Gas-Loading Capabilities at the NIST Center for Neutron Research

J. B. Leão, D. Dender, C. M. Brown

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Gas Loading

$0.3K \leq T \leq 4.0K$

$4.0K \leq T \leq 800K$

Computer Controlled Sieverts Apparatus

- Pressure Vessels up to 10kbar
- Summary
- Questions
0.3K ≤ T ≤ 4.0K

OC Dilution Insert:
- 50 mK base Temp
- 70 mm x Ø35 mm smpl spc
- 2 - 0.8mm capillary lines

Cu Sample Can:
- V = 5.5 cm³ or 20 cm³
- 500bar rating (SF2)
4.0K \leq T \leq 800K

TLCCCR:

55 \text{ mm bore allows for handling air sensitive and cryogenic samples as well as 10T magnet insert}
Sample sticks with temperature controlled heated gas line provide up to 25 watts @ 24V along the entire length

Pressure rating (SF2):
- Al - 1kbar
- Va - 200bar
Computer Controlled Sieverts Apparatus

Four different pressure gauges for accurate reading:
- 0 - 2 bar
- 0 - 7 bar
- 0 - 35 bar
- 0 - 200 bar

\[ P \leq 100 \text{bar} \]

\[ 4.0K \leq T \leq 1500K \]

\[ V_d \sim 10 \text{ cm}^3 \]
Computer Controlled Sieverts Apparatus

Safety Features:

If pressure exceed max. limit
Cylinder valve closes
Gauge valves close
Sample valve opens
$V_d$ is evacuated
Computer Controlled Sieverts Apparatus

RS232 communication
Python GUI works both in Linux and “Bill”
Supports scripting for remote experiments
Excess Adsorption Isotherm (SWNH)

Excess Adsorption Isotherm (Pt SWNH)
Pressure Vessels

Al 7075-T6 construction
P ≤ 6kbar (SF1.5)
W = 4.5:1
1.5K ≤ T ≤ 300K
V_s = 1.6 cm³
T_{2θ_{av}} = 65% at 2Å

13-8Mo construction
P ≤ 10kbar (SF1.5)
W = 3:1
1.5K ≤ T ≤ 300K
V_{s eff} = 1.6 cm³
T_{2θ_{av}} = 25% at 2Å
Proposed NCNR Expansion

- Instruments Benefited
Gas Loading

- Span $0.3K \leq T \leq 800K$ thru OC Dilution Insert and TLCCR
- Air sensitive and cryogenic samples capability
- Automated Sieverts apparatus

Hydrostatic Pressures up to 10kbar
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