青岛创梦仪器有限公司

Qingdao ChuangMeng Instrument Co., Ltd.

固相含量测定仪

Oil and Water Retort

使用手册

Instruction Manual

版本 1.0
Version 1.0

请你仔细阅读《使用手册》，正确掌握本产品的安装和使用方法。阅读后请将本《使用手册》妥善保管，以备今后进行检修和维护时使用。

Carefully read this User Manual to learn how to install and use the product correctly. After reading, properly keep the User Manual as a reference for future maintenance and repair.

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1、概述 Summary

创梦仪器生产的油水固相含量测定仪是用来分离和测定钻井液样品中水、油和固相体积的仪器。是了解固相浓度和组成钻井液粘度、滤失控制的基础。其特点为结构简单，操作方便，是实验室和现场理想适用的专用仪器。

The oil-water solid phase content analyzer produced by Chuangmeng Instrument is an instrument used to separate and determine the volume of water, oil, and solid phase in drilling fluid samples. It is the basis for understanding solid phase concentration and composition, drilling fluid viscosity, and filtration control. Its characteristics are simple structure and easy operation, making it an ideal specialized instrument for laboratory and on-site use.

2、型号及规格 Model and specification

型号 Model	名称 Name
1402	固相含量测定仪 Oil and Water Retort

3、技术参数 Technical Parameter

名称 Name	技术参数 Technical parameter
电源 Power Supply	220V 50/60Hz
功率 Power	100W
蒸馏器容量 Capacity of distiller	20±0.2ml 10±0.2ml

4、结构及原理 Structure and principle

A.组成部分 Constituent parts

1.蒸馏器：不锈钢材料精制而成。

2.液体冷凝器：将油和水混合蒸汽在离开冷凝器之前冷却至蒸发温度以下。

3.加热棒组件：将样品温度升至液相蒸发温度，而不致使固相沸腾出来。

4.量筒：容量 20ml、10ml、精度±0.2ml。

5.试管刷：清洗量筒用的毛刷。

6.刮刀：用来刮取蒸馏器内剩余的固相成分。

7.杯架：用来拿取蒸馏器。

8.箱体：采用全不锈钢材料制成，固定盛装各部件用的容器。

1. Distiller: Made from refined stainless steel material.

2. Liquid condenser: Cool the steam mixture of oil and water to below the evaporation temperature before leaving the condenser.

3. Heating rod component: Raise the sample temperature to the liquid phase

evaporation temperature without causing the solid phase to boil out.

4. Measuring cylinder: Capacity 20ml, 10ml, accuracy ± 0.2ml.

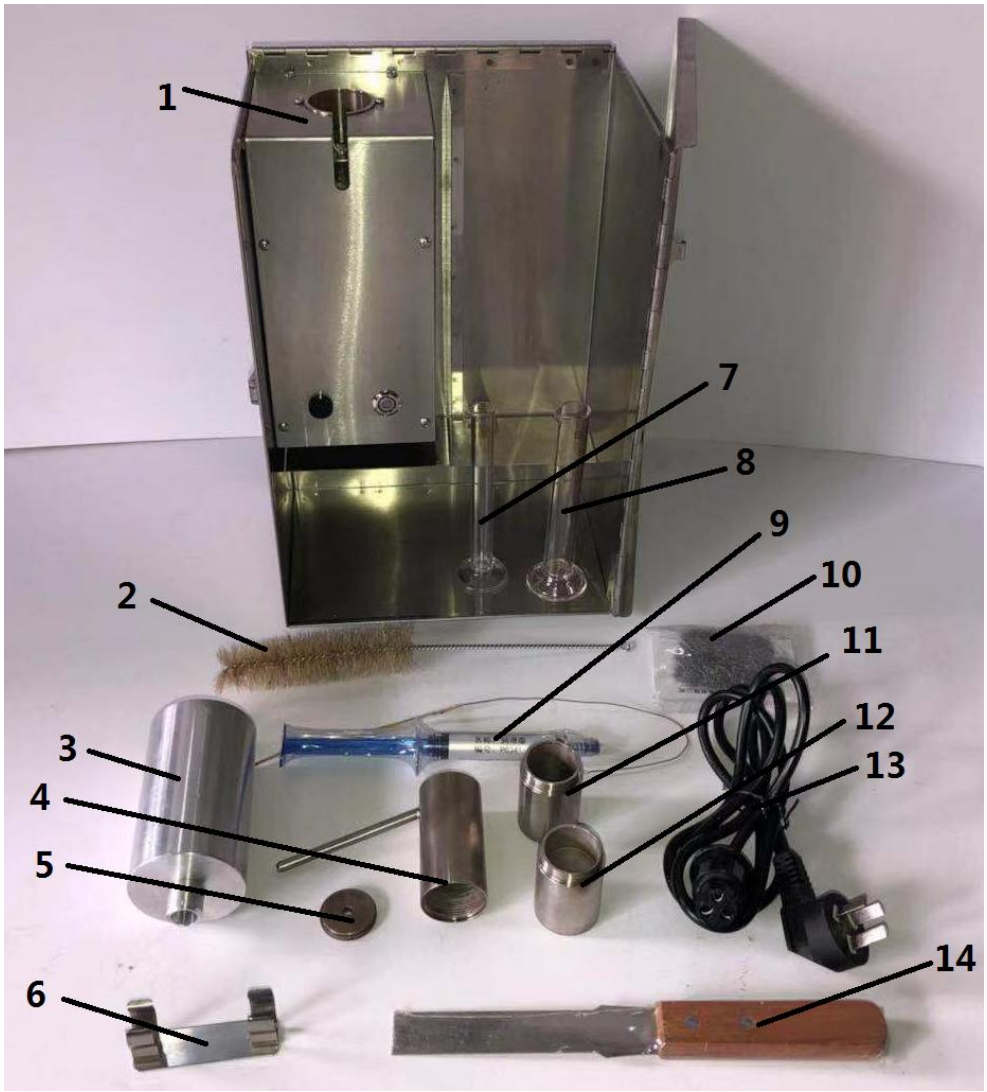
5. Test tube brush: a brush used for cleaning measuring cylinders.

6. Scraper: used to scrape off the remaining solid components in the distiller.

7. Cup holder: used to retrieve the still.

8. Box: Made of all stainless steel material, it is a container used to securely hold various components.

B. 固相含量测定仪结构图 Structure chart



序号 No	编号	名称 Name	序号 No	编号	名称 Name
1	14021	箱体组件 Box assembly	8	G0100	量筒 20ml% Measuring cylinder 20ml%
2	G0311	毛刷	9	G0427	高温润滑脂
3	14025	冷凝体组件 Condensate assembly	10	P0322	钢丝绒
4	14022404	蒸馏套 Distiller	11	14022401	蒸馏杯 20ml
5	14022403	计量盖 Metering lid	12	14022402	蒸馏杯 10ml
6	1402107	量筒支架	13	P0191	电源线
7	G0109	量筒 10ml% Measuring cylinder 10ml%	14	P0344	刮刀 Scraper

C.工作原理 Working principal

在蒸馏器内加热已知体积的钻井液样品,使其液相成分通过蒸馏方法收集在量筒内,液体体积直接从量筒中油相和水相的读值确定。总的固相体积（悬浮的和溶解的）从差值（样品总体积减去液相体积）得到。由于所有溶解的固体将留在蒸馏器内。所以必须经过计算才能确定悬浮固相体积。也能通过计算得到低比重固相和加重材料的相对体积。

Heat a known volume of drilling fluid sample in a still to collect its liquid phase components in a graduated cylinder through distillation. The liquid volume is directly determined from the readings of the oil and water phases in the graduated cylinder. The total solid phase volume (suspended and dissolved) is obtained by subtracting the liquid phase volume from the total sample volume. As all dissolved solids will remain

in the still. So it is necessary to calculate in order to determine the volume of suspended solid phase. The relative volume of low specific gravity solid phase and weighting material can also be calculated.

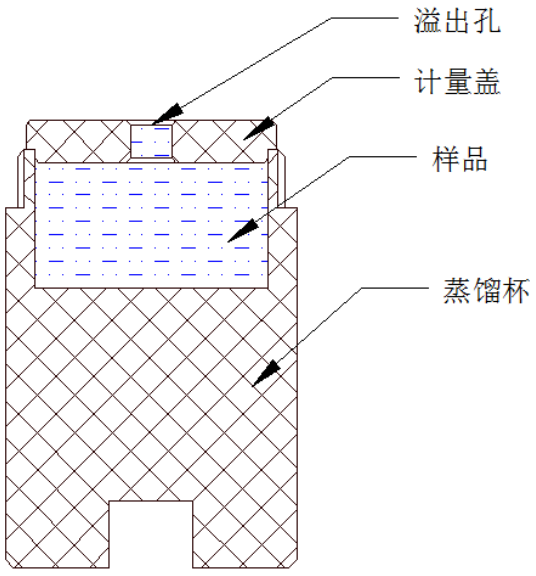
5、仪器的操作

1.检查仪器各部件是否清洁干燥。

2.取有代表性的样品，通过 12 目筛网倒入容器中。充分搅拌样品，排出空气，使样品混合均匀。

注：样品不可以是含油量过高的泥浆。

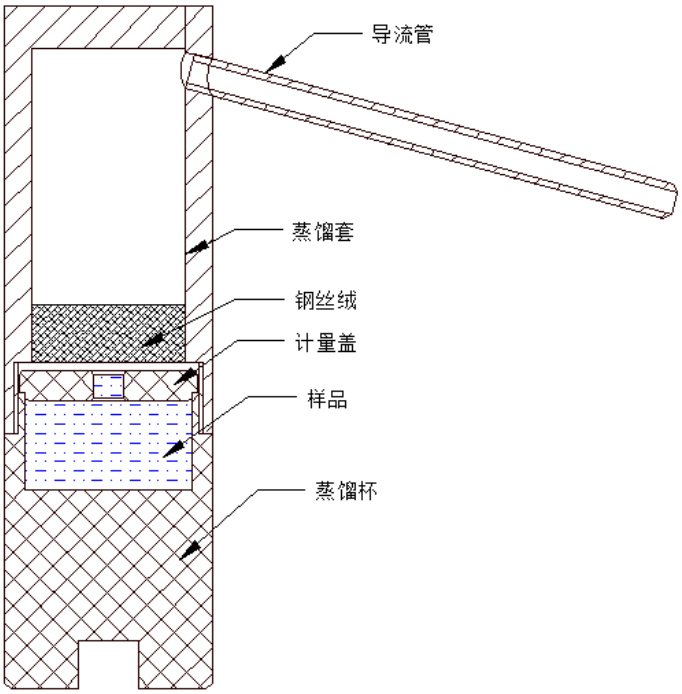
3.将样品倒入蒸馏杯中，放上计量盖，样品从计量盖上端小孔溢出，擦净多余的样品。(如图二）



（图二）蒸馏杯

4.将钢丝绒放入蒸馏套，再装上蒸馏杯。（如图三）

注：为保证密封，丝扣上需抹一些高温润滑脂或密封脂。



（图三）蒸馏器组件

5.将蒸馏器放入加热套内，把冷凝器装在蒸馏器的出液管上，用量筒支架将量筒与冷凝器的排液管口连接。

6 打开开关，开始实验（一般为 15～25min，取决于样品中油的含量和室温）。

7.实验结束，关闭开关，等蒸出的液相冷却至室温，读取总液相 VL、油和水的体积百分数 VO 和 VW（如油水界面不清晰，可滴入 1～2 滴破乳剂）。

8.拆卸，清洗各部件以备下一次使用。

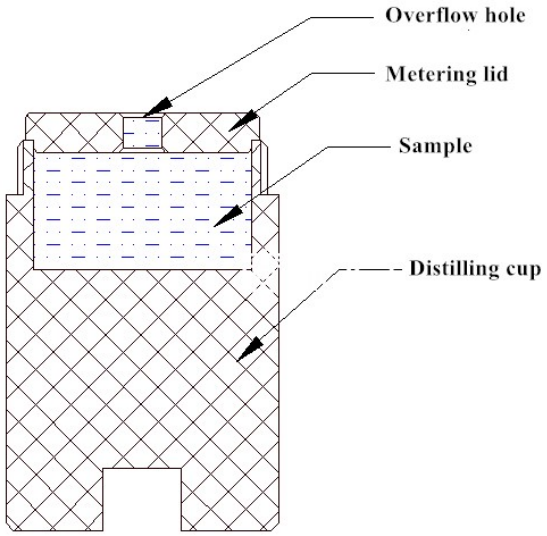
9.对于两种常用的水基钻井液——淡水钻井液和盐水钻井液，计算的方法不同。

1. Check if all components of the instrument are clean and dry.

2. Take representative samples and pour them into a container through a 12 mesh sieve. Stir the sample thoroughly, exhaust the air, and mix the sample evenly.

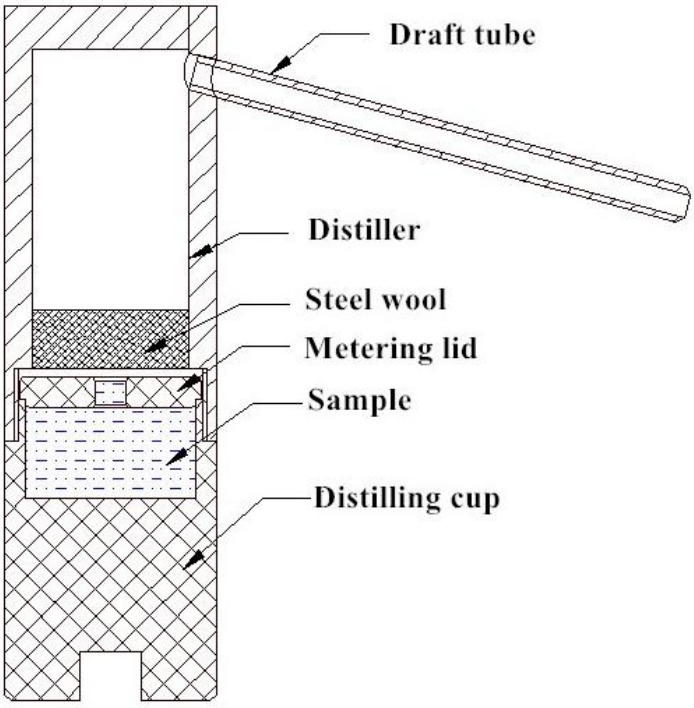
Note: The sample cannot be mud with excessively high oil content.

3. Pour the sample into a distillation cup, place the measuring cover, and let the sample overflow from the small hole at the top of the measuring cover. Wipe off any excess sample. (As shown in Figure 2)。



(Figure 2) Distillation cup

4. Place the steel wool into the distillation sleeve and then put it into the distillation cup. (As shown in Figure 3)



(Figure 3) Distiller assembly

Note: To ensure sealing, some high-temperature lubricating grease or sealing grease should be applied to the thread.

5. Place the distiller into the heating jacket, install the condenser on the outlet pipe of the distiller, and connect the measuring cylinder to the outlet pipe of the condenser with a measuring cylinder bracket. Turn on the switch and start the experiment (usually 15-25 minutes, depending on the oil content in the sample and room temperature).

7. After the experiment is completed, turn off the switch and wait for the evaporated liquid phase to cool to room temperature. Read the total liquid phase VL, volume percentages VO and VW of oil and water (if the oil-water interface is unclear, 1-2 drops of demulsifier can be added).

8. Disassemble and clean all components for the next use.

9. The calculation methods for the two commonly used water-based drilling fluids - freshwater drilling fluid and saltwater drilling fluid - are different.

钻井液油水固相含量计算

Calculation of Solid Phase Content in Drilling Fluid Oil Water

根据蒸馏杯中的样品体积，将油和水的测量体积（mL）转换为体积百分比。

The measured volumes (mL) of oil and water are converted into volume percents based on the volume of whole mud in the retort cup.

$$\text{体积百分比（%）油} = V_O = \frac{100\ (\text{Oil Volume Collected, mL})}{\text{Sample Volume, mL}}$$

Volume Percent (%) Oil

$$\text{Volume Percent (\%) Water} = V_W = \frac{100\ (\text{Water Volume Collected, mL})}{\text{Sample Volume, mL}}$$

体积百分比（%）水

$$\text{Volume Percent (\%) Solids} = V_S = 100 - (V_O + V_W)$$

固体体积百分比（%）

固体体积百分比包括悬浮固体（重量物质等）和溶解物质（例如盐）。只有当泥浆是未经处理的淡水泥浆时，这个体积百分比才会代表总悬浮固体。

The volume percent solids include both suspended solids (weight material, etc.) and dissolved materials (for example salts). This volume percent will represent total suspended solids only if the mud is an untreated, freshwater mud.

为了计算悬浮固体的体积百分比（%）并将其与低重力固体和加重材料的相对体积联系起来，必须知道准确的泥浆重量和氯化物浓度。

To find the volume percent (%) of suspended solids and relate them to the relative volumes of low-gravity solids and weighting materials, an accurate mud weight and Chloride concentration must be known.

$$V_{SS} = V_S - V_W \qquad \frac{\text{氯化物浓度 Chloride Concentration, mg/L}}{1{,}680{,}000 - 1.21\ (C_S)}$$

式中 Where:

V_{SS} = 悬浮固体体积百分比（%）Volume Percent (%) Suspended Solids

C_S =氯化物浓度 Chloride Concentration, mg/L

低重力固体体积百分比（%）Vlg 计算如下：

Volume percent (%) Low-Gravity solids, V_{lg}, are calculated as follows:

$$V_{lg} = \frac{1}{P_b - P_{lg}} [100\ P_f + (P_b - P_f)V_{SS} - 12\ W_m - (P_f - P_0)\ V_0\ ]$$

式中 Where:

V_{lg} = 低重力固体的体积百分比（%）。Wm=泥浆重量，磅/加仑

Volume percent (%) low-gravity solids. Wm = Mud Weight,pounds per gallon

P_f = 滤液密度，克/立方米

Density of filtrate, grams per cubic meter

P_b =加重材料的密度，克/立方米

Density of weighting material, grams per cubic meter

P_{lg} = 低重力固体密度，克/立方米（如果未知，则使用 2.6）

Density of low gravity solids, grams per cubic meter (use 2.6 if unknown)

P_o =油密度，克/立方米（如果未知，请使用 0.84）

Density of oil, grams per cubic meter (use 0.84 if unknown)

重量材料（Vb）的体积百分比（%）计算如下：

Volume percent (%) weighting material (Vb) is calculated as follows:

$V_b = V_{SS} - V_{lg}$

低重力固体、加重材料和悬浮固体的浓度可按以下公式计算：

Concentrations of low gravity solids, weighting material and suspended solids may be calculated as:

$C_{lg} = 3.49\ (P_{lg})\ x\ (V_{lg})$

$C_b = 3.49\ (P_b)\ x\ (V_b)$

$C_{SS} = C_{lg} + C_b$

式中 Where:

C_{lg} = 低重力浓度，磅/桶

Low gravity concentration, pounds per barrel

C_b = 称重材料浓度，磅/桶

Weighting material concentration, pounds per barrel

C_{SS} = 悬浮固体浓度，磅/桶

Suspended solids concentration, pounds per barrel

6、仪器的维护与保养 Maintenance of the instrument

1.清洗各部件并干燥待用，仪器置于干燥环境中。

2.移动或保养仪器时。要轻拿、轻放，以免造成部件变形影响精度和使用。

3. 实验结束后，及时关闭加热。

4. 蒸馏杯和套筒之间的密封面不要损伤以免影响密封。

1. Clean all components and dry them for later use, and place the instrument in a dry environment.

When moving or maintaining instruments. Handle with care to avoid deformation of components that may affect accuracy and usability.

3. After the experiment is completed, turn off the heating in a timely manner.

4. The sealing surface between the distillation cup and the sleeve should not be damaged to avoid affecting the sealing.

7、故障的判定与排除 Troubleshooting procedures

故障 Fault	原因 Reasons	维修方法 Maintenance methods
蒸馏器组件通电不加热 Distiller assemble at power-up state doesn't heat	加热圈坏 Heating ring breakdown	用万用表Ω档测量加热棒两端有无阻值，若无阻值加热圈线烧断，更换加热圈. Use the multimeter to measure the resistance at the two ends of the heating ring. Replace the heating ring if there is no resistance for the burn-out of the heating wire.
	电线插头接触不好. Bad connections at plugs of electric wire.	检查电线接头组件各插头是否牢固插牢. Check whether all wire connections are securely fixed.

注意：

连续加热时间不能超过 1 小时。

Continuous heating time shall not exceed 1 hour.

青岛创梦仪器有限公司 装箱单

Qingdao Chuangmeng Instrument Co., Ltd. Packing list

生产企业：青岛创梦仪器有限公司
Manufacturing enterprise: Qingdao Chuangmeng Instrument Co.,Ltd.
生产地址：青岛市城阳区流亭街道兴海路 3 号
Production address: No. 3 Xinghai Road, Liuting Street, Chengyang District, Qingdao
主机型号:
Model of the main motor:
出厂编号：
Manufacturing No:

序号 No	编号	名称及规格 Name and specification	数量 Qty	备注 Remarks
1		箱体 Box body	1	
2		蒸馏套 Distiller	1	
3		蒸馏杯 10ml Distilling cup 10ml	1	
4		蒸馏杯 20ml Distilling cup 20ml	1	
5		计量盖 Metering lid	1	
6		刮刀 Scraper	1	
7		量筒支架 Measuring cylinder bracket	1	
8		量筒 10ml Measuring cylinder 10ml	1	
9		量筒 20ml Measuring cylinder 20ml	1	
10		电源线 Power cord	1	
11		钢丝绒 Steel wool		
12		高温润滑脂 High temperature grease	1	非常规配件 Unconventional
13		毛刷（大） Brush	1	
14		毛刷（小） Brush	1	
15		使用手册 Operation manual	1	

产品合格证

Product Quality Certificate

出厂编号：
Manufacturing No:

产品名称： Description:	
产品型号： Model:	
检验标准： Standard:	
生产日期： Date of Manufacture:	
产品编号： Product Code:	

结论：Conclusion:

经检验，青岛创梦仪器有限公司生产的产品符合上述标准的要求。准予出厂。
After inspection,Qingdao Chuangmeng Instrument Co., Ltd The products produced meet the requirements of the above standards. Approved for delivery.

本企业通过： ISO014004 环境管理体系认证；
ISO9001:2015 质量管理体系认证；
ISO18000 职业健康安全管理体系认证质检科；

QC Department: