



# PHENIX Procedure for Regeneration of TEC-TRD Gas System Purifiers with Argon + 5% Hydrogen Mixture

---

## PHENIX Procedure No. PP-2.5.2.6-05

Revision: A

Date: 11-29-04

### Hand Processed Changes

| <u>HPC No.</u> | <u>Date</u> | <u>Page Nos.</u> | <u>Initials</u> |
|----------------|-------------|------------------|-----------------|
| _____          | _____       | _____            | _____           |
| _____          | _____       | _____            | _____           |
| _____          | _____       | _____            | _____           |

### Approvals

\_\_\_\_\_  
PHENIX S E & I    Date

\_\_\_\_\_  
Cognizant Scientist/Engineer Date  
/Activity Manager

\_\_\_\_\_  
PHENIX Safety    Date

\_\_\_\_\_  
CA-D Safety Date

\_\_\_\_\_

\_\_\_\_\_

REVISION CONTROL SHEET

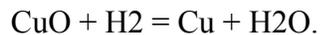
| LETTER | DESCRIPTION | DATE       | WRITTEN BY | APPROVED BY                                | TYPED BY  |
|--------|-------------|------------|------------|--|-----------|
| A      | First Issue | 11/29/2004 | R. Pisani  | D. Lynch, R. Pisani, P. Gianotti, A. Atkin | R. Pisani |
|        |             |            |            |  |           |
|        |             |            |            |  |           |

## **1.0 Purpose and Scope**

The goal of this procedure is to instruct authorized PHENIX personnel in the correct procedure for the regeneration of TEC-TRD Gas System Purifiers with Argon + 5%Hydrogen Mixture.

This procedure contains the steps necessary to start Purifier regeneration during Normal Operation of TEC-TRD Gas System which recirculates Xe + 50%He + 10% CH<sub>4</sub> Mixture through one of the Purifier and TRDs. In this operation Ar + 5%H<sub>2</sub> mixture is routed from the cylinder located on the gas pad through one of the purifier and vented outside the Mixing house. The mixture flow will be less than 200 cubic centimeters per minute (CCM). There are two Purifiers. One is in operation while the second one should be regenerated. Each purifier consists of two sections. One section is filled with activated copper and the second one with Ni/Cr Catalyzer. Both purifiers are supported at a temperature of 220C during normal operation mode and regeneration.

The primary purpose of this procedure is to recover the activated copper from copper Oxide in accord with the chemical reaction



## **2.0 Prerequisites**

2.1 Required training and authorization to operate the gas system in the manner described in 1 above:

2.1.1 BNL General Employee Training (GET)(V001)

2.1.2 BNL Compressed gas safety course (OSH026)

2.1.3 AD-CA Collider User Training

2.1.4 TEC/TRD gas system authorization is required (List is posted in Phenix Mixing House).

2.2 Confirm that the gas supply line is intact from the cylinder to the purifier block.

2.3 Confirm that the gas vent line is intact and not blocked from the water reservoir.

## **3.0 Precautions**

3.1 Primary care should be given to adjusting the Ar +5%H<sub>2</sub> mixture pressure on the cylinder pressure regulator PCV0 outlet (see attached gas scheme). Pressure should not exceed 25 PSI.

## **4.0 Procedure --generation with Ar + 5%H2 Mixture Flow**

Purifiers block temperature is 220°C.

**Caution:** Check which Purifier is in operation (I or II).

If purifier I is in use —MV6 should point to I and MV8 should be open and MV7 should be closed.

If purifier II is in use ---MV6 should point to II and MV7 should be open and MV8 should be closed.

MV6a, MV6b, MV6c, MV7a, and MV8a should be closed when the system is not being regenerated.

**Note:** During running, the O<sub>2</sub> content of the system can be monitored with the TEC O<sub>2</sub> sensor. If the O<sub>2</sub> content in the system starts to rise steadily, it is time to switch to the other purifier and regenerate the one which is being used.

Consider the case when purifier I is in operation.

### **4.2 If purifier II needs to be regenerated**

4.1.1 Confirm that FI0 valve is closed.

4.1.2 Adjust PCV0 output pressure to 5PSIG (read from PI ArH<sub>2</sub> in mixing house).

4.1.3. Confirm that the Vent line valve MV6d is open.

4.1.4 Open valve MVArH<sub>2</sub>

4.1.5 Open MV6b shut off valve.

4.1.6 Open MV7a shut off valve.

4.1.7 Adjust FI0 flow to 150CCM.

4.1.8 Regenerate for 10 days.

4.1.9 During regeneration check water level daily in the water reservoir and empty if needed

4.1.9 After regeneration close FI0 valve

4.1.11 Close MV7a, MV6b and MV6d.

4.1.12 Close valve MVArH<sub>2</sub> that feeds the Ar + 5%H<sub>2</sub> mixture to the purifiers.

4.1.13 Drain the water from the water reservoir using MV6c valve.

4.1.14 Do not turn MV6 to purifier II for 24 hrs to deplete H<sub>2</sub> in it.

### **4.2 If purifier I needs to be regenerated**

4.2.1 Confirm that FI0 valve is closed.

4.2.2 Adjust PCV0 output pressure to 5PSIG (read from PI ArH<sub>2</sub> in mixing house).

4.2.3. Confirm that the Vent line valve MV6d is open.

4.2.4 Open valve MVArH<sub>2</sub>

4.2.5 Open MV6a shut off valve.

4.2.6 Open MV8a shut off valve.

- 4.2.7 Adjust FI0 flow to 150CCM.  
 4.2.8 Regenerate 10 days.  
 4.2.9 During regeneration check water level daily in the water reservoir and empty if needed  
 4.2.10 After regeneration close FI0 valve  
 4.2.11 Close MV8a, MV6a and MV6d  
 4.2.12 Close valve MVArH2 that feeds the Ar + 5%H2 mixture to the purifiers.  
 4.2.13 Drain the water from the water reservoir using MV6c valve.  
 4.2.14 Do not turn MV6 to purifier I for 24 hrs to deplete H2 in it.

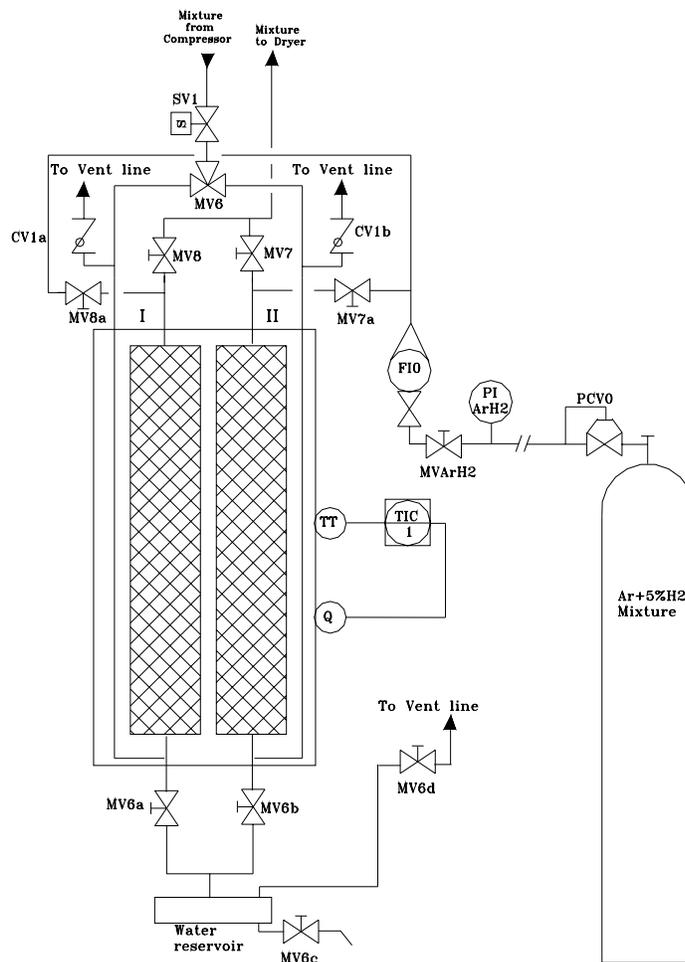


Fig.1. Purifiers block gas scheme