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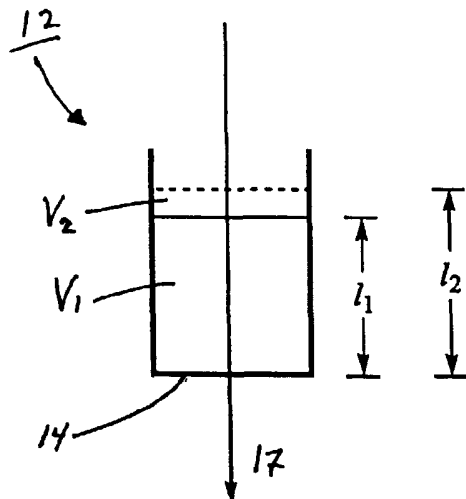
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: PHOTOMETRIC CALIBRATION OF LIQUID VOLUMES



(57) Abstract: A method and apparatus for measuring and calibrating the measurement of small volumes of liquids. The small volumes of liquid are typically dispensed from liquid delivery devices, the delivery device often having multiple channels to analyze many samples at once. The liquid samples are delivered to one or more cells, typically in a multi-well plate, and positioned in a spectrophotometer for determining an absorbance of a chromophore in the liquid sample. Based upon an absorbance measurement and the concentration of the chromophore, a path length of the liquid sample is determined, from which a volume of the sample may be calculated. The method and apparatus provide various means for correcting for differences in the dimensions and/or other factors causing a non-linear deviation from the Beer-Lambert law. A system or kit may be provided including sets of sample solutions of varying dilution ranges for calibrating different liquid volumes. The kit may further include software code for storing and analyzing the various sample solutions.

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 02/37603

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G01N21/25 B01L3/00 G01F17/00 G01F25/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G01N B01L G01F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|---|---|
| X | US 5 766 875 A (CRAWFORD KIMBERLY L ET AL) 16 June 1998 (1998-06-16) | 1-9,11, 12,14, 19,20, 23,26-30 |
| Y | column 10, line 64 -column 20, line 37; figures 6-8 | 10,13, 15-18, 21,22 |
| Y | --- US 5 492 673 A (CURTIS RICHARD H ET AL) 20 February 1996 (1996-02-20) column 2, line 8 -column 13, line 56; claims 1-14; figures 1-5 --- -/-- | 10,13, 15-18, 21,22, 41-43, 55-57 |

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

26 March 2003

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13.08.03

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 02/37603

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|---------------------------|
| X | US 5 258 308 A (FREEMAN GARY M ET AL) 2 November 1993 (1993-11-02) | 31-40, 44,45, 48-54 |
| Y | the whole document | 41-43, 55-57 |
| A | --- US 4 354 376 A (GREENFIELD WALTER ET AL) 19 October 1982 (1982-10-19) column 2, line 41 -column 6, line 50; figures 1-3 ----- | 1-45, 48-57 |

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 02/37603

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-45, 48-57

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-45,47-57

Method and system for determining/calibrating a liquid volume characterized by a sample solution including a first and a second chromophore and a blank solution including the second chromophore in a concentration equal to that in the sample solution.

2. Claim : 46

Method of determining a liquid volume characterized by a contact angle from about 80 to about 100 degrees between the meniscus and the well.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box 3.

Claims Nos.: 47

The use of multiple independent claims 1, 31, 32, 44, 47 and 48 makes it difficult for the skilled person to establish which features are essential for the definition of the invention, and thus the scope of protection afforded by the claims. So the invention is not clearly defined, in breach of Article 6 PCT.

Furthermore, claim 47 lacks clarity because:

- claim 47 leaves the reader in doubt whether the feature "a path length dimension of a sample holder in which the 'reaching' is made" refers to the path length of the liquid sample solution or whether it refers to a dimension of the holder, like the diameter.

- the expression "a quantification of a non-linearity from the Beer-Lambert law of the reading" used in claim 47 is obscure: the skilled person would not know which non-linearity is meant, how it is quantified and which reading is meant.

The wording of claim 47 thus is such that a lack of clarity within the meaning of Article 6 PCT arises to such an extent as to render a meaningful search of claim 47 impossible.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 02/37603

| Patent document cited in search report | | Publication date | Patent family member(s) | Publication date |
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