



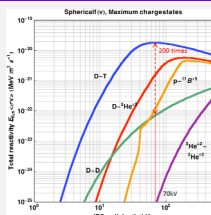
# Gas supply/exhausting system with getter pump for D-T Burning in IECF-†

Hiroki Konda, Yasushi Yamamoto, Masami Onishi, Hodaka Osawa,  
Keiji Miyamoto, Masaaki Onishi, Hiroki Konda, Takahiro Kato,  
Kai Masuda, Yuji Hatano, and Isao Murata

Kansai University, Kyoto University, Toyama University, Osaka University  
k674451@kansai-u.ac.jp

## Background of the research

- Increase of the neutron production rate in IECF
- the reaction cross-section of D-T is **200 times** as large as that of D-D (at about 70kV)

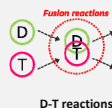


Trying to Use D-T fusion reaction in IECF

### Purpose of research

- transport / recovery of tritium
- experiments by sealed vacuum chamber

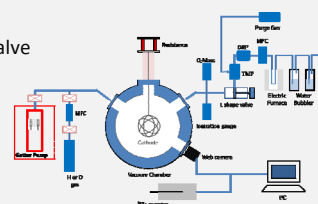
➡ Use of Getter Pump



## IEC entire device view

While using **getter pump**,  
closing cylinder valve and the L-shape valve  
to **seal** the vacuum chamber

After recovering the gas in the chamber  
by using the getter pump  
to recover the remaining gas  
by using the bubbler system



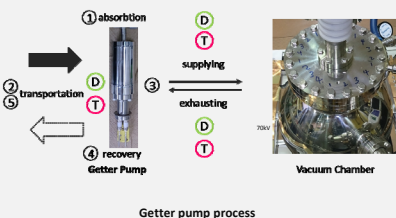
IEC entire device schematic view

- ▣ Vacuum chamber  
radius is 25 cm  
entire is about 10 l

## Getter Pump | Process

### Process

1. absorbing the mixed gases  
( $40 \text{ Pa} \cdot \text{s} = 1.75 \times 10^{-5} \text{ mol}$ )
2. bring getter pump  
absorbed the mixed gas and  
attach to the vacuum chamber
3. control of gas pressure  
in the vacuum chamber  
by current operation
4. recovery 99% gas of the total
5. carry to the treatment plants

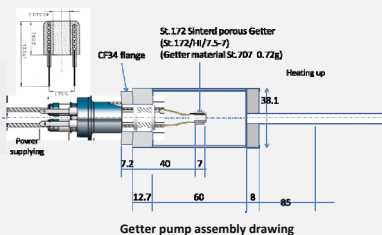


Getter pump process

## Getter Pump | Operation

### Operation

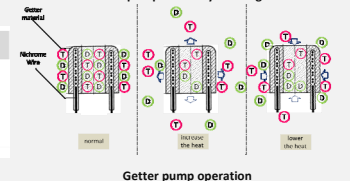
Controlling the **temperature**  
(heating current)  
of the getter material



Getter pump assembly drawing

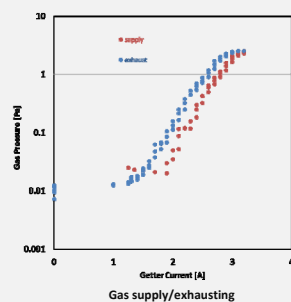
### Temperature Getter operation

Normal most absorbing gases  
Increase **supplying** gases  
Lower **exhausting** gases

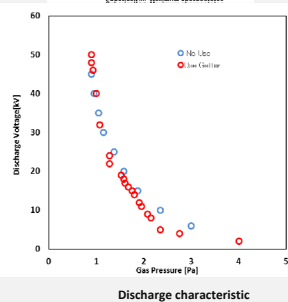


Getter pump operation

## Preliminary Experiments



Gas supply/exhausting



Discharge characteristic

### Experimental result (using deuterium)

- **control of gas pressure** are successful
- **recovery 99% gas** of the total
- Discharge characteristics are **both the same**



There is probably usefulness in characteristics  
**only hydrogen gas** of one type

## Partial Pressure Property

preliminary experiments were performed by absorbing the getter pump  
at the rate of **larger quantity of hydrogen than lesser quantity of Deuterium**

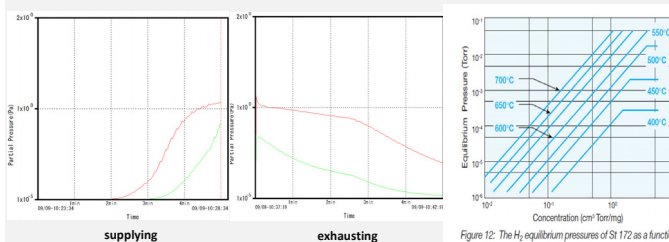


Figure 12: The  $H_2$  equilibrium pressures of St 172 as a function of the  $H_2$  concentration in the gettering material at different working temperatures.

### Experimental result

D is **easily exhausted** and **difficult to supplied**,  
against a ratio that was absorbing actually



### Challenges for the future

Supply/exhausting characteristics of the each  
gas for the absorbing ratio