ATO

Hydrothermal Synthesis Reactor
Operating Manual

IMPORTANT

PLEASE READ CAREFULLY BEFORE INSTALLING OR OPERATING THIS EQUIPMENT

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I. Working principle

Hydrothermal synthesis reactor is working under certain temperature and pressure conditions to dissolve the material. Mainly for material which doesn't dissolution, poorly soluble material, or the reaction product of the dissolving substance. By controlling the temperature of the solution errand convection to form a supersaturated state and folding crystal growth. Hydrothermal synthesis reactor is used to the preparation or synthetic compound of nano materials. Also can used to do small synthesis reaction of crystal growth. Hydrothermal synthesis reactor is widely used in college laboratory.

II. Product characteristics

- Beautiful appearance, reasonable structure, simple operation, shorten analysis time, reliable data.
- 304 stainless steel sleeve, using circular tenon groove seal, manual screw strong.
- The inner tank is made of polytetrafluoroethylene (PTFE), its characteristics:

1. high temperature resistance: use temperature-200~+230℃;
2. low temperature resistance :-196℃ can maintain 5;
3. corrosion resistance: strong acid, strong alkali, Wang Shui and various organic solvents;
4. insulation resistance: dielectric properties independent of temperature, frequency;
5. lubrication: the lowest friction coefficient in solid material;
6. non-adhesion: non-adhesion to any substance; strong self-run: coefficient of friction in solid material 0.04
7. non-toxic: physiological inertia, can be implanted in the human body; aging resistance can be used in the atmosphere for a long time
8. pollution prevention: low metal blank value, lead content less than 10-11 g/ml, uranium content less than 10-12 g/ml;
9. leakage prevention: from 1.2 meters above the ground, the bottle body does not break, bottle cap does not fall off, no damage leakage phenomenon.

- After heating up and raising pressure, the samples which are difficult to dissolve under the conventional conditions and the samples containing volatile elements can be dissolved quickly and nondestructive.
- It can replace platinum crucible to solve the problem of sample solution for trace element analysis in high purity alumina. The high pressure digestion tank used in the oven, also known as the sample dissolving device, the pressure dissolving bomb, the polymerization reactor, the digestion tank, the polytetrafluoroethylene high pressure tank, is the right hand to dissolve the sample when determining the trace elements and trace elements. Sample pretreatment digestion of heavy metals, agricultural residues, food, silt, rare earth, aquatic products, organic matter, etc.

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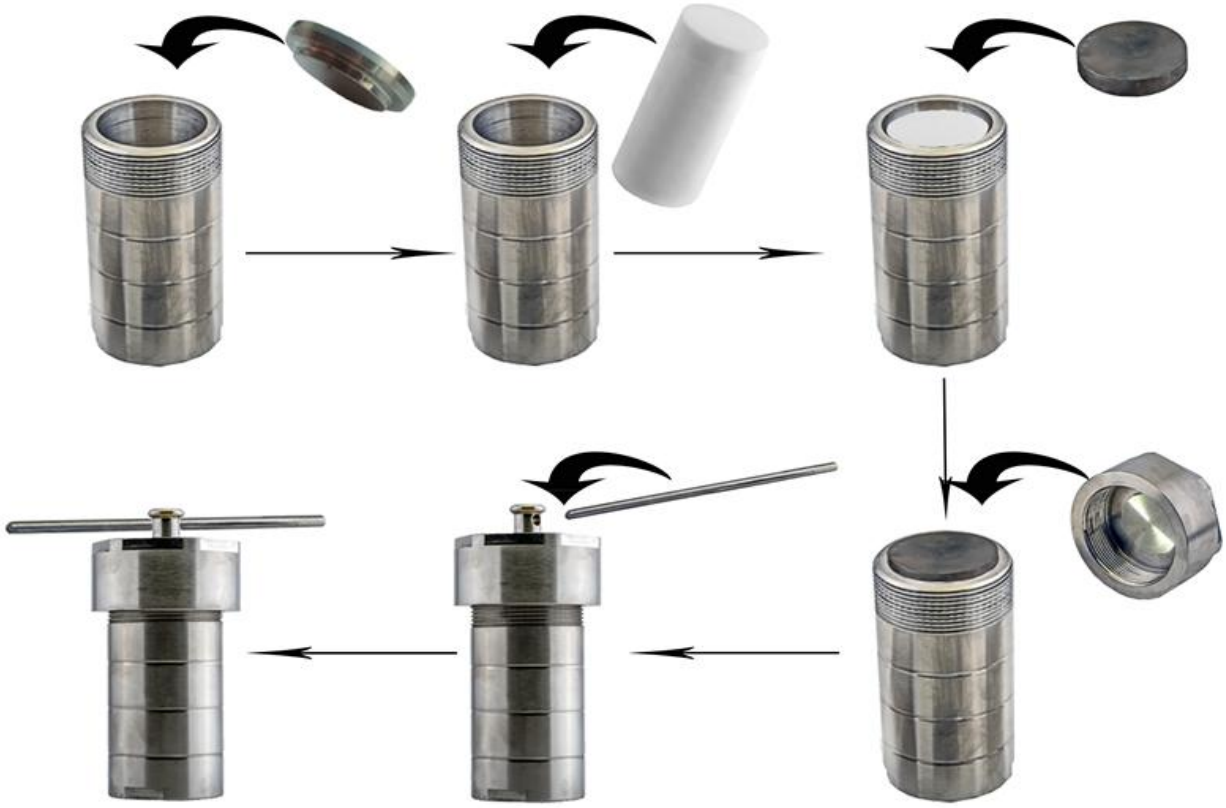
III. Composition

Stainless steel sleeve, kettle lid, Teflon cup (lined), steel bar, stainless steel shims (two).



IV. Main Specification

Specification of Size							
Model	OD of Lid mm	OD of kettle mm	Height of kettle mm	OD if lining mm	Height of lining mm	Inner size of lining mm	NW kg
25ml	57	45	117	33	61.5	23X53	1
50ml	**65**	**53**	**140**	**39.5**	**79**	**30X69**	**1.7**
100ml	75	62	155	48.5	94	40X85	2.5
150ml	92	72	189	55	114	44X105	4.85
200ml	100	82	210	61.5	131	49X115	5.9
250ml	102	82	219	64	144	49X128	6.15
300ml	109	91	226	74	150	56X134	8
400ml	120	104	231	84	151	68X132	8.6
500ml	120	104	243	84	164	69X145	8.7
1000ml	170	146	232	119	150	99X136	17.5

Material：304 Stainless steel Shell and PTFE（Teflon）Lining; The 280℃ PPL lining is optional
Working pressure：≤3Mpa
Working Temp.：≤230℃（Top Temperature）
Solvent addition：It is usually 60% ~ 80%of the inner cup capacity
Heating and Cooling Rate：≤5°C/min
Note：Safe temperature is 200℃, The top pressure is 3MPa
Remark：PPL is a kind of synthetic material added to polytetrafluoroethylene, and its properties are better than those of polytetrafluoroethylene alone. PPL can be used continuously at 260 ℃, with the highest operating temperature 280 ℃-300 ℃, very low friction coefficient, good wear resistance and excellent chemical stability.

V. Specific operation

1. Before use: tetrafluorine inner cup needs to be soaked in acid (due to experimental requirements) for a period of time, can clean the surface of the tetrafluorine inner cup attachment; check.
2. In use: the solvent and sample are added to the teflon inner cup and the feeding coefficient is less than 80. Cover and press (even if pressed, the tetrafluorine lid and the tetrafluorine cup body interface still have about 1 mm sealing gap), then put the tetrafluorine inner cup in the stainless steel sleeve (the steel pad inside the steel sleeve is small face down), two steel pads cover, tighten the kettle cover, generally do not need to use steel rod to help tighten, ordinary gay hand twist strength is enough; put the reactant and tighten the water and heat kettle in the oven to heat, when the temperature reaches 100℃, maintain an hour, then heat up to the required temperature, maintain two hours, heating temperature can not exceed 200℃;

Note: according to the technical specifications of different samples, determine different heating temperature and heating methods.

3. After use: after the reaction, do not immediately unscrew the hydrothermal kettle, to confirm that the temperature in the kettle is lower than the boiling point of the solvent in the reactor system, first release the kettle cover knob with a steel rod, and then open the kettle cover. After cooling, the outer tank can be opened easily. If it can not be opened, open with steel rod. At the end of the experiment, clean it in time to avoid corrosion. Special attention should be paid to cleaning the seal of the kettle body and the cover line, and to prevent its bruising and damage.
4. Precautions:

1) When use, strictly require temperature not to exceed the maximum use temperature of 200℃, working pressure ≤3 Mpa(gauge pressure).

Note: No overpressure, the actual reaction material pressure can not exceed 3

MPA, the pressure in the material this requires different customers according to their own experiments used different materials, accurate calculation of how much temperature when the pressure, Must accurately calculate the pressure within the normal allowable range, can experiment, otherwise the consequence is at your own risk.

2) The amount of solvent added to the reaction depends on different tests, generally 60%~80% of the inner cup capacity. If the reactant produces a large amount of gas, it is recommended to cool overnight and use perchloric acid. Hydrogen peroxide and so on should pay special attention!

3) Oven quality is good, the actual temperature control inside the oven should reach ±2℃, considering that some old oven temperature will have 20℃ overshoot, more obvious at high temperature.

4) The oven begins to heat up, there must be no personnel in the room to prevent explosion injury! After cooling to room temperature before entering, the tank needs necessary safety protection measures, such as: facial protection, hand protection, respiratory protection and so on.

VI. After-Sale Service

The company provides free repairs for any product with failures due to manufacturing quality within 12 months after the date of delivery on the premise of normal operation by users. Reasonable repair cost will be charged for the damage caused by improper use.