

KNF-  
FUEL-03

# AUH Reconversion

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**AUH Recconversion is a wet reconversion technology developed and designed by KNF which can produce  $UO_2$  powder from  $UF_6$  or Uranyl Nitrate solution.**

※ **AUH : Ammonium Uranate Hydrate [ $6UO_3 \cdot NH_3 \cdot 32H_2O$ ], an intermediate in wet reconversion process developed by KNF**

- To develop and possess KNF's unique reconversion process with economic feasibility and quality stability
- To build an advanced wet reconversion process which is indispensable to uranium recovery process

## ● Process Constitution

- AUH reconversion process consists of 4 unit processes : Vapor hydrolysis, Crystallization, L/S separation, Fluosolids reduction
  - Vapor hydrolysis : Making  $UO_2F_2$  solution by vaporization and hydrolysis of  $UF_6$
  - Crystallization : Making AUH slurry by adding reactant gases into  $UO_2F_2$  or UN solution
    - ※ UN solution is from Uranium purification process.
  - L/S separation : Making AUH powder by filtration and drying of AUH slurry

## Description

### ● Purpose

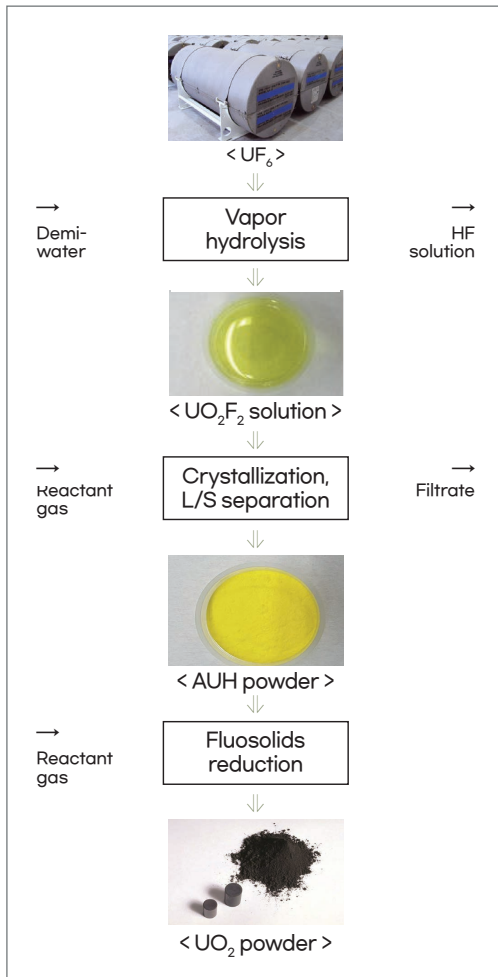
- To produce  $UO_2$  powder from  $UF_6$  or UN solution

### ● Necessity

- To improve the wet reconversion process technology

### ● Principle

- **Hydrolysis** :  $UF_6$  vapor reacts with water and produces  $UO_2F_2$  solution.  
 $UF_6(g) + 2H_2O(l) \rightarrow UO_2F_2(aq) + 4HF(g)$
- **Crystallization** :  $UO_2F_2$  solution or UN solution reacts with reactant gases and produces AUH slurry.  
(UN solution is from Uranium purification process.)
- **Fluosolids reduction** : Calcination and reduction of dried AUH powder to  $UO_2$  powder  
 ※ AUH : Ammonium Uranate Hydrate [ $6UO_3 \cdot NH_3 \cdot 32H_2O$ ], precursor of  $UO_2$  in the wet reconversion process developed by KNF



- Fluosolids reduction : Production of UO<sub>2</sub> powder by calcination and reduction of AUH powder

### Distinctiveness

#### ● Characteristics

- Major unit processes and devices

independently developed by KNF, Upgraded wet reconversion process that has proven to perform better

- Comparison with the existing wet reconversion processes
- Performance : Suitable to sintered UO<sub>2</sub> powder production
  - The test pellet made of UO<sub>2</sub> powder produced in this process satisfies the specification of the LWR UO<sub>2</sub> pellet.
  - No harmful discharge : less than 1 ppm of U content in the filtrate

#### ● Benefits

- Cost reduction in purchasing new uranium by utilizing/recycling uranium scrap
- Transfer of plant technology

### Experience

- Commercial plant construction in progress : Max. capacity 80 ton. U/yr

### Deliverables

- Product : UO<sub>2</sub> powder
- Overseas AUH reconversion plant EPC
- Technical services
  - Reconversion
  - Uranium recovery from wastes containing uranium [with Uranium purification process]
  - Wet reconversion process design and engineering

### Technology Readiness Level (TRL)

Actual system completed through demon.

### Business Model

Technology Transfer

Licensing

Joint Search

Service Execution

Others

		AUH	AUC	ADU
Quality Feature	Particle size	≥ 10 μm	30 μm	0.1 ~ 0.2 μm
	BET	7 m <sup>2</sup> /g	6 m <sup>2</sup> /g	2.5 ~ 4.5 m <sup>2</sup> /g
	Sintered density	95 %TD	95 %TD	96 %TD
Process Feature Unit	Unit:process	Simple : 5 unit processes	Complicated : 8 unit processes	Complicated : 8 unit processes
	Plant scale	Small : 1/2 of others	Large	Large
	Reactants	2 chemicals	6 chemicals	4 chemicals
	Radioact. waste	Nearly zero	Large amount	Large amount
	Powder handling	Easy	Easy	Difficult
	Process control	Simple	Complicated	Complicated
Others	Application	PWR/PHWR	PWR/PHWR	PHWR