Specification

A cap-shaped reagent vessel for analysis reagents

[Technical Field]

The present invention relates to a cap-shaped reagent vessel for analysis reagents by which water quality analysis is simply performed.

[Background Art]

Many of analysis methods of an easy water quality analysis adopt a colorimetric analysis.

As to the colorimetric analysis, since the characteristics are such that devices used are small and light, and also low priced, and the result can be seen visually as colors, and the measurement result is fast etc., colorimetric analysis is widely used in industry. However, in such colorimetric analysis, since chemical agents are used, it requires chemical knowledge, techniques, experience, etc.

Moreover, since many types of chemical agents are used, not only more than a few types of reagents are required to be prepared, but also, and its storage is required. Further, in order to use reagents, weight meters such as scales, measuring cylinders etc. and capacity measuring instruments are necessary to fractionate required amounts to use reagents, and many beakers and flasks are necessary to churn and store them.

Because of this, if one wants to perform on site water quality analysis, fractionation work of reagents etc. are very difficult, but also, depending on the situation, water quality analysis is not possible.

As to the reagents for water quality analysis, there are liquid forms and powder forms. As to liquid reagents, there are different methods in which the reagent stored in glass bottles and plastic bottles is fractionated by an accompanying dropper, or fractionated by the dropper built into the glass or plastic bottles, or dripped by eye droppers.

On the other hand, as to powder reagents, there are some methods in which the reagent stored in glass or plastic vessels is fractionized by an accompanying light weight spoon, or depending on the case, as to the reagent that are packed into a bag with laminated packaging one at a time, or packed into soft plastic tube with both ends welded, the packaging is cut and the reagent is added to test water etc. Further, liquid or powder reagent is sometimes pre-sealed one at a time into the colorimetic cells made of transparent glass and transparent plastic.

Furthermore, liquid or powder reagent is pre-sealed one time portion at a time into the coloriometic cell itself made of transparent glass and transparent plastics.

By the way, if more than two types of liquid or powder reagents that cannot be mixed and stored are used, it is necessary to repackage and store each of them; if test water analysis is performed, each reagent must be inputted into the test water separately according to the use method. Hence, more the number of reagents, more complicated the analysis work, and if the handling method is different by each reagent, the user can get mixed up.

On the other hand, one can think of inputting the reagent automatically by machines etc., and performing automatic measurements, but if there are many inputting reagents, the structure gets complicated, and also reagent storage methods are complicated in like fashion as above.

By the way, there are some methods that were worked on storing the reagent that could not be mixed and stored separately, and mixing them simply when used. That is, this is not the purpose for handling reagents for analysis but for instance, glass ampule tightly sealed with liquid reagent is placed into the soft plastic tube with other reagents, and when in use, an impact is applied on the soft plastic to break the glass ampule inside to mix the reagents. Moreover, a method exists in which the substance that cannot be mixed and stored are placed into double bags separately and when used, a pressure is applied from outside, and the only bag insides is broke.

However, using such an operation method, it not only needs deliberate operations but also the operation method could be different for each use purpose, so the user gets confused about the operation procedures and methods.

As described above, in performing the easy water quality analysis, in using the above colorimetric analysis, some characteristics were that the devices to be used were small and light and also low priced, and the result could be visually seen as colors and measurement result was fast, but due to the reasons that preparation and storage of reagent to be used and handling of the reagent were troublesome etc., the flaw was that it needed the sufficient chemical knowledge and experience etc. to analyze water quality.

[Disclosure of the invention]

The first technical challenge of the present invention is to provide a cap-shaped reagent vessel for analysis reagents that can perform safe and accurate water quality analysis by a simple operation even without chemical knowledge.

The second technical challenge of the present invention is to simplify the production processes.

The solution method of the first technical challenge of the present invention comprises, as written in the scope 1 of the claims, a transparent vessel main body which enables inputting the test water of a specified amount from the opening; a lid body which can be mounted from the aforementioned opening unit side of the vessel main body; a reagent storage vessel which houses a specified reagent; a cutter which is pushed into the aforementioned lid body, depending on mounting amount of the aforementioned lid body with respect to the aforementioned vessel main body, and breaks through the aforementioned reagent storage vessel loaded into the aforementioned lid body so that the aforementioned reagent is discharged into the aforementioned vessel main body.

According to this solution method, after inputting a test water of a specified amount into the transparent vessel main body, when the lid body which holds the reagent storage vessel housed with a specified reagent is mounted from the opening of the vessel main body inside thereof, the cutter is moved depending on the tightening amount, and the reagent storage vessel is broken through thus, the reagent inside the reagent storage vessel is discharged into the vessel main body.

Hence, when test water is analyzed, the lid body is tightened into the vessel main body with test water inputted, thereby, the reagent can be mixed into the test water, hence even with no chemical knowledge, safe and accurate water quality analysis is performed by a simple operation.

Moreover, other solution method of the first technical challenge of the present invention is that as described in the scope 2 of the claims, the aforementioned lid body is mounted by tightening from the aforementioned opening side of the aforementioned vessel main body, and the aforementioned cutter is pushed into the aforementioned lid body depending on the tightening amount of the aforementioned lid body with respect to the aforementioned vessel main body.

According to the solution method, depending on the tightening amount of the lid body with respect to the vessel main body, the cutter is pushed into the lid body; hence this has the same effects as the scope 1 of the claims.

Moreover, according to the other solution method of the first technical challenge of the present invention, as described in the scope 3 of the claims, the aforementioned lid body is mounted by being pushed in from the aforementioned opening side of the aforementioned vessel main body, and the aforementioned cutter is pushed into the aforementioned lid body depending on the push amount of the aforementioned lid body with respect to the aforementioned vessel main body.

According to the solution method, since the cutter is pushed into the lid body depending on the amount of push of the lid body with respect to the vessel main body, this has the same effects as the scope 1 of the claims.

Moreover, according to the other solution method of the first technical challenge of the present invention, as described in the scope 4 of the claims, a plural number of reagent storage vessels which store mutually different reagents is housed inside the aforementioned lid body along the moving direction of the aforementioned cutter, so depending on the mounting, tightening and push of the aforementioned lid body, the aforementioned plural number reagent storage vessels are broken thru sequentially by the aforementioned cutter.

According to this solution method, a plural number of reagent storage vessels are housed on the lid body along the moving direction of the cutter and when handling the reagent storage vessel of analysis reagent with the test water,

The lid body is mounted, tightened or pushed to the vessel main body with test water inputted, thus each reagent is mixed with test water sequentially.

Moreover, according to the other solution method of the first technical challenge of the present invention, as described in the scope 5 of the claims, a packing was mounted on the lower surface side of the aforementioned cutter, and due to the mounting, tightening or push of the aforementioned lid body with respect to the aforementioned vessel main body, the opening edge part of the aforementioned vessel main body abuts the aforementioned packing, and the aforementioned vessel main body and the aforementioned lid body inside are tightly sealed.

According to the solution method, due to the tightening of the lid body, the packing mounted on the lower surface side of the cutter abuts the opening edge part of the vessel main body, thereby, the vessel main body and the lid body inside are tightly sealed, hence even when test water and reagent are churched, these test water and reagent do not leak outside.

Moreover, according to the other solution method of the first technical challenge of the present invention, as described in the scope 6 of the claims, a soft material protector is intervened between the aforementioned reagent storage vessel and the aforementioned cutter, thus the aforementioned reagent storage vessel is protected so that it is not damaged carelessly by the aforementioned cutter.

According to this solution method, due to the protector of a soft material held between the reagent storage vessel and the cutter, the contact of the reagent storage vessel and the cutter is designed to be interrupted, so when test water is not analyzed, the reagent storage vessel is not broken through by a cutter by mistake, thus the reagent storage vessel is surely saved.

According to the other solution method of the first technical challenge of the present invention, as described in the scope 7 of the claims, a spacer to promote the movement halt of the aforementioned cutter accompanied by mounting, tightening and pushing-in of the aforementioned lid body is intervened between aforementioned reagent storage vessels, hence a moderation is provided for breaking thru of the aforementioned reagent storage vessels by the aforementioned cutter.

According to the solution method, a spacer is intervened between reagent storage vessels, to provide moderation for breaking thru of the aforementioned reagent storage vessels by the aforementioned cutter, hence

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