psset { unit =0.5cm}
\pstChauffageBallon
\pstChauffageBallon [ barbotage , tubeCoudeUB , becBunsen , substance=\pstBilles ]
\pstChauffageBallon [ glassType=flacon , recuperationGaz , tubeRecourbeCourt , substance=\pstClouFer ]
\pstChauffageBallon [ doubletube , recuperationGaz , substance=\pstClouFer ]

```



```

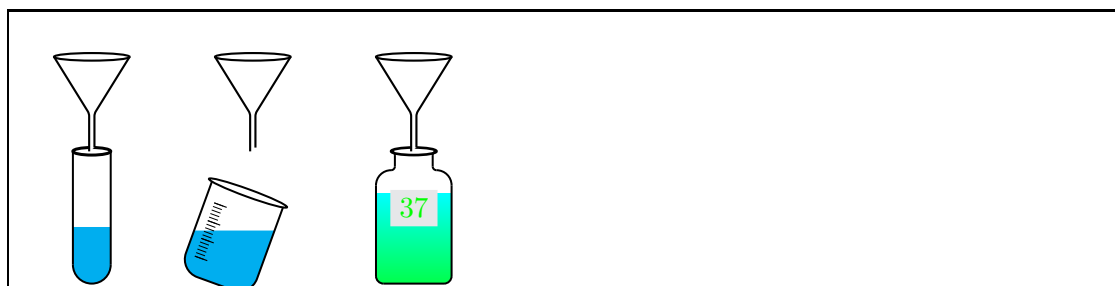
\psset { unit =0.5cm}
\pstChauffageBallon [ glassType=erlen , tubeRecourbe , recuperationGaz , substance=\pstClouFer ]

```

```
\pstChauffageBallon [ glassType=becher , aspectLiquide1=Champagne , substance=\
\pstChauffageBallon [ glassType=erlen , substance=\pstBullesChampagne , tubeDro
```

3.5 \pstEntonnoir

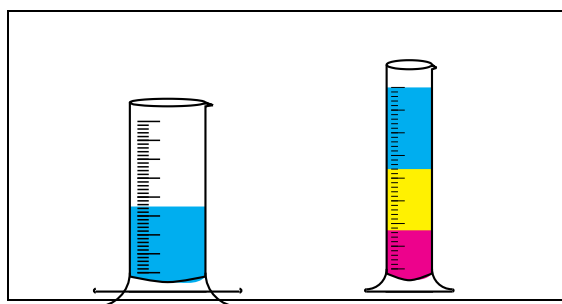
\pstEntonnoir displays a funnel. Called without any parameters it is combined with a test tube. It can be combined with any kind of setup.



```
1 \psset{unit=0.5cm}
2 \pstEntonnoir
3 \pstEntonnoir[glassType=becher,tubePenche=-20]
4 \pstEntonnoir[glassType=flacon,etiquette=true,Numero={\green 37},%
5 aspectLiquide1=DiffusionBleue,niveauLiquide1=80]
```

3.6 \pstEprouvette

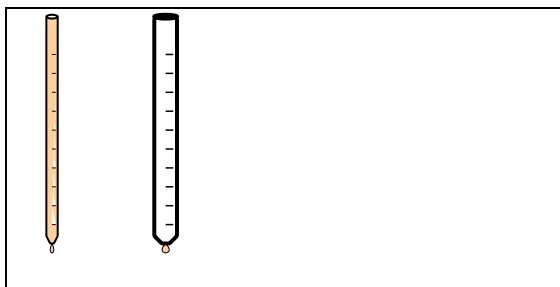
\pstEprouvette displays a measuring cylinder. Its size can be changed using the PSTricks scaling factor.



```
1 \pstEprouvette[yunit=0.5cm]
2 \pstEprouvette[unit=0.6cm,niveauLiquide1=100,niv
```

3.7 \pstpipette

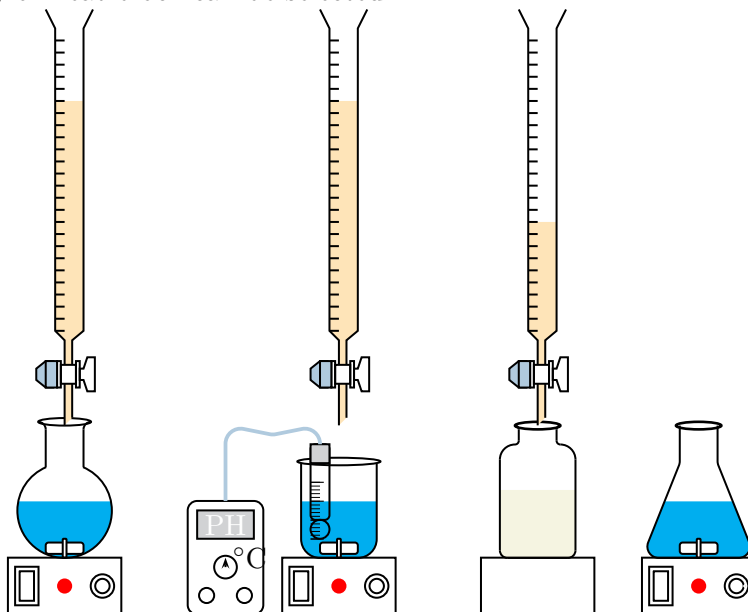
\pstpipette displays a pipette. Its scaling range can be altered by changing PSTricks scaling factors.



```
1 \pstpipette[unit=0.5cm,tubePenche=40]
2 \pstpipette[yunit=0.5cm]
```

3.8 \pstDosage

\pstDosage is normally used in combination with other devices. The buret has a maximal capacity of 25 mL. The current height and substrate can be changed by their options. An optional pH-meter (only with glass type becher) or heat block can be selected.



```
\psset{unit=0.5cm}
\pstDosage
\pstDosage[ glassType=becher , phmetre=true ]
\pstDosage[ niveauReactifBurette=10,niveauLiquide1=60,aspectLiquide1=Champ
  glassType=flacon , agitateurMagnetique=false ]
\pstDosage[ glassType=erlen , burette=false ]}
```

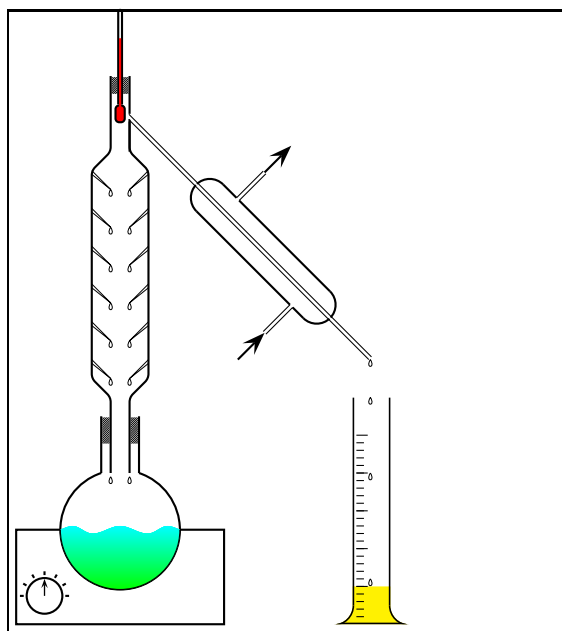
3.9 \pstDistillation

The only macro which has been passed on to \pstDistillation are the dimensions of the picture environment.

`\pstDistillation`

`\pstDistillation(xll, yll)(xur, yur)`

In case these coordinates are not supplied a rectangle of $(-4, -10)(8, 7)$ is used, assuming that further objects will be included using `\rput`,



```
1 \psset{unit=0.5cm}
2 \pstDistillation(-3,-10)(7,6)
```

4 Basic objects

The file `pst-laboObj.tex` includes all possible basic objects. For lack of space they are not displayed here explicitly.

5 Examples

Creating complex examples is eased significantly by using a coordinate grid underlying the setup (`\psgrid`) as has been shown previously in section ?? on page ??.

References

- [1] Denis Girou. Présentation de PSTricks. *Cahier GUTenberg*, 16:21–70, April 1994.
- [2] Denis Girou, Christoph Jorssen, Manuel Luque, and Herbert Voß. *pst-labo – a PSTricks package for chemical Objects*. CTAN:/graphics/pstricks/contrib/pst-labo/, 2005.

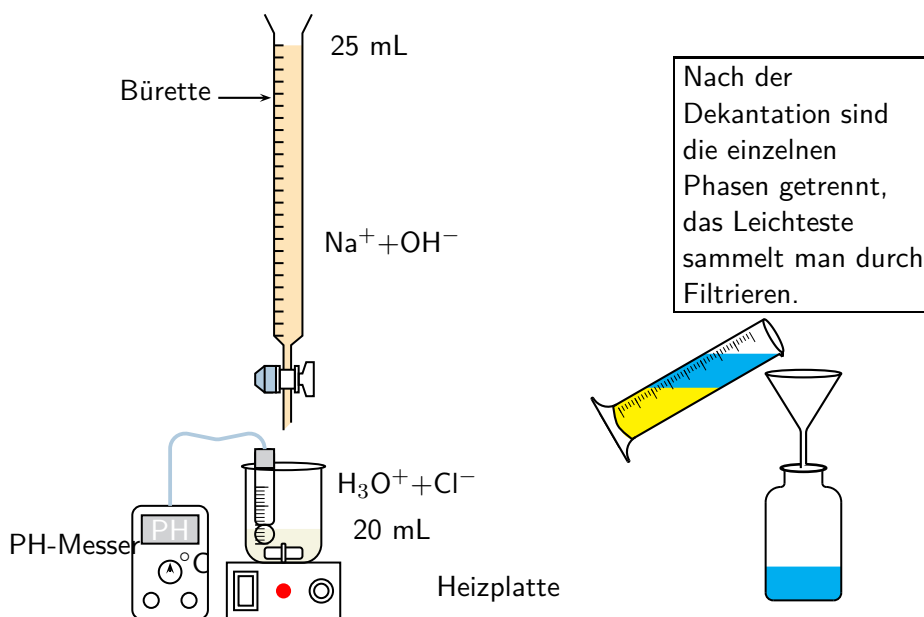


Figure 1: Example usage of `\pstDosage`

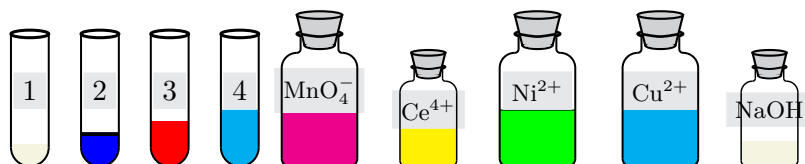


Figure 2: Example usage of `\pstTubeEssais`

- [3] Frank Mittelbach and Michel Goosens et al. *The L^AT_EX Graphics Companion*. Addison-Wesley Publishing Company, Boston, second edition, 2004.
- [4] Sebastian Rahtz. Most of the pstricks examples of the L^AT_EX graphics companion. CTAN: `graphics/pstricks/doc/lgc/`.
- [5] Sebastian Rahtz. An introduction to PStricks, part I. *Baskerville*, 6(1):22–34, February 1996.
- [6] Sebastian Rahtz. An introduction to PStricks, part II. *Baskerville*, 6(2):23–33, April 1996.
- [7] Timothy Van Zandt. *PStricks - PostScript macros for Generic T_EX*. <http://www.tug.org/application/PStricks>, 1993.
- [8] Timothy Van Zandt. *PStricks - PostScript macros for Generic T_EX, Documented Code*. CTAN: `/graphics/pstricks/obsolete/doc/src/pst-code.tex`, 1997.

- [9] Herbert Voß. *PSTricks Grafik für T_EX und L^AT_EX*. DANTE – Lehmanns, Heidelberg/Hamburg, 6 edition, 2010.
- [10] Timothy Van Zandt and Denis Girou. Inside pstricks. *TUGboat*, 15:239–246, September 1994.