Support Information

Calcium manganese (IV) oxides: Biomimetic and Efficient catalysts for Water Oxidation

Mohammad Mahdi Najafpour[1,2*], Babak Pashaei[1] and Sara Nayeri[1]

[1]Department of Chemistry, Institute for Advanced Studies in Basic Sciences (IASBS), Zanjan, 45137-66731, Iran

[2] Center of Climate Change and Global Warming, Institute for Advanced Studies in Basic Sciences (IASBS), Zanjan, 45137-66731, Iran

Corresponding author; Phone: (+98) 241 415 3201; E-mail: mmnajafpour@iasbs.ac.ir

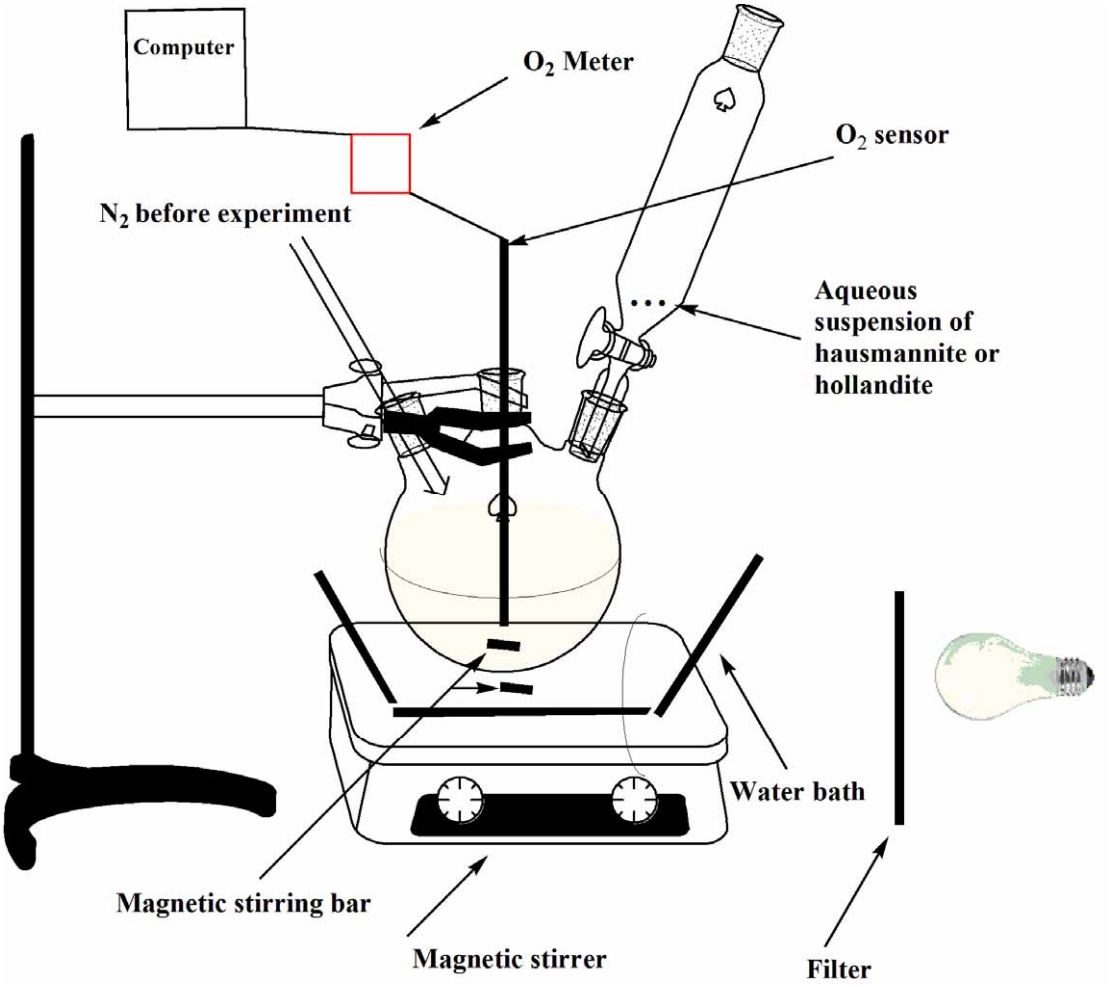


Fig. S1. The reactor set-up for oxygen evolution experiment from aqueous solution in the presence of tris(2,2'-bipyridyl)ruthenium(II) chloride, chloro pentaammine cobalt(III) chloride, in acetate buffer and manganese calcium oxides in the presence of light ($\lambda > 400$ nm).

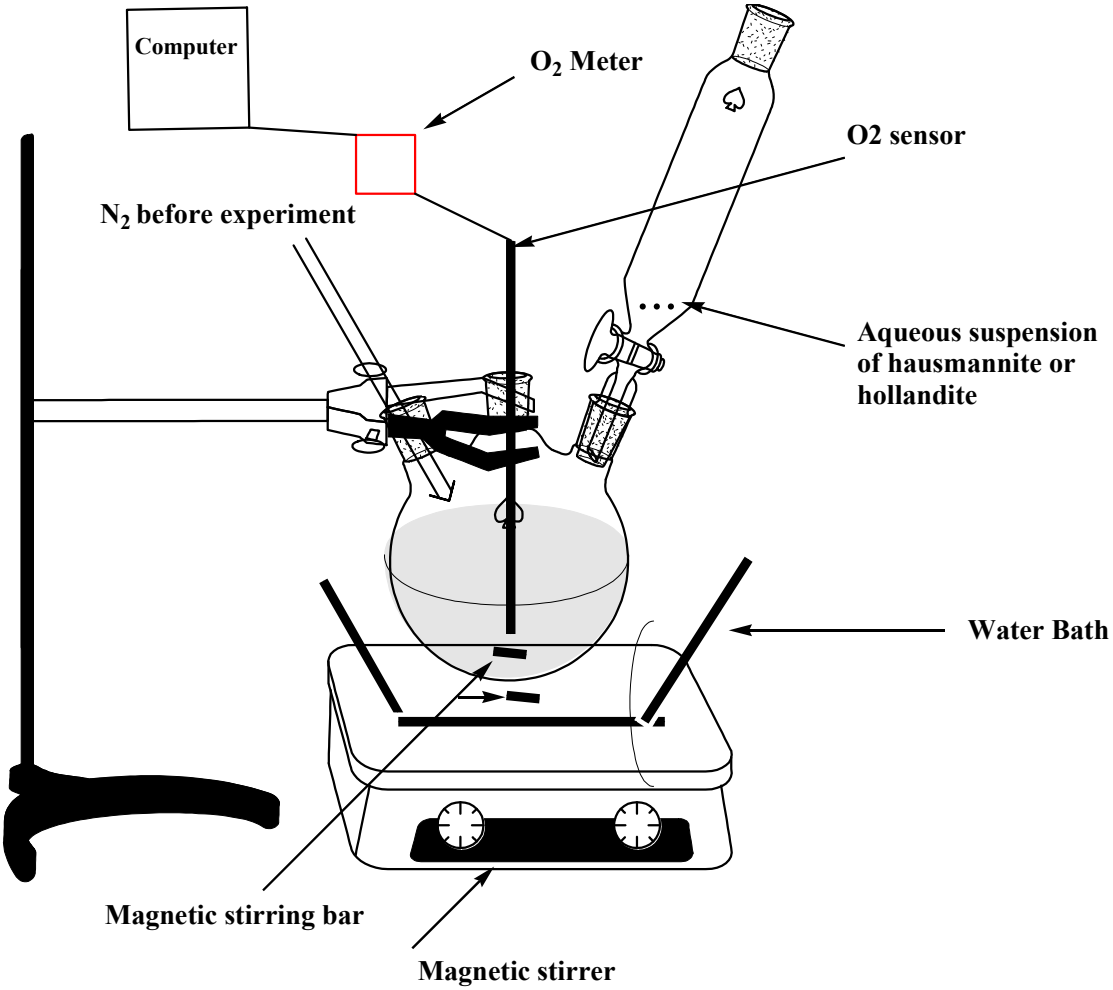
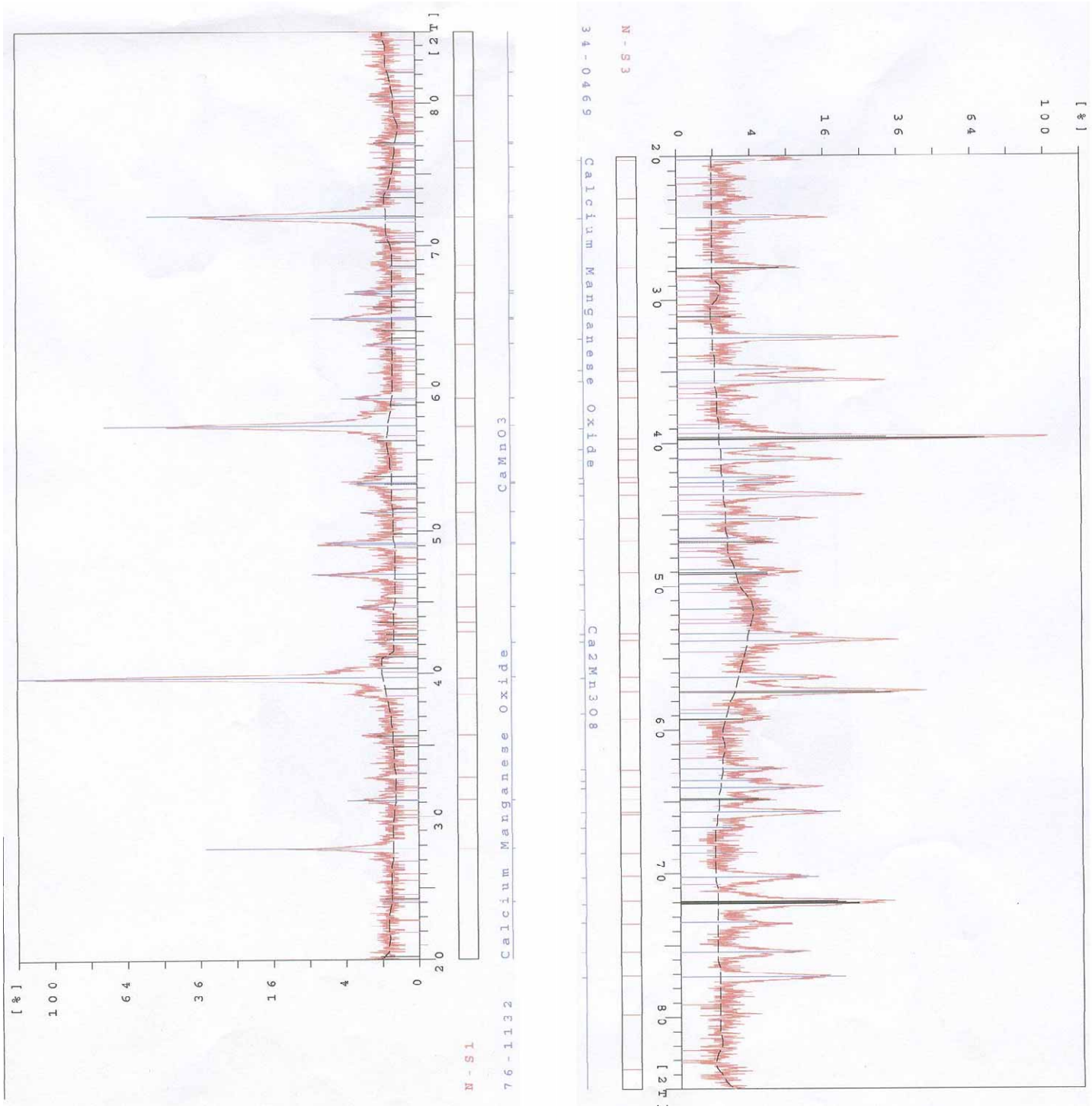


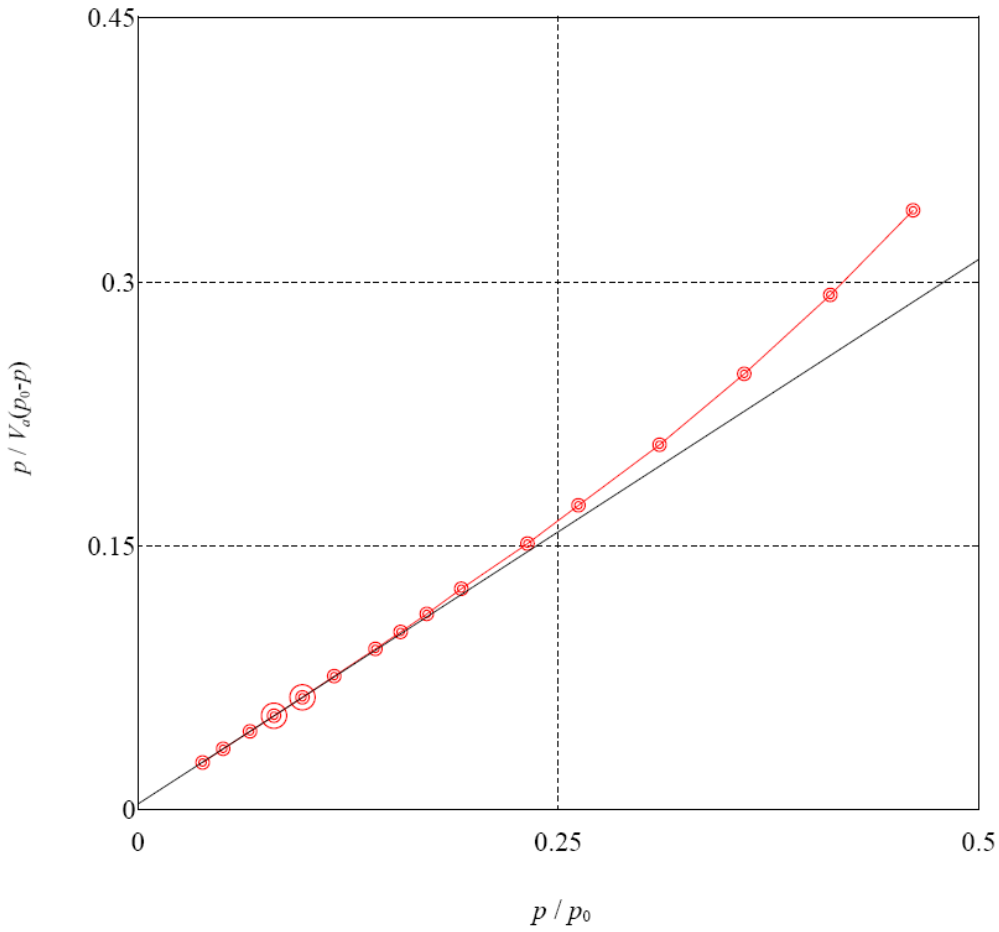
Fig. S2. The reactor set-up for oxygen evolution experiment from aqueous solution in the presence of $(NH_4)_2Ce(NO_3)_6$ (Ce(IV)) and manganese calcium oxides.



(a) (b)

Fig. S3. XRD patterns of the obtained $CaMnO_3$ (a) $Ca2Mn_3O_8$ (b).

BET Experiments for Mn_2O_3



BET-Plot

Adsorbate N2

Adsorption temperature 77 [K]

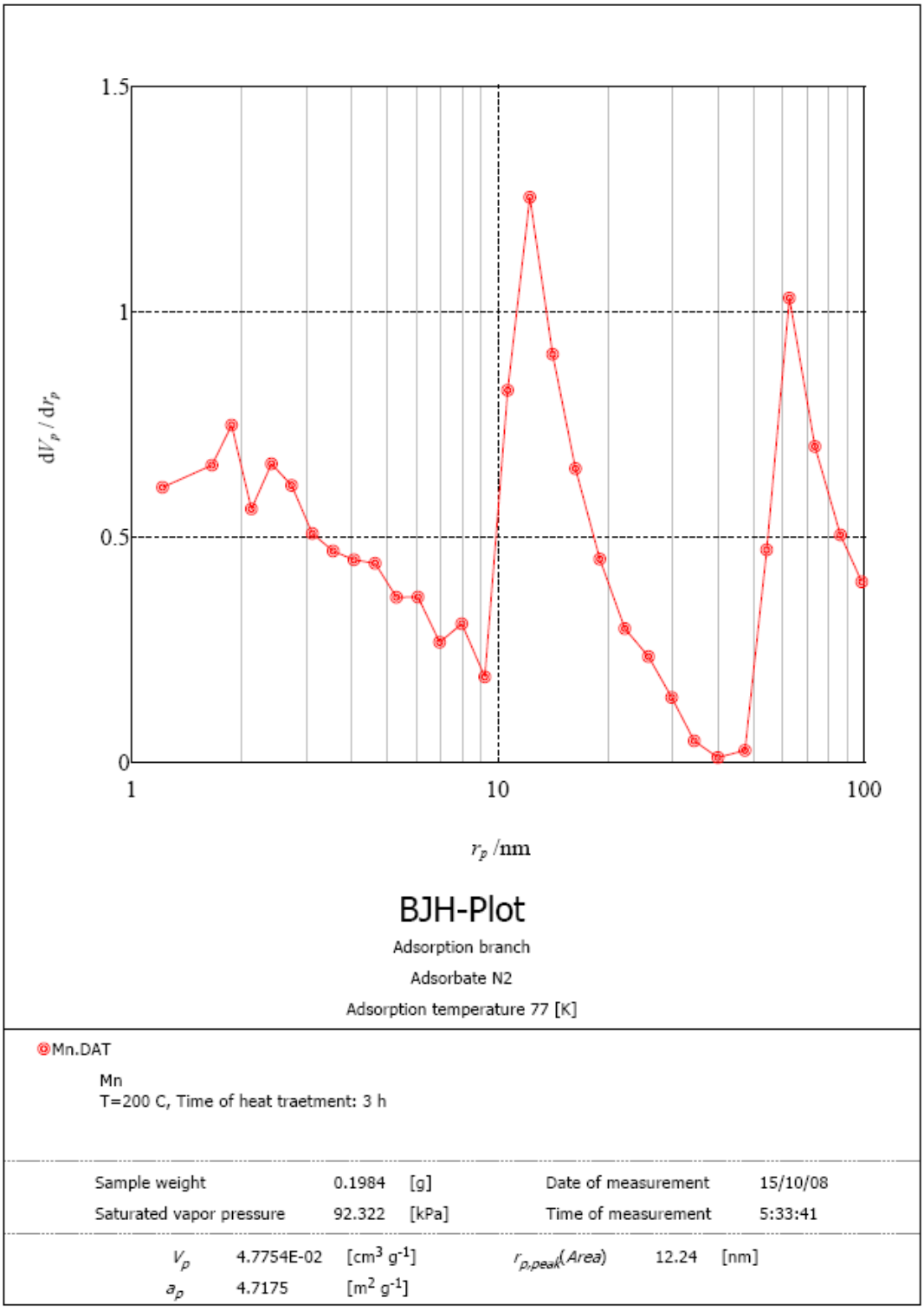
◎Mn.DAT

Mn
T=200 C, Time of heat traetment: 3 h

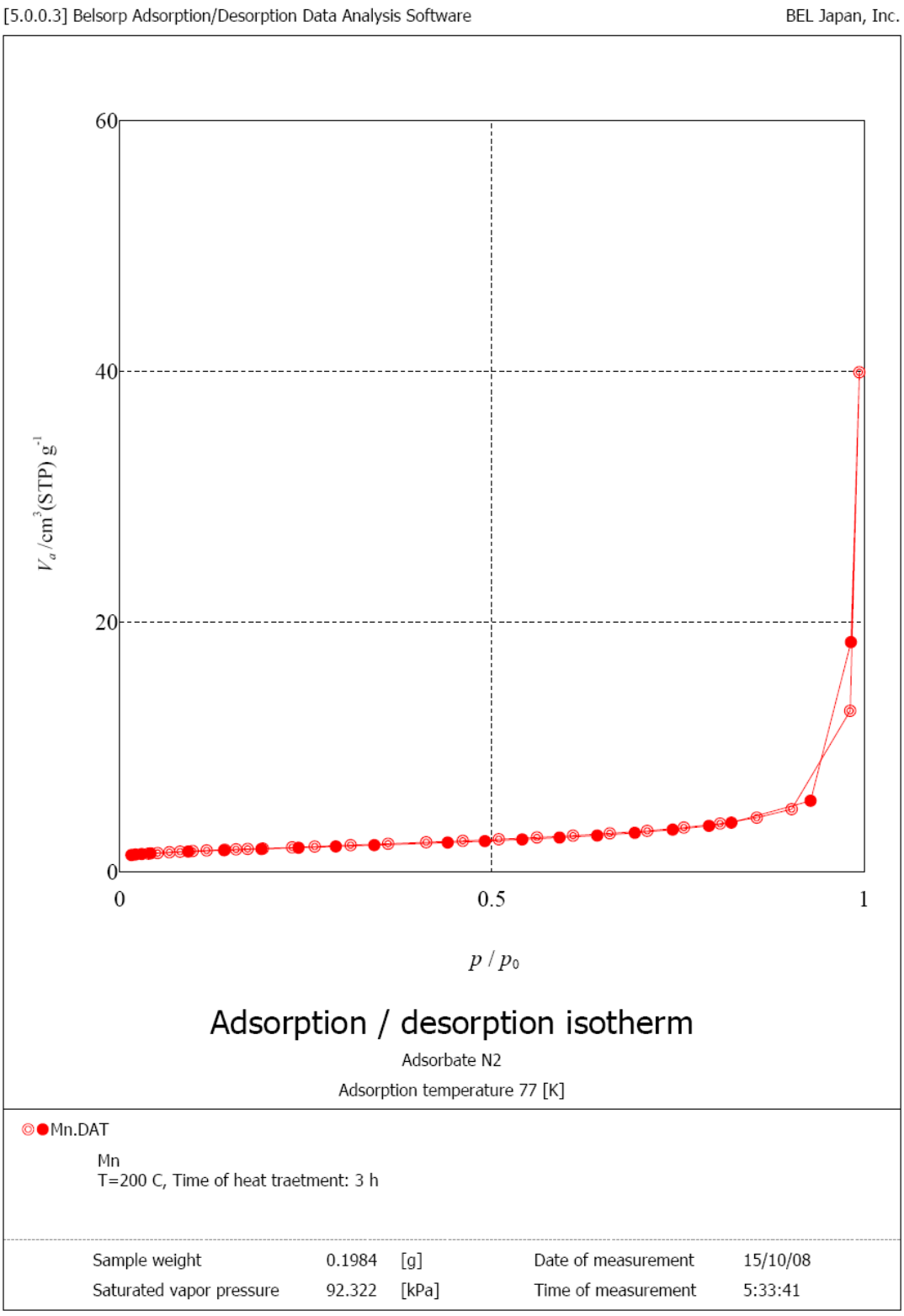
Sample weight	0.1984	[g]	Date of measurement	15/10/08	
Saturated vapor pressure	92.322	[kPa]	Time of measurement	5:33:41	

V_m	1.6067	[cm^3(STP) g^{-1}]	$a_{s,BET}$	6.9931E+00	[m^2 g^{-1}]
C	179.70		Total pore volume (p/p_0=0.990)	4.9217E-02	[cm^3 g^{-1}]
Mean pore diameter	28.152	[nm]			

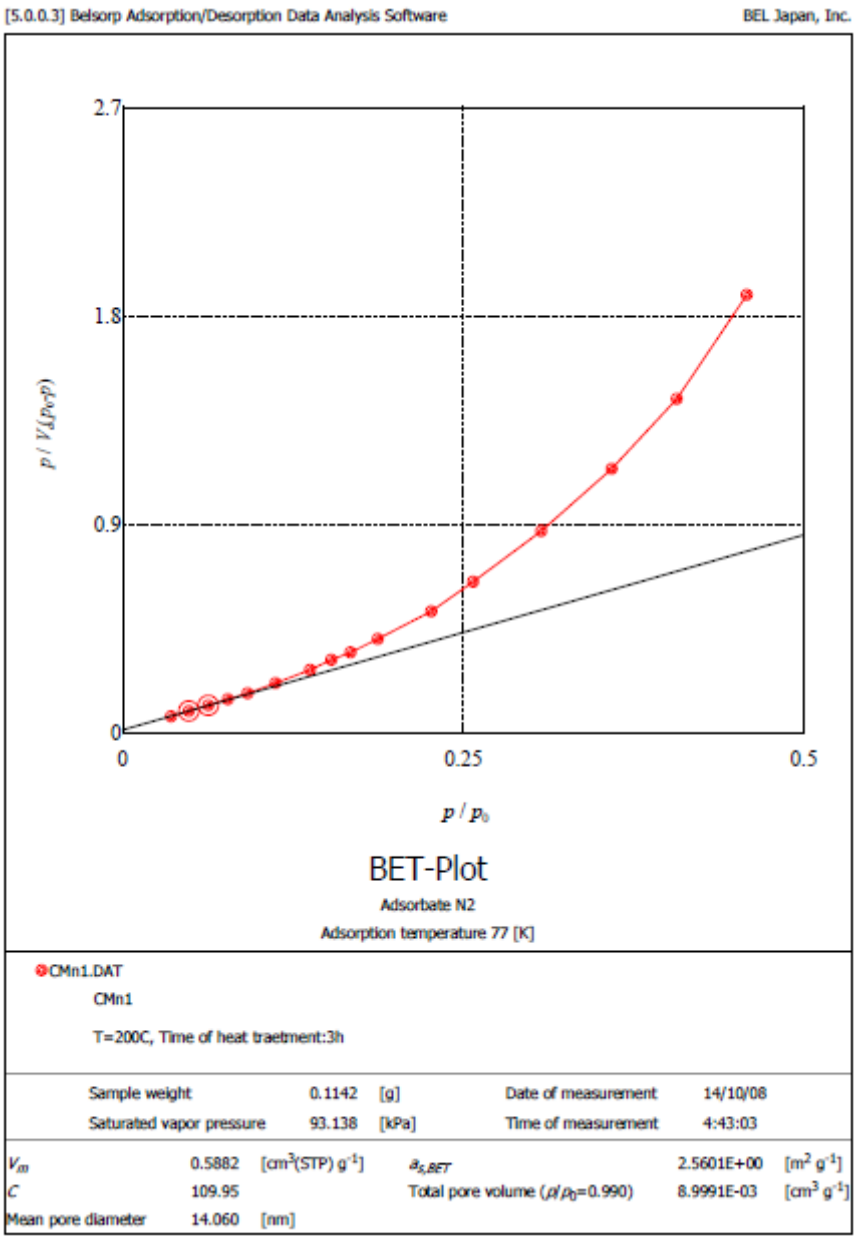
BJH Experiments for Mn_2O_3



Adsorption / desorption isotherm for Mn_2O_3

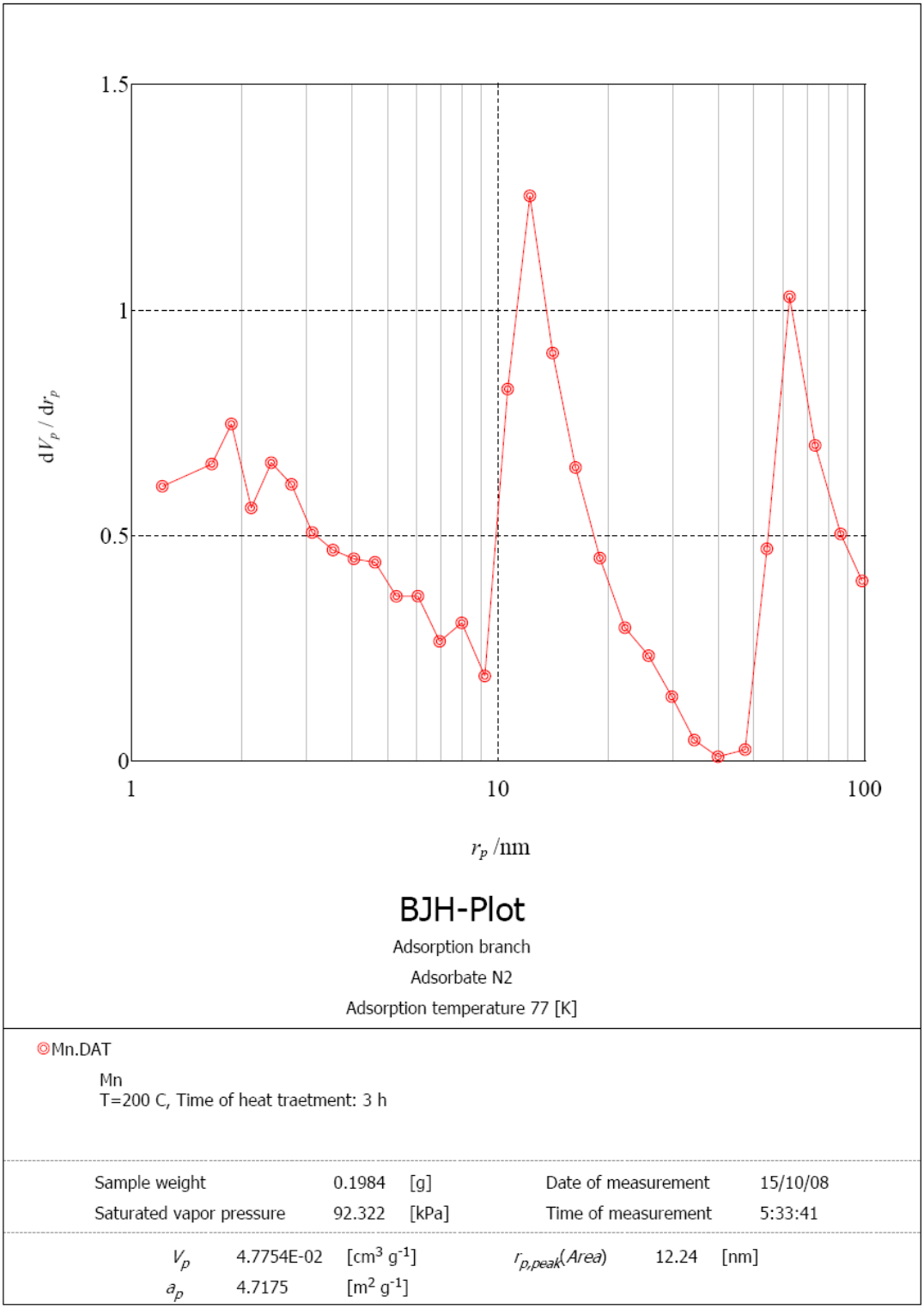


BET Experiments for $CaMnO_3$

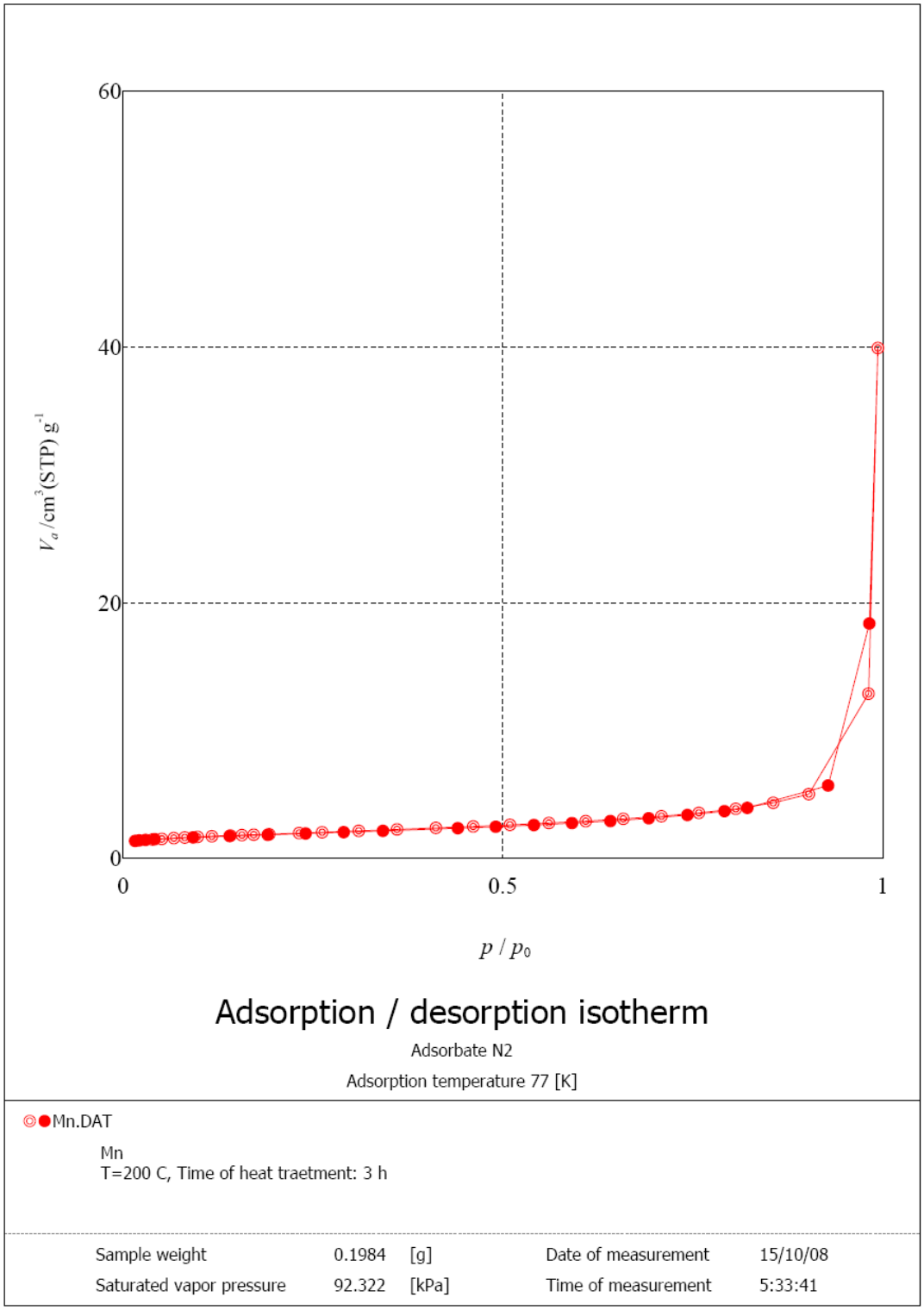


BJH Experiments for $CaMnO_3$

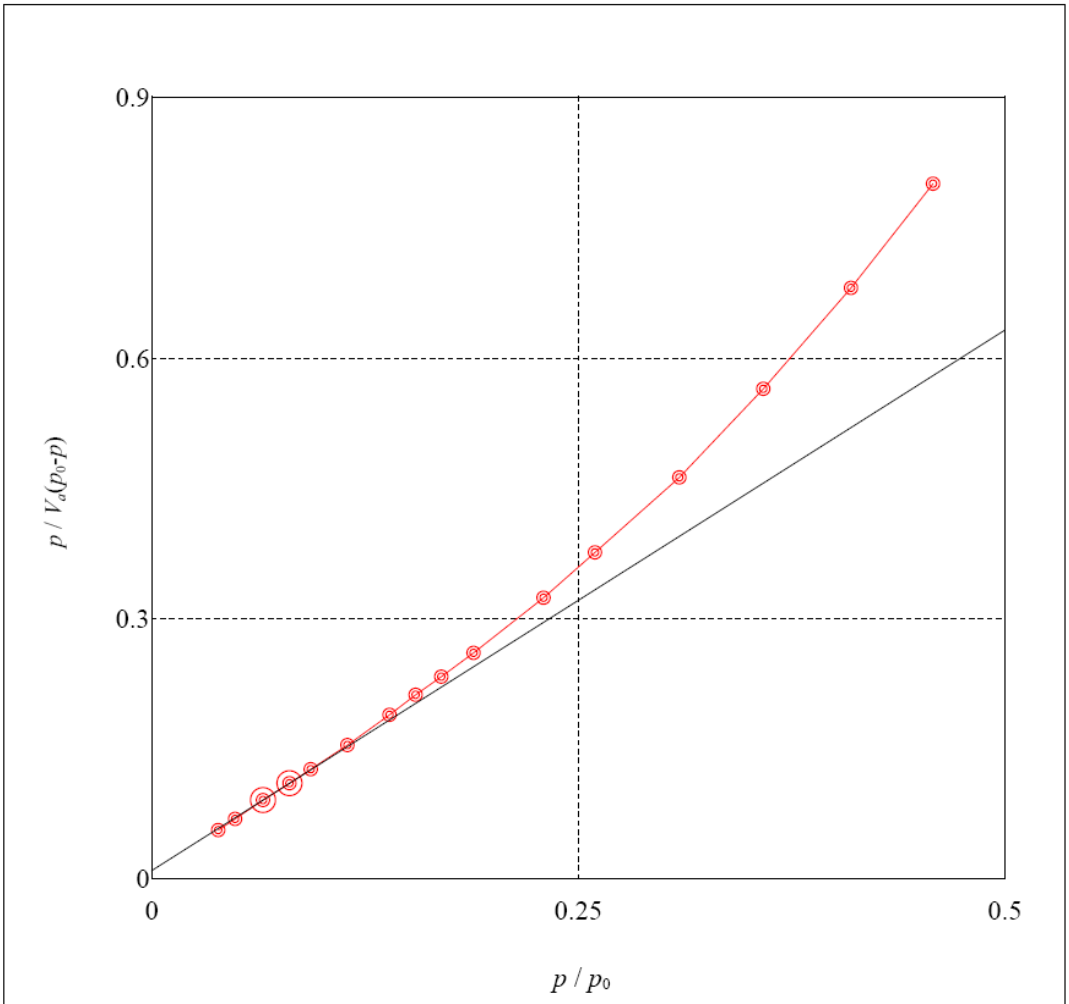
[5.0.0.3] Belsorp Adsorption/Desorption Data Analysis Software BEL Japan, Inc.



Adsorption / desorption isotherm for $CaMnO_3$



BET Experiments for $CaMn_3O_8$



◎CaMn.DAT

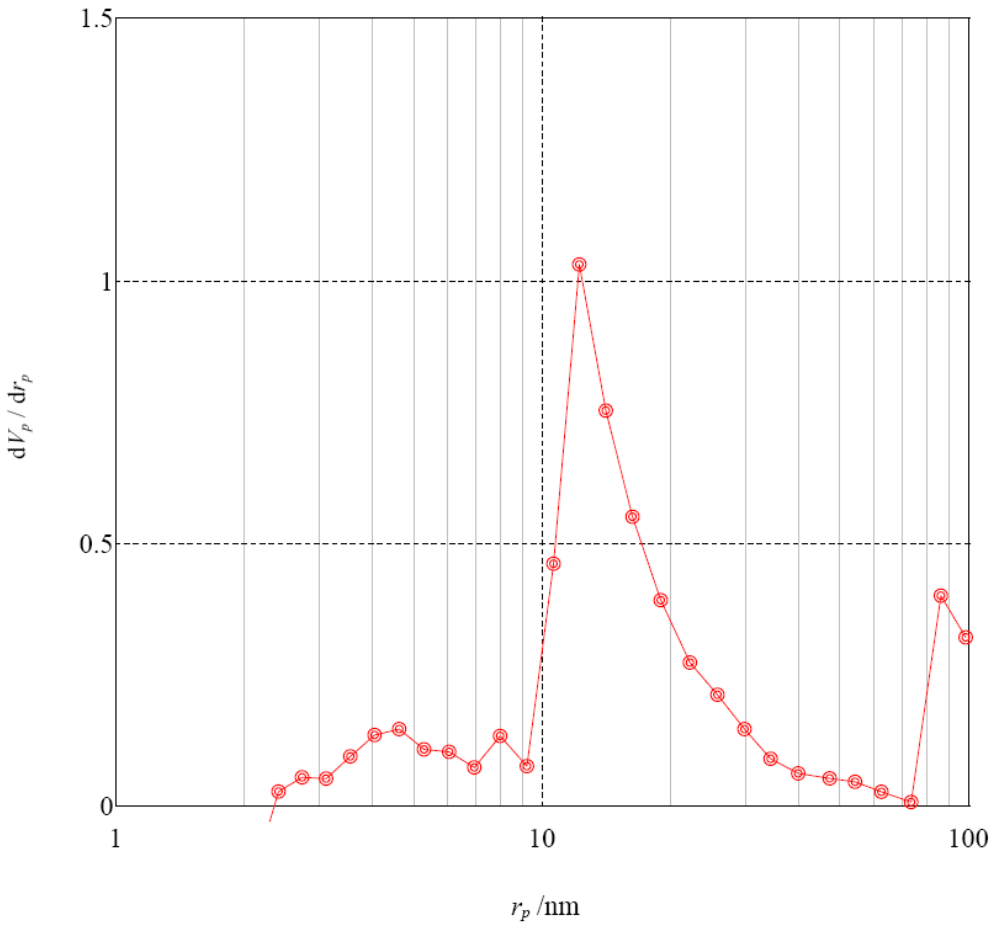
CaMn

T=200C, Time of heat traetment:3h

Sample weight	0.1428	[g]	Date of measurement	15/10/08	
Saturated vapor pressure	92.315	[kPa]	Time of measurement	5:17:34	

V_m	0.7967	[cm^3(STP) g^{-1}]	$a_{s,BET}$	3.4676E+00	[m^2 g^{-1}]
C	124.84		Total pore volume (p/p_0=0.990)	2.1517E-02	[cm^3 g^{-1}]
Mean pore diameter	24.821	[nm]			

BJH Experiments for $CaMn_3O_8$



BJH-Plot

Adsorption branch

Adsorbate N2

Adsorption temperature 77 [K]

◎CaMn.DAT

CaMn

T=200C, Time of heat traetment:3h

Sample weight	0.1428	[g]	Date of measurement	15/10/08	
Saturated vapor pressure	92.315	[kPa]	Time of measurement	5:17:34	
V_p	2.0593E-02	[$cm^3\ g^{-1}$]	$r_{p,peak}(Area)$	12.24	[nm]
a_p	1.5368	[$m^2\ g^{-1}$]			

Adsorption / desorption isotherm for $CaMn_3O_8$