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ELECTRO-CATALYTIC REDUCTION OF NO_x

Technical Report

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TABLE OF CONTENTS

LIST OF FIGURES ii

EXECUTIVE SUMMARY 1

INTRODUCTION 3

LITERATURE REVIEW 4

EXPERIMENTAL SET-UP AND PROCEDURE 5

RESULTS AND DISCUSSIONS 7

PROPOSED MECHANISM 29

CONCLUSIONS 32

RECOMMENDATIONS 33

ACKNOWLEDGEMENT 35

LITERATURE CITED 35

Appendix A - Thesis - cycled separately
Appendix B - Copyrighted Conf Paper - removed

LIST OF FIGURES

Figure No.		Page
1.	Schematic of Experimental Setup	6
2.	Effect of Catalyst Packing Material on NO Conversion	9
3.	Effect of Catalyst Packing Material on NO Conversion	10
4.	Effect of the Amount of Glass Wool Catalyst and Empty Bed Residence Time on NO Conversion	11
5.	Effect of Distance between the Electrodes on NO Conversion for Empty and Glass Wool Catalyst Beds	13
6.	Effect of Inlet NO Concentration on NO Conversion	14
7.	Effect of Oxygen on NO Conversion using 12g of Glass Wool Catalyst	16
8.	Effect of Oxygen on NO Reduction using 12g of Glass Wool Catalyst	17
9.	Effect of Oxygen on NO Conversion using 18.8g of Glass Wool Catalyst	18
10.	Effect of Oxygen on NO Reduction using 18.8g of Glass Wool Catalyst	19
11.	Effect of Inlet NO Concentration on NO Conversion using 18.8g of Glass Wool Catalyst and 5% Oxygen	21
12.	Effect of Inlet NO Concentration on NO Reduction using 18.8g of Glass Wool Catalyst and 5% Oxygen	22
13.	Effect of Water Content on NO Conversion	23
14.	Effect of Water Content on NO Reduction	24
15.	Effect of Inlet SO_2 Concentration on NO Conversion	26
16.	Effect of Carbon Monoxide on NO Conversion with 1.0-1.3% Oxygen	27
17.	Effect of Carbon Monoxide on NO Conversion with 1.0-1.3% Oxygen	28

EXECUTIVE SUMMARY

Over twenty million tons of nitrogen oxides are emitted into the atmosphere each year as a result of the high temperature combustion of fossil fuels. Nitrogen oxides have been linked to a broad range of air pollution problems including acid rain and the atmospheric production of photochemical ozone. Effort to control nitrogen oxides emission have lagged because of the generally low discharge concentrations of nitrogen oxides in combustion exhaust and because nitrogen oxides are difficult to remove due to their low reactivity.

In this investigation, a stream containing nitric oxide has been subjected to intense electric fields in the presence of catalysts. The work has been conducted in two phases. In the first phase catalysts tested included steel, stainless steel, and gold plated stainless steel wools. The effect of parameters such as inlet nitric oxide concentration, oxygen and water vapor content, gas residence time and temperature on NO reduction have been studied. In the second phase, the effect of non-conducting materials such as glass wool as a catalyst on NO reduction has been investigated. Experiments were also conducted with no catalyst to study the advantage of catalyst use.

About 85% conversion of NO to N_2 and O_2 has been achieved using gold plated stainless steel at an AC potential of 14 KV and a gas residence time of 5.4 seconds. The conversion achieved with no catalyst has been about 50% under comparable reactor conditions. The inclusion of glass wool as a catalyst in the reactor tube showed a dramatic effect on NO decomposition. Almost 100% conversion of NO to N_2 and O_2 has been achieved at 16 KVAC using approximately 8 grams of ordinary glass wool for a residence time of 2 seconds with 500 ppm of NO in the inlet gas stream.

The results of this work have the potential for a nitrogen oxides removal technology costing much less than the techniques currently employed. However, a considerable amount of research work, particularly in the areas of reactor design and power consumption is required. Additional efforts should be made to understand the reaction mechanism so that the process can be optimized with respect to various parameters and a scale up procedure delineated.

INTRODUCTION

Nitrogen Oxides (NO_x) have been linked to a broad range of air pollution problems including acid deposition, the atmospheric production of photochemical ozone, health threatening nitrate particles that also limit visibility, and the formation of toxic nitrogen compounds such as nitrosoamines. Efforts to control nitrogen oxides emissions have lagged because of the generally low discharge concentrations of nitrogen oxides in combustion exhaust and because nitrogen oxides are difficult to remove due to their low reactivity.

The control of NO_x emissions is being approached from two different standpoints. The first is preventing the formation of NO_x in the combustion process. Second is the post-combustion removal of NO_x from exhaust gases (flue gas treatment). It is expected that combustion modifications can lower NO_x emissions by about 50%, a substantial reduction, but not enough to meet the limit of NO_x discharges being implemented in Japan and several states in the U.S. It is clear that to meet these limits, flue gas treatment must be employed. Since no catalyst has yet been found to directly and rapidly decompose NO_x in the presence of oxygen, several other NO_x removal techniques have been developed. These processes include homogeneous (non-catalytic) reduction with ammonia as the reducing agent, catalytic reduction by ammonia, sorption of NO_x on solids, absorption of NO_x followed by liquid phase oxidation or reduction, and gas phase oxidation of NO to NO_2 followed by absorption into a liquid.

In this investigation, a stream of nitrogen containing nitric oxide has been subjected to intense electric fields with and without catalysts present to study the NO decomposition behavior. The work has been conducted in two

phases. In the first phase, the catalysts tested included conductors in the form of metal wools, such as steel wool, stainless steel wool, and gold plated stainless steel wool. The effect of parameters such as temperature, oxygen content, moisture content, and residence time has been studied. In the second phase, the effects of non-conducting materials such as glass wool (used as catalysts) have been investigated. Readers are requested to refer to Appendix A and B for details particularly on the first phase.

LITERATURE REVIEW

The chemical reactions for the decomposition of nitric oxide (NO) have been studied over a number of years by many investigators. These studies include homogenous reactions, heterogeneous catalytic reactions and reactions taking place in electrical discharges. Shelef and Kummer [1] investigated the thermodynamic instability of NO and also equilibrium data. Shelef and Kummer [1] and Hightower and Van Leirsburgh [2] have reviewed the various catalysts tested and the problems associated with the catalytic decomposition of NO. Mahaligam, et al. [3] show that zirconia supported nickel and zirconia supported cobalt achieve significant NO removal at temperatures in the vicinity of 1000°C, where the decomposition is a combination of heterogeneous and homogeneous reactions. Rosenberg, et al. [4] summarize the technologies that have been developed for NO_x removal and combined NO_x and SO_2 removal. The use of reducing agents such as CO, H_2, CH_4 and NH_3, with or without a catalyst, has been widely studied.

The use of electrical discharges to initiate chemical reactions in gases has been investigated for over sixty years. Joshi [5,6,7,8] studied the decomposition of nitrous oxide (N_2O) to its elements using an electric

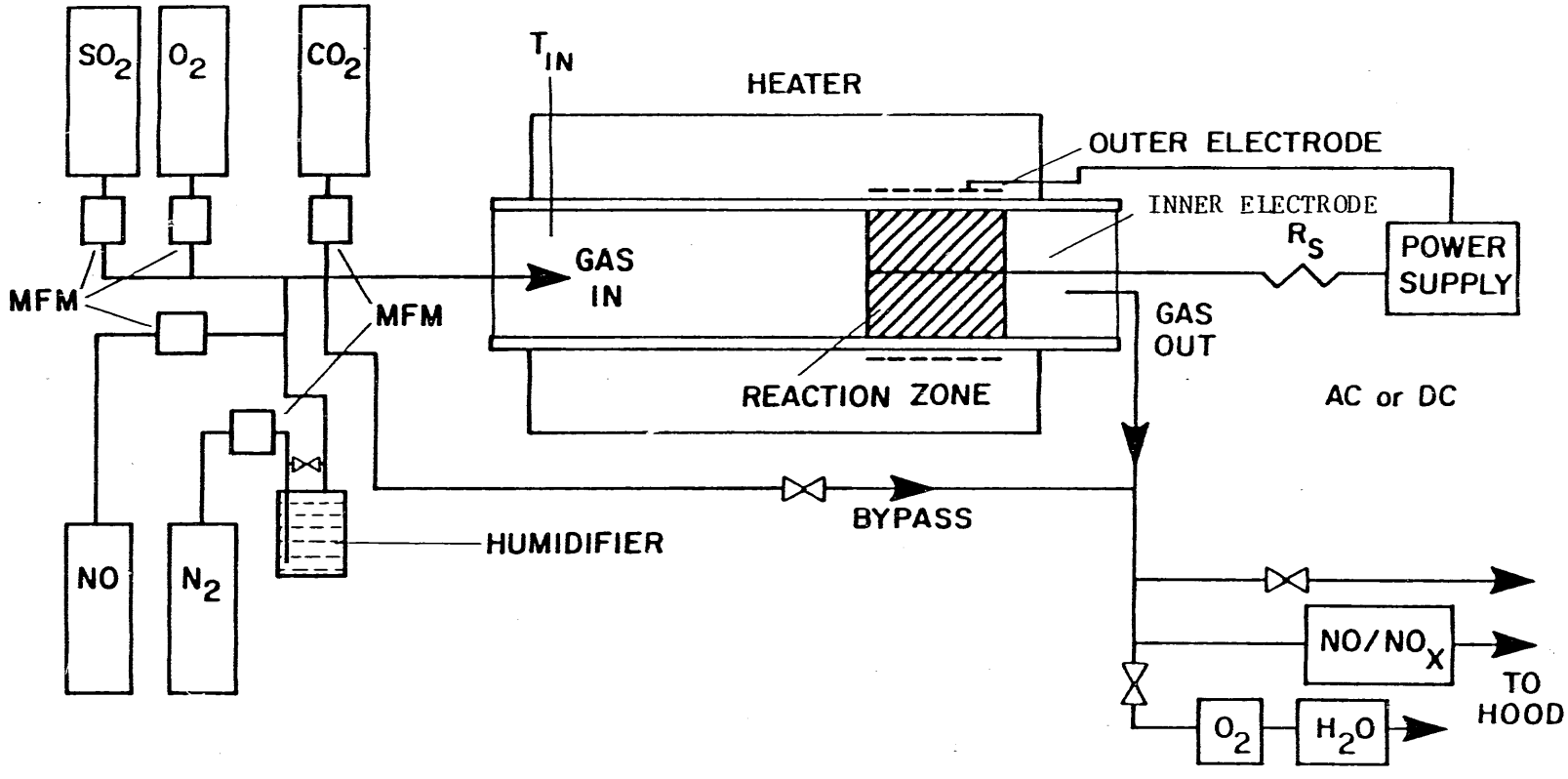
discharge in a Siemen's ozonizer. Visvanathan [9,10] used procedures similar to those developed by Joshi to study the decomposition of NO. Recently, Masuda and Nakao [11] and Masuda and Wu [12] have used corona discharge for NO removal. The use of an electron beam is another electrical discharge method under investigation to produce active species for NO removal. An electron beam is a stream of electrons produced by a discharge then accelerated to a very high energy level before coming into contact with the flue gases [13].

There are a few investigations reported in the literature in which an electrical discharge in the presence of catalytic materials is used to remove nitric oxide. Wooten and Mangold [14] report that NO reduction can be achieved using high voltage applied to a metal catalyst. However, the U.S. patent filed provides very few details of the experiments conducted. In another study, Henis [15] investigated the use of electrical discharge in the presence of non-conducting catalysts for the removal of NO.

EXPERIMENTAL SET-UP AND PROCEDURE

Figure 1 shows the schematic of the experimental set-up. The NO, N_2, and O_2 gases were obtained from cylinders and made into mixtures of desired compositions using calibrated mass flow meters (MFM). The gaseous mixture was passed through a preheat section before entering the furnace. The N_2 was bubbled through an air tight water container to provide humidity if necessary. The glass tube reactor was placed in a 3 ft long furnace. A thermocouple was installed at the inlet of the furnace to record the gas temperature.

The reaction zone was in the downstream side of the furnace. The reactor essentially consisted of a glass tube with outer and inner



SCHEMATIC OF EXPERIMENTAL SETUP

Figure 1

electrodes. The two electrodes were connected to a high voltage power supply. The inner electrode was a stainless steel rod placed at the center of the tube. The outer electrode was an aluminum foil wrapped around the glass tube over the reaction zone. To protect the furnace from the high voltage, sheets of 12 mil silicone bonded, phlogopite mica paper was placed between the outer electrode and the furnace heating element.

The premixed gases passed through the thermally equilibrated reaction zone and on exiting the reaction zone were analyzed for O_2, H_2O, NO and NO_x. The gases could be made to bypass the reaction zone at any time to check the inlet composition. Details of the apparatus and analytical procedures are available in Appendix A.

RESULTS AND DISCUSSIONS

Definitions and Operating Parameters:

$$\text{NO Conversion (\%)} = \frac{NO_{in} - NO_{out}}{NO_{in}} \times 100$$

$$\text{NO Reduction (\%)} = \frac{NO_{in} - NO_{x,out}}{NO_{in}} \times 100$$

All experiments were conducted in a 1" vycor tube mostly using an 8" catalyst bed. The operating parameters were catalyst packing material, gas residence time, oxygen concentration and water vapor concentration.

Effect of Non-Conducting Materials on NO Conversion

Catalyst packing material was considered to be one of the most important variables in this investigation. In addition to the use of metal wools (as discussed in Appendix A and B), experiments were performed using non-

conducting fibers as the reactor packing. The following materials were tested for their electro-catalytic activity in the reduction of NO:

Glass wool (supplied by Supelco, Inc.)

Glass wool (supplied by Fisher Scientific Co., Inc.)

Silanized glass wool (supplied by Supelco, Inc.)

Kaowool Standard Blanket (supplied by Thermal Ceramics)

Kaowool Zirconium Blanket (supplied by Thermal Ceramics)

Molecular Sieve (4A, supplied by Union Carbide, Inc.)

The length of the reactor was 8" for each of the materials tested except for the Kaowool Zr blanket for which a reactor length of 5.25" was used. The residence time was kept at 2.0 - 2.1 seconds for all of the experiments except those performed with no catalyst packing, where the effect of residence time was studied.

As seen from Figures 2 and 3, all the non-conducting materials behaved in a similar fashion. Almost total NO conversion was achieved at an applied voltage in the range of 14 - 16 KVAC (kilovolts AC) in each case except for the molecular sieves in which a maximum of 82% conversion was obtained.

Effect of Reactor Packing versus No Packing on NO Conversion

A number of experiments were performed to ascertain the effect of reactor packing on NO conversion against no packing. The curves A, B and C in Figure 4 show the NO conversion with no packing for residence times of 2.0 sec, 4.0 sec and 5.1 seconds, respectively. There is an increase in NO conversion from approximately 32% at a residence time of 2.0 seconds to 66% for 5.1 seconds at an applied voltage of 16 KVAC. If the reactor is packed with 3.72g, 7.68g, or 24.6g of glass wool supplied by Fisher Scientific Company (curves D, E, and F), the NO conversions were found to be 82, 96, and almost 100%, respectively

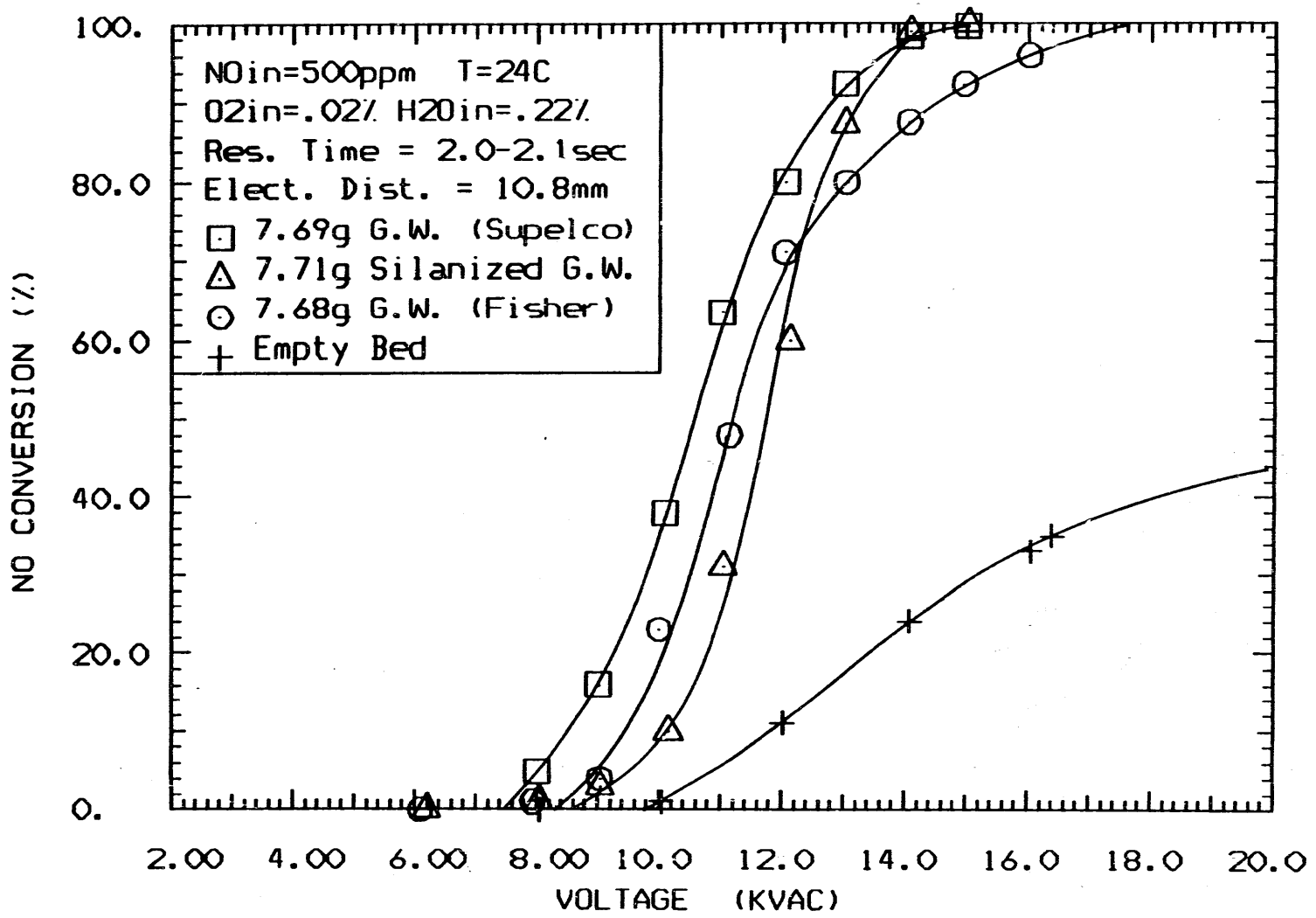


Fig. 2: Effect of Catalyst Packing Material on NO Conversion

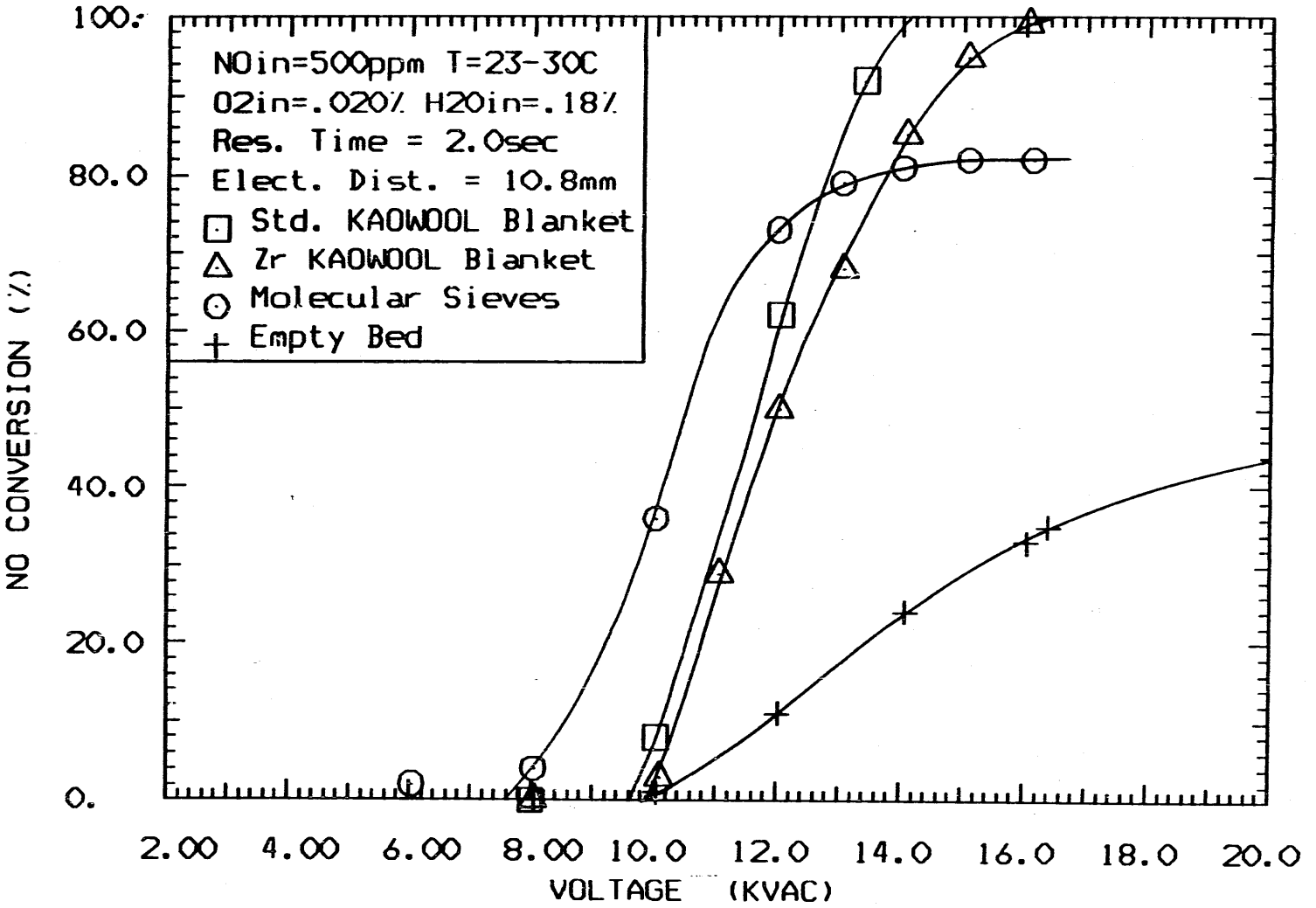


Fig. 3: Effect of Catalyst Packing Material on NO Conversion

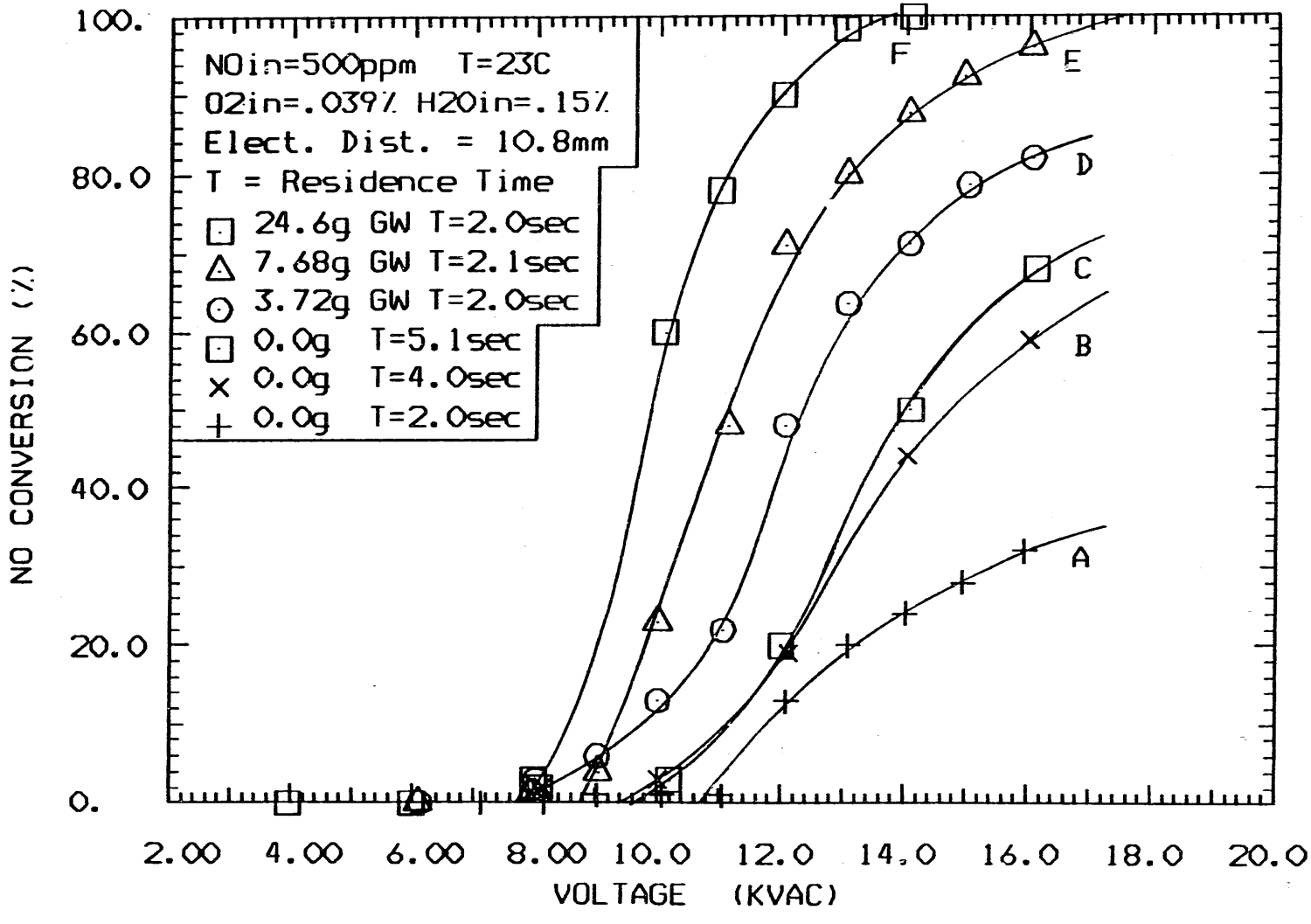


Fig. 4: Effect of the Amount of Fisher Glass WoolCatalyst and Empty Bed Residence Time on NO Conversion

for an applied voltage of 16 KVAC and a residence time of 2.0 - 2.1 seconds. It is noteworthy that inclusion of a small amount of glass wool enhanced the conversion to 82% at a 2.1 second residence time, which was considerably higher than 66% obtained in 5.1 seconds with no packing. These results clearly show the electro-catalytic effect of the glass wool.

Effect of Distance between Concentric Electrodes on NO Conversion

The distance between the concentric electrodes was varied by changing the diameter of the inner electrode. Experiments were conducted at distances of 10.8 and 3.9mm. The results are shown in Figure 5. Curves A and B are for NO conversion at the two distances between the electrodes for no reactor catalyst packing. Curves C and D are for the two distances with 7.7 and 6.9g of glass wool catalyst packing, respectively. As can be seen from the figure, decreasing the distance between the electrodes allowed nearly complete conversion of NO to be achieved at 9 KVAC versus 15 KVAC, a 40% decrease in applied voltage (compare curves B and D). These experiments clearly showed that the use of a non-conducting reactor material such as glass wool considerably increased the NO conversion compared to when no packing was placed between the two electrodes. They also showed that decreasing the distance between the two electrodes, thereby increasing the electric field strength for a given applied voltage, decreased the required applied voltage for nearly 100% NO conversion.

Effect of Inlet NO Concentration on NO Removal

Experiments were conducted at inlet NO concentrations of 200, 500, and 700 ppm using 24.6g of glass wool (Figure 6). An increase in potential difference required for nearly 100% removal was observed with an increase in inlet NO concentration. The applied voltages required for nearly 100% NO

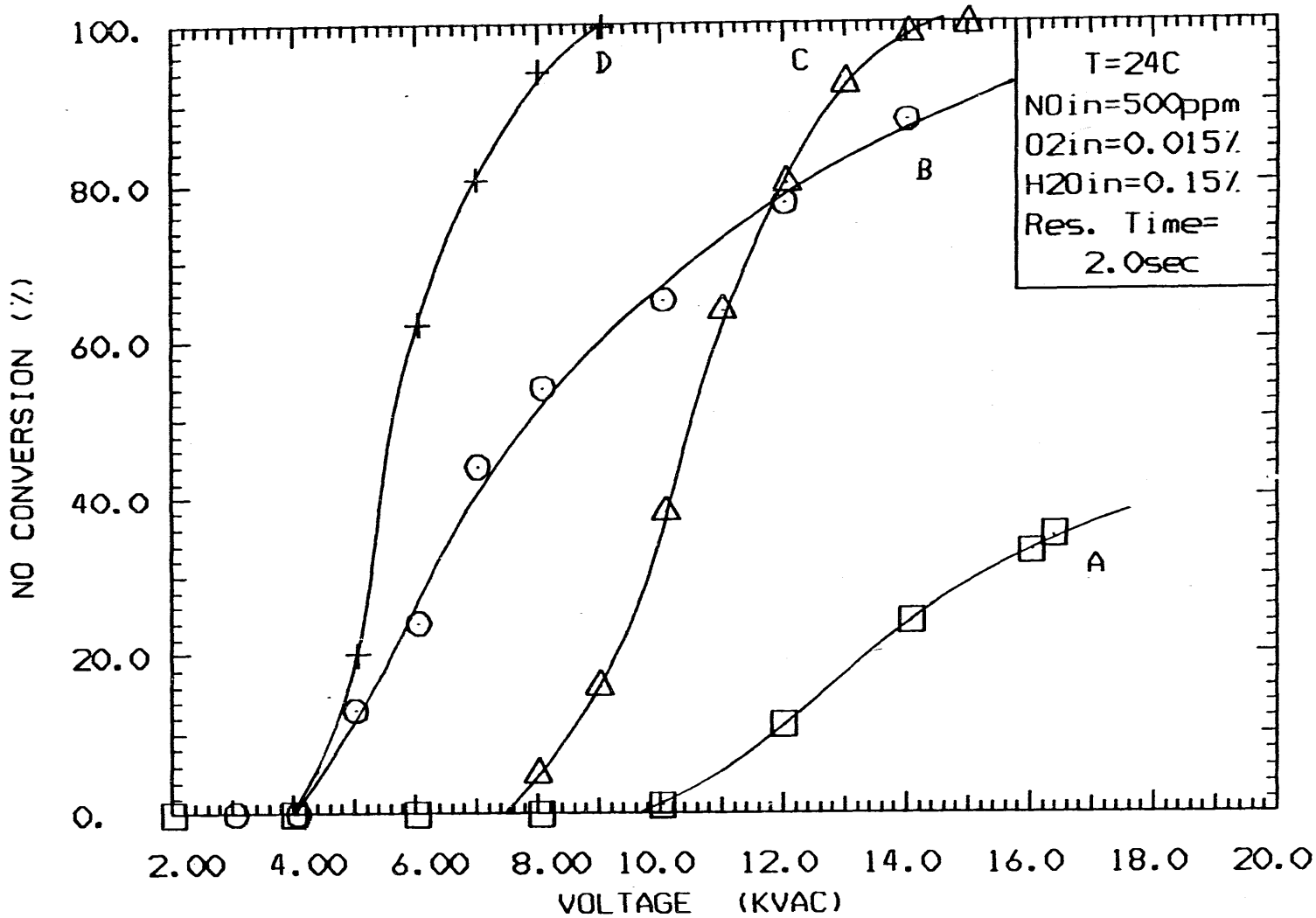


Fig. 5: Effect of Distance between the Electrodes on NO Conversion for Empty (A,B) and Glass Wool Catalyst (C,D) Beds

A: 0.0g, d=10.8mm; B: 0.0g, 3.9mm; C: 7.7g, 10.8mm; D: 6.9g, 3.9mm

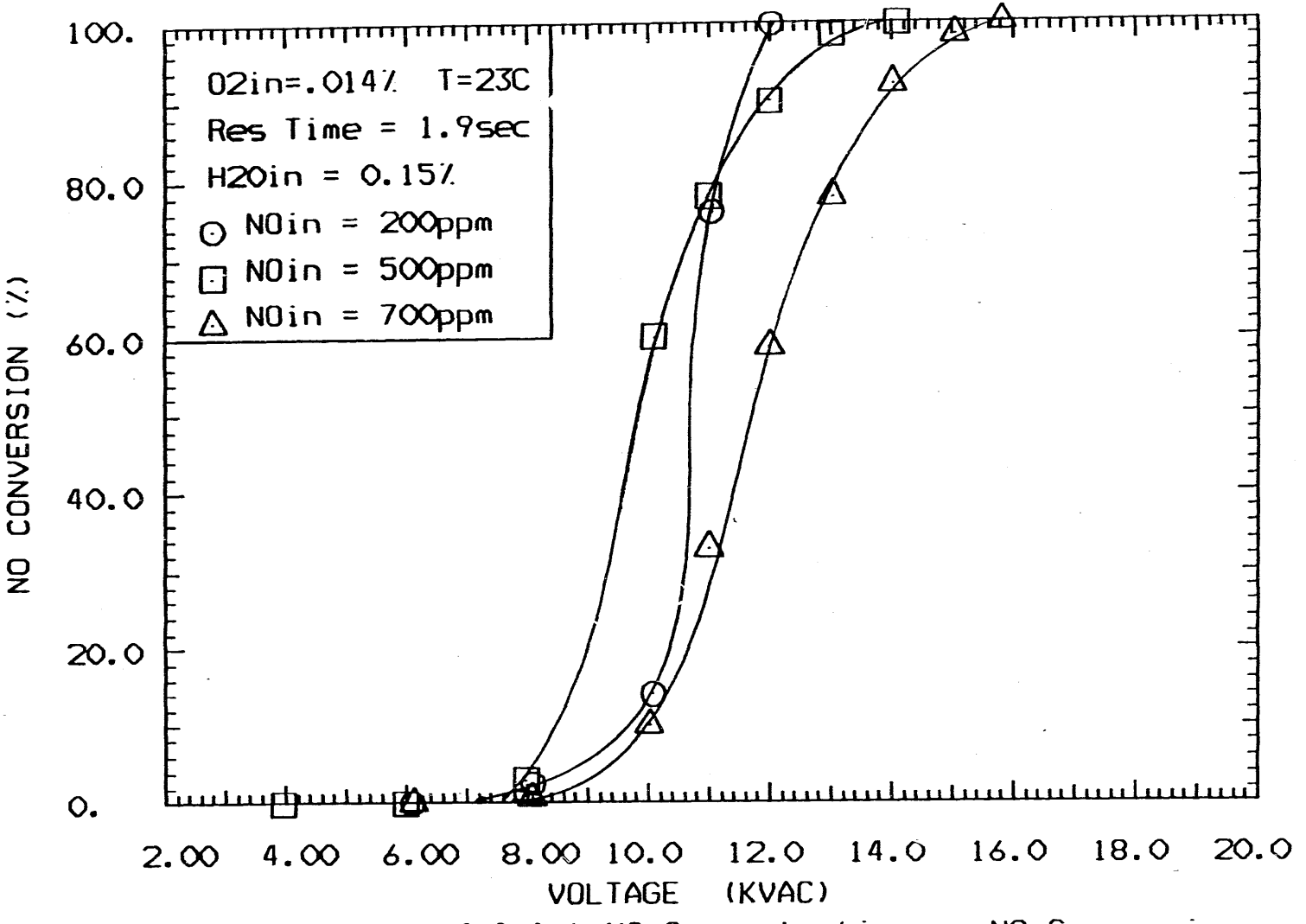


Fig. 6: Effect of Inlet NO Concentration on NO Conversion using 24.6g of Glass Wool Catalyst Packin

conversion were 12.0, 14.1 and 15.8 KVAC for 200, 500 and 700ppm NO respectively, in the inlet gas.

Effect of Oxygen on NO Conversion and Reduction

A number of experiments were conducted studying the effect of oxygen on NO conversion and reduction. The oxygen content in the inlet stream was varied from .02 to 5.9%. The experiments were conducted for glass wool amounts of 12.7 grams and 18.8 grams. Nitric Oxide conversion data are present in Figures 7 and 9 where as reduction data are shown in Figures 8 and 10.

Excess air calculations based on the oxygen content in the inlet stream were also made. The results are presented below:

Excess Air for Coal Combustion

$C + O_2 \rightarrow CO_2$

% O_2 in Experimental Inlet Stream	% Excess Air
1.0	5.0
2.0	10.6
3.0	16.8
4.0	23.7
5.0	31.5
6.0	40.3

Excess Air for CH_4 Combustion

$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

% O_2 in Experimental Inlet Stream	% Excess Air
1.0	5.6
2.0	11.7
3.0	18.5
4.0	26.2
5.0	34.8
6.0	44.5

The experimental data presented in Figures 7 through 10 show the NO

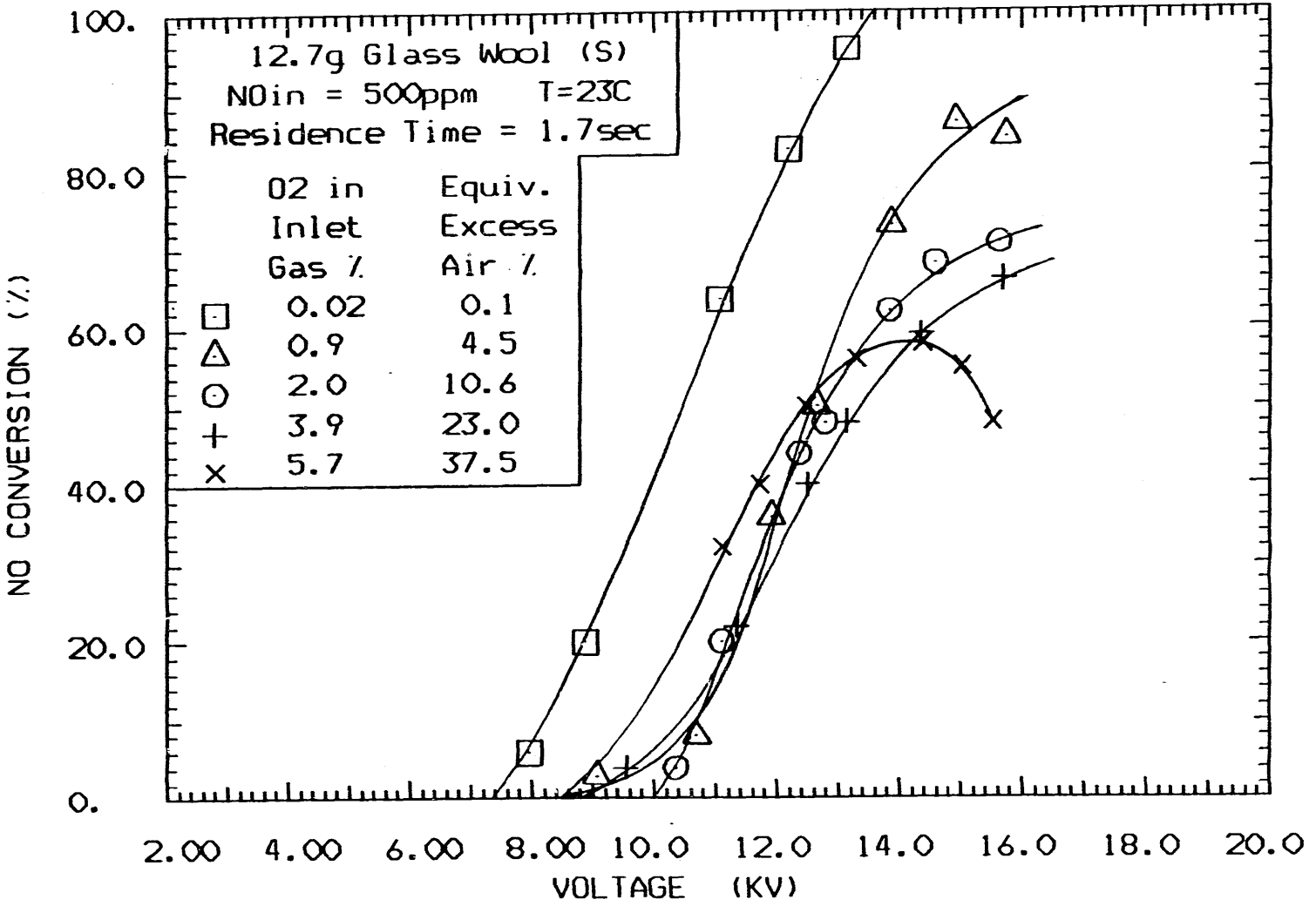


Fig. 7: Effect of Oxygen on NO Conversion using 12.7g of Glass Wool Catalys

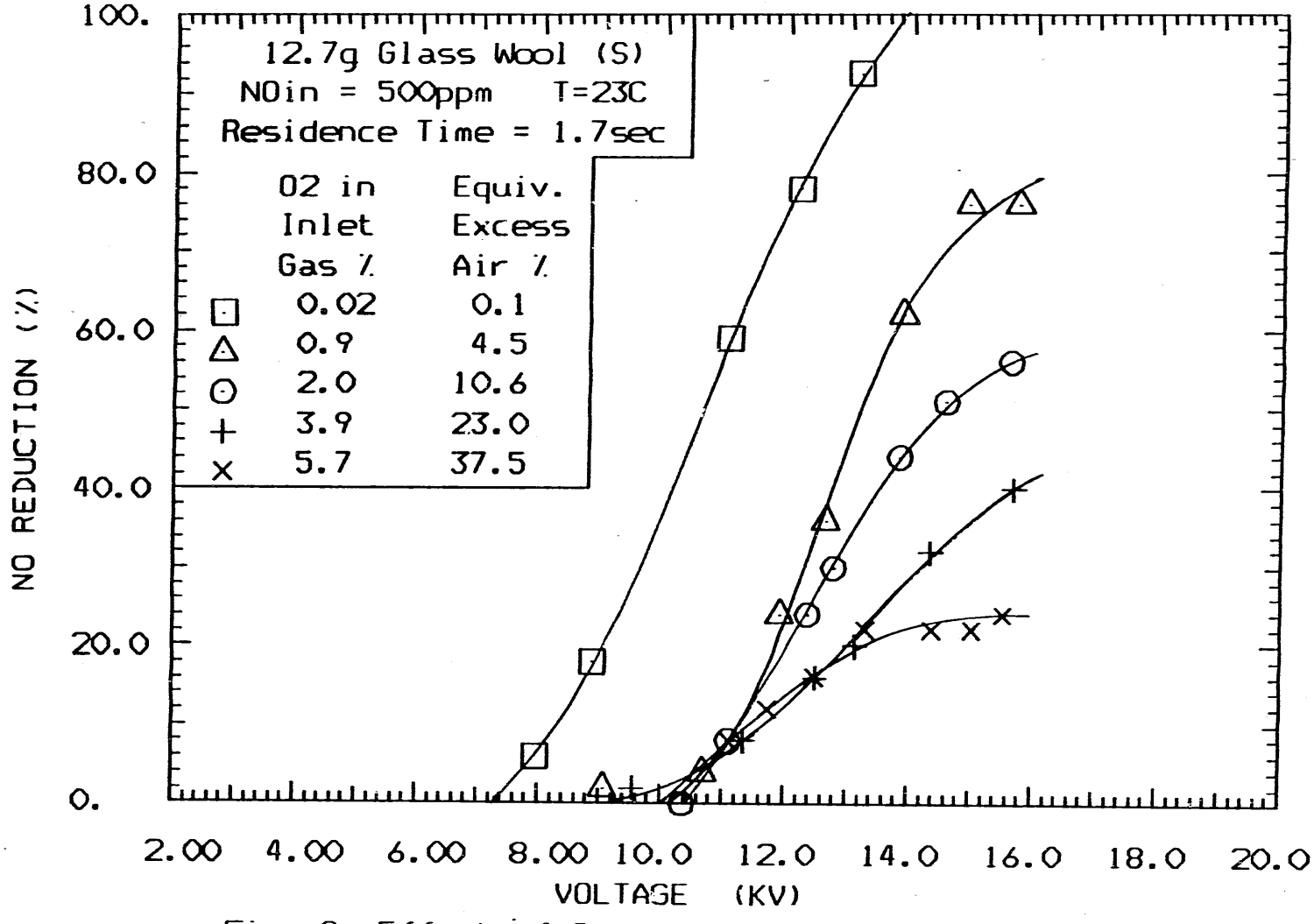


Fig. 8: Effect of Oxygen on NO Reduction using 12.7g of Glass Wool Catalyst

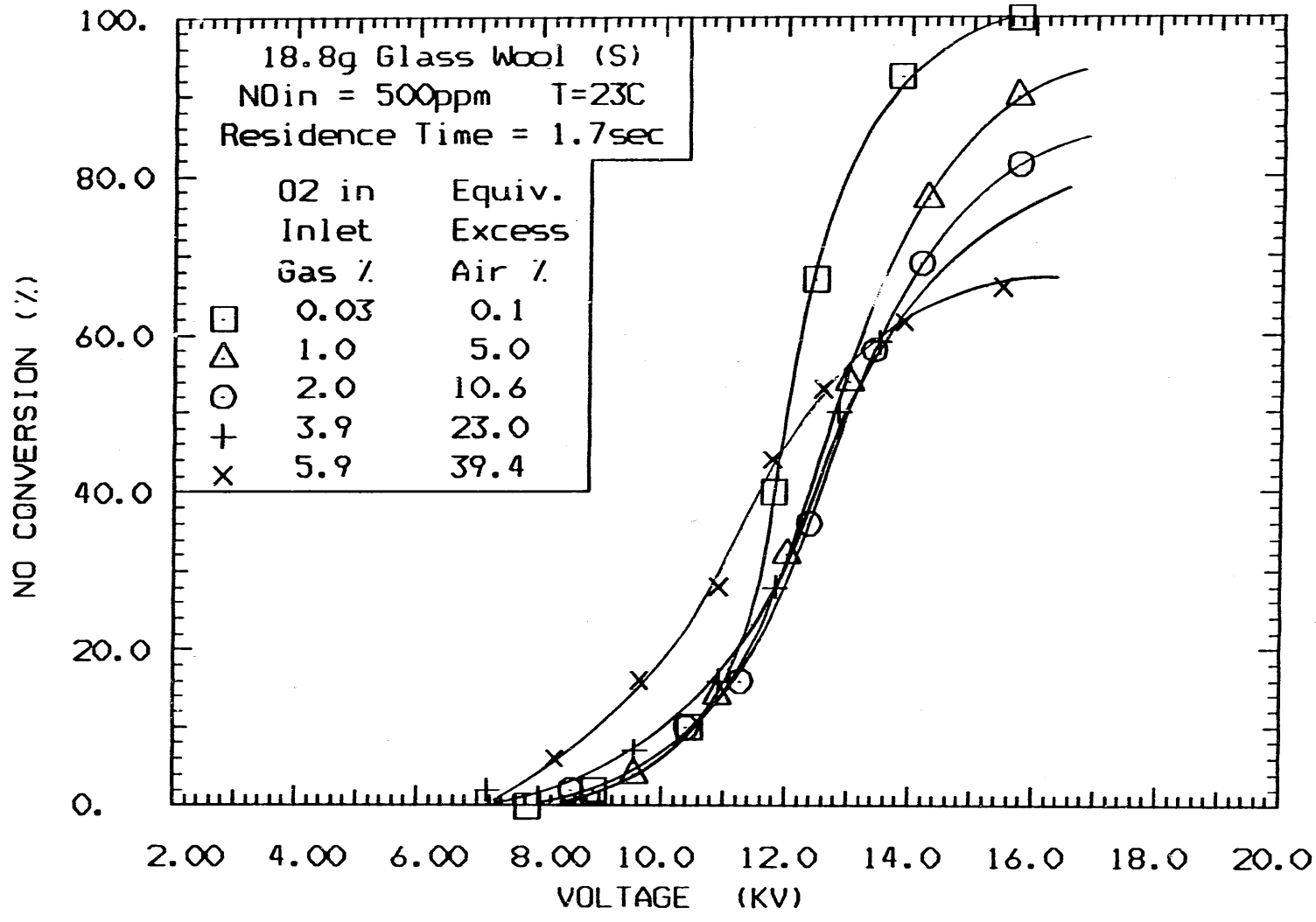


Fig. 9: Effect of Oxygen on NO Conversion using 18.8g of Glass Wool Catalyst

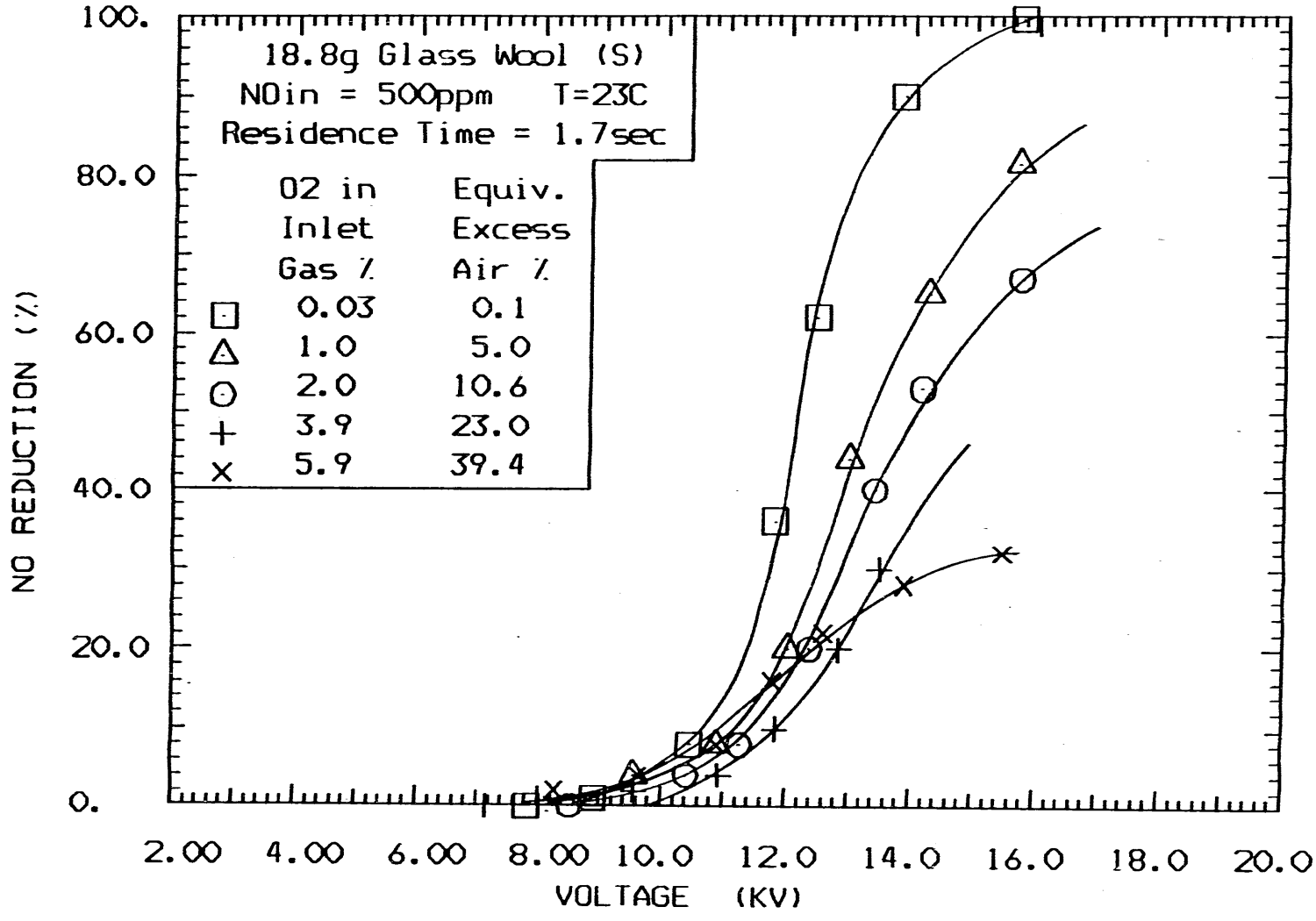


Fig. 10: Effect of Oxygen on NO Reduction using 18.8g of Glass Wool Catalyst

conversion and reduction at equivalent excess air values ranging from less than 1% to 39%. Coal combustion operates with approximately 20% excess air. Gas combustion units operate with 6% or less excess air. Under these conditions, NO conversion and reduction were above 60% (Figures 9 and 10). Results improved as the amount of glass wool was increased from 12.7 to 18.8 grams. It is obvious that conversion and reduction increased as space velocities were decreased.

In order to further study the effect of space velocities, detailed experiments varying NO concentrations from 100 - 500 ppm with oxygen constant at about 5% (31% excess air) were conducted. The amount of glass wool was kept constant at 18.7 grams. As shown in Figures 11 and 12, NO conversion and reduction were found to increase as inlet NO concentration was decreased.

Effect of Water Content on NO Conversion and Reduction

The effect of water content on NO conversion and reduction has been studied. Figures 13 and 14 show the effect of 1.0 and 1.1% water in the inlet gas on NO conversion and reduction at inlet NO concentrations of approximately 500 and 100ppm.

Figure 13 shows that for an inlet NO concentration of 100ppm the level of NO conversion decreased from nearly 100% at 16 KVAC to 68% when the water content was raised from 0.11% to 1.1%. At 500 ppm NO, the NO conversion decreased from nearly 100% at 16 KVAC to 57%. Figure 14 shows that at 100 ppm NO the level of NO reduction dropped from nearly 100% at 16 KVAC to 53%. At 500 ppm NO the NO reduction decreased from nearly 100 % at 16 KVAC to 49%.

Effect of Sulfur Dioxide on NO Removal

The effect of SO_2 presence in the inlet NO-N_2 stream was investigated.

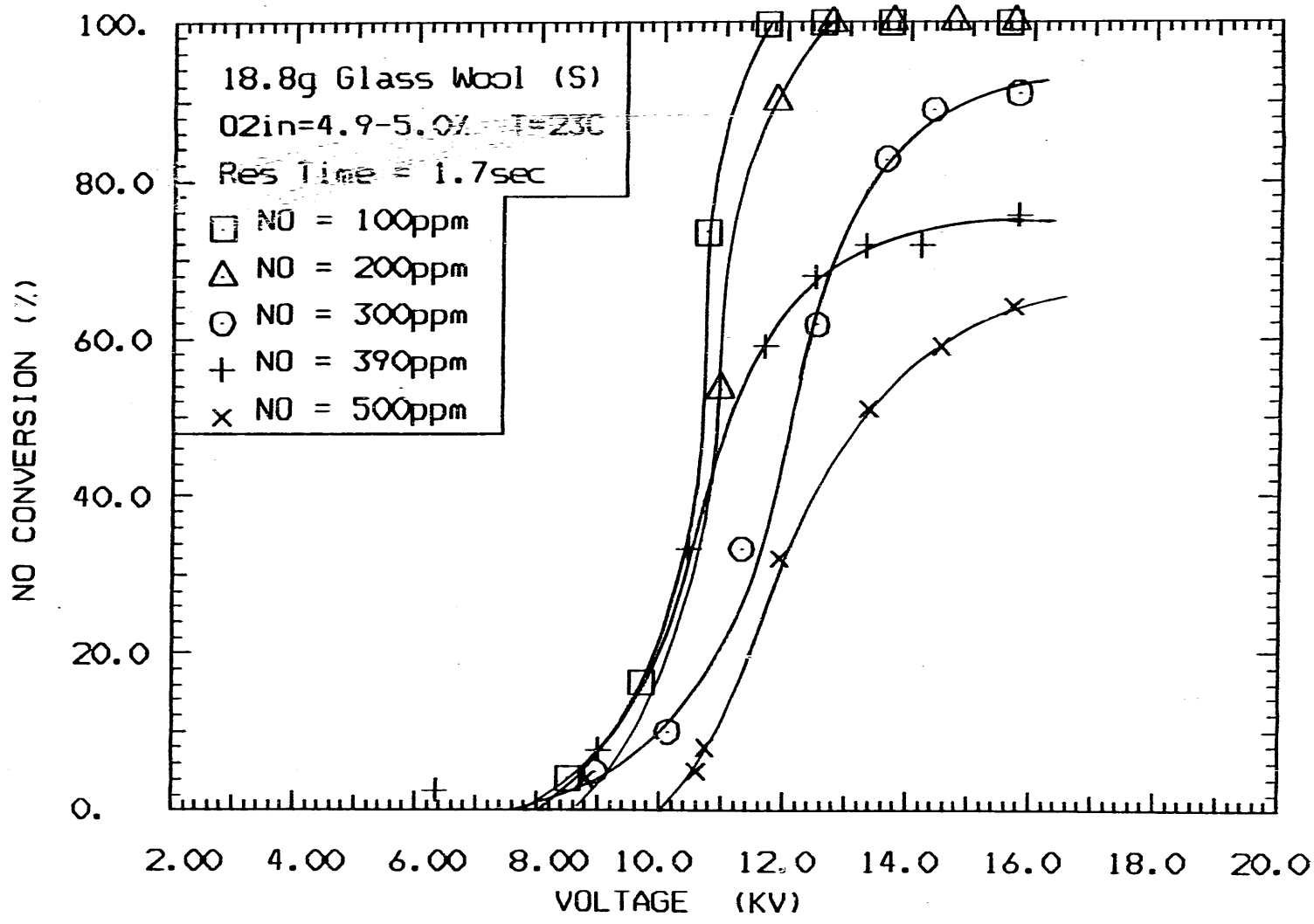


Fig. 11: Effect of Inlet NO Concentration on NO Conversion using 18.8g of Glass Wool Catalyst and 5% Oxygen

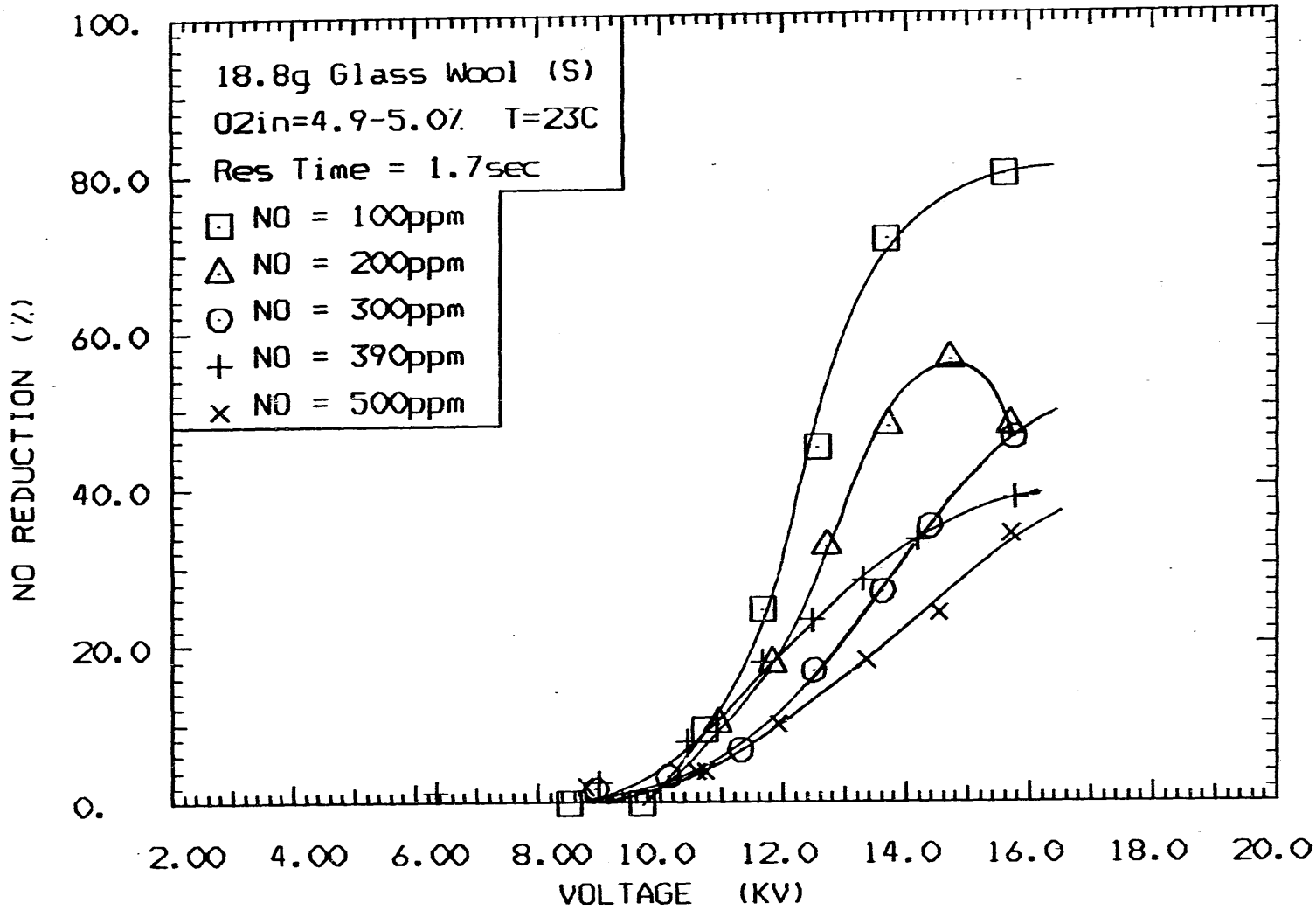


Fig. 12: Effect of Inlet NO Concentration on NO Reduction using 18.8g of Glass Wool Catalyst and 5% Oxygen

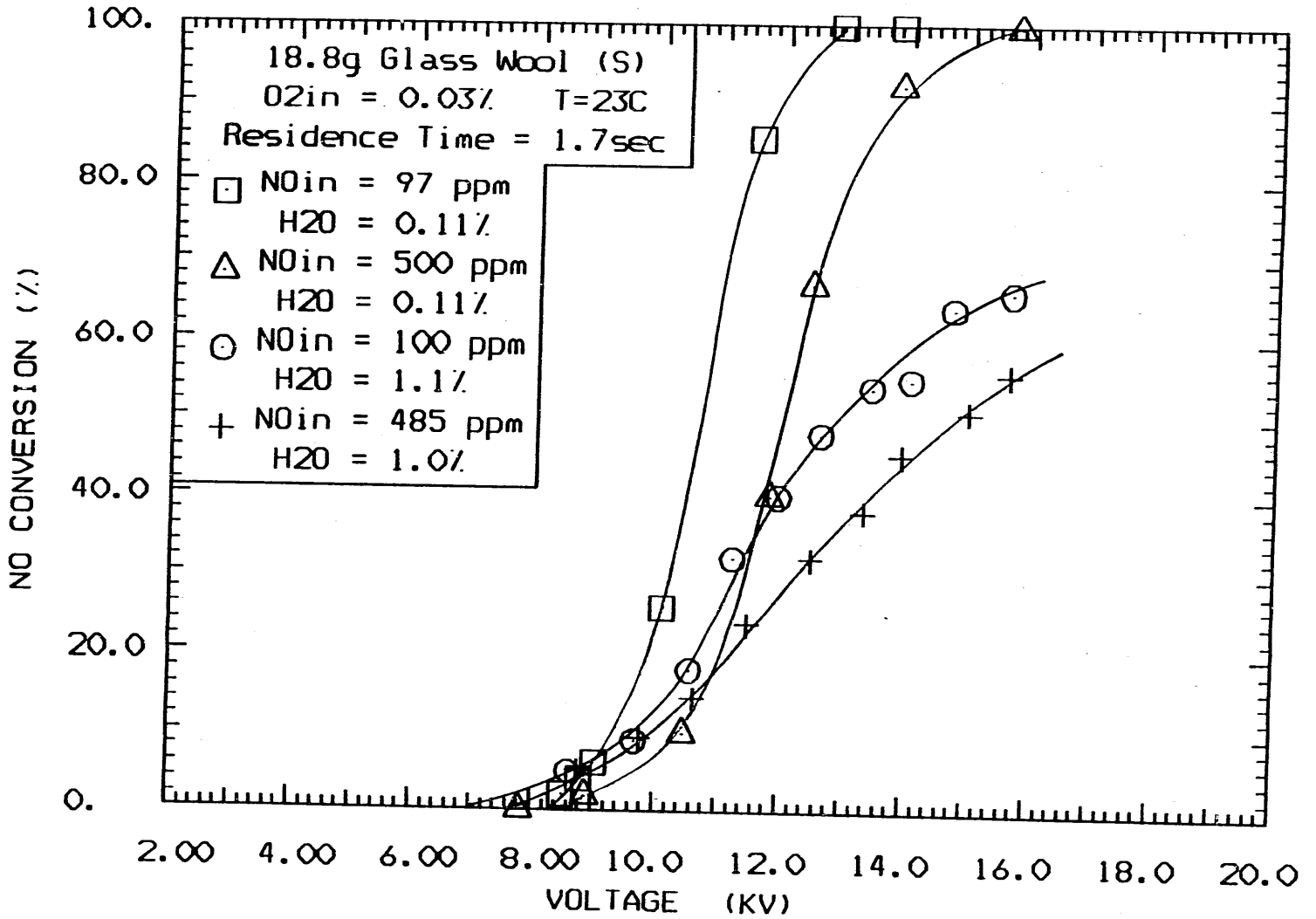


Fig. 13: Effect of Water Content on NO Conversion

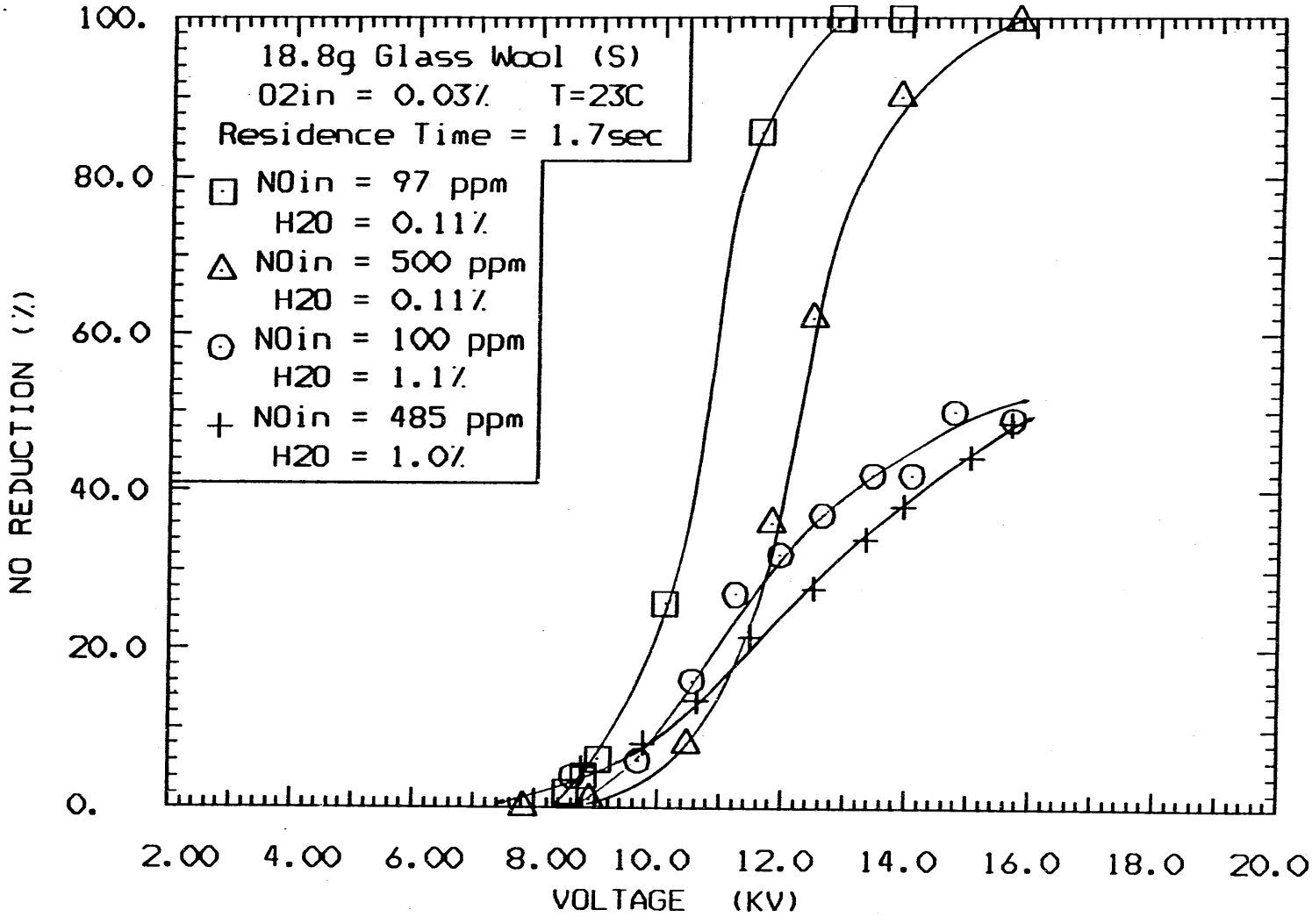


Fig. 14: Effect of Water Content on NO Reduction

Results of NO removal in the presence of 470 ppm SO_2 are presented in Figure 15. The potential difference required for 100% removal was slightly higher as compared to when no SO_2 was present. The 100% removal was maintained for an experimental run of about two hours. This finding is important as SO_2 in stack gas did not effect the catalyst packing in any significant manner.

Effect of CO and CH_4 on NO Conversion and Reduction

The effects of reducing gases (carbon monoxide and methane) on NO decomposition have been investigated. Figures 16 and 17 show the effect of CO, in concentrations from 0 to 505 ppm, on NO conversion and reduction at room temperature. As can be seen from the figures, CO had little effect on the levels of conversion and reduction obtained under the conditions listed. The introduction of CH_4 to the inlet gas stream also resulted in little change in the levels of NO conversion and reduction.

Electric Power Consumption

The method used for determining the power consumed by the system was to measure the RMS current and voltage supplied to the primary windings of the high voltage transformer. These measurements are included in Appendix C. The power measured by this method includes the reactive power oscillating in the circuit, the power lost in the transformer windings and in the secondary side series resistor, and the power supplied to the reactor to effect the decomposition of NO to N_2 and O_2. Therefore, the power consumption measured by this method is actually much higher than that needed to cause NO decomposition in the reactor alone.

This method has been recently modified to measure only the power supplied to the reactor. This is done using a Tektronix model 2211 digital storage oscilloscope and model P6015 high voltage probes. Voltages are measured

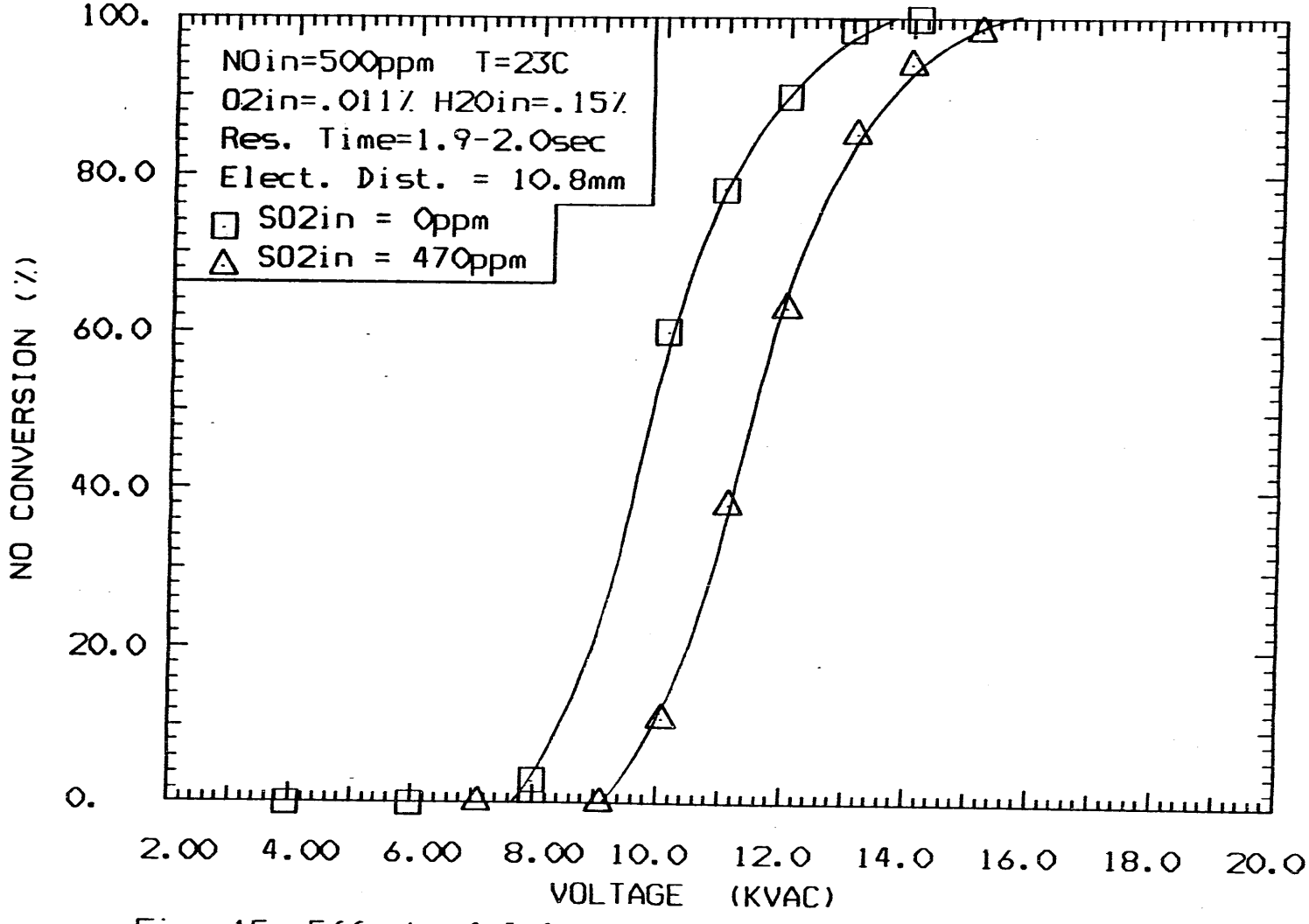


Fig. 15: Effect of Inlet SO2 Concentration on NO Conversion using 24.6g of Glass Wool Catalyst Packing

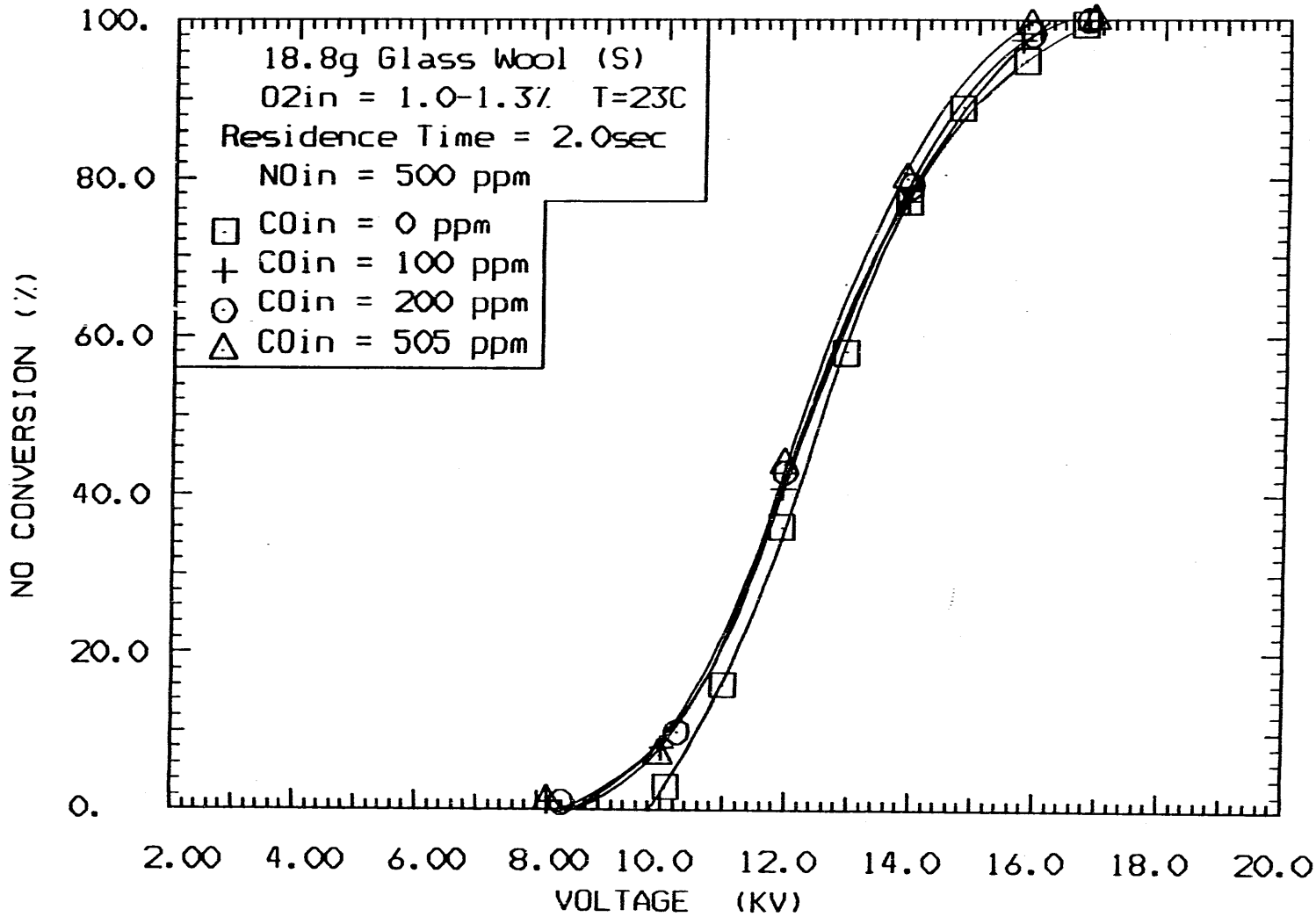


Fig. 16: Effect of Carbon Monoxide Concentration on NO Conversion with 1.0-1.3% Oxygen

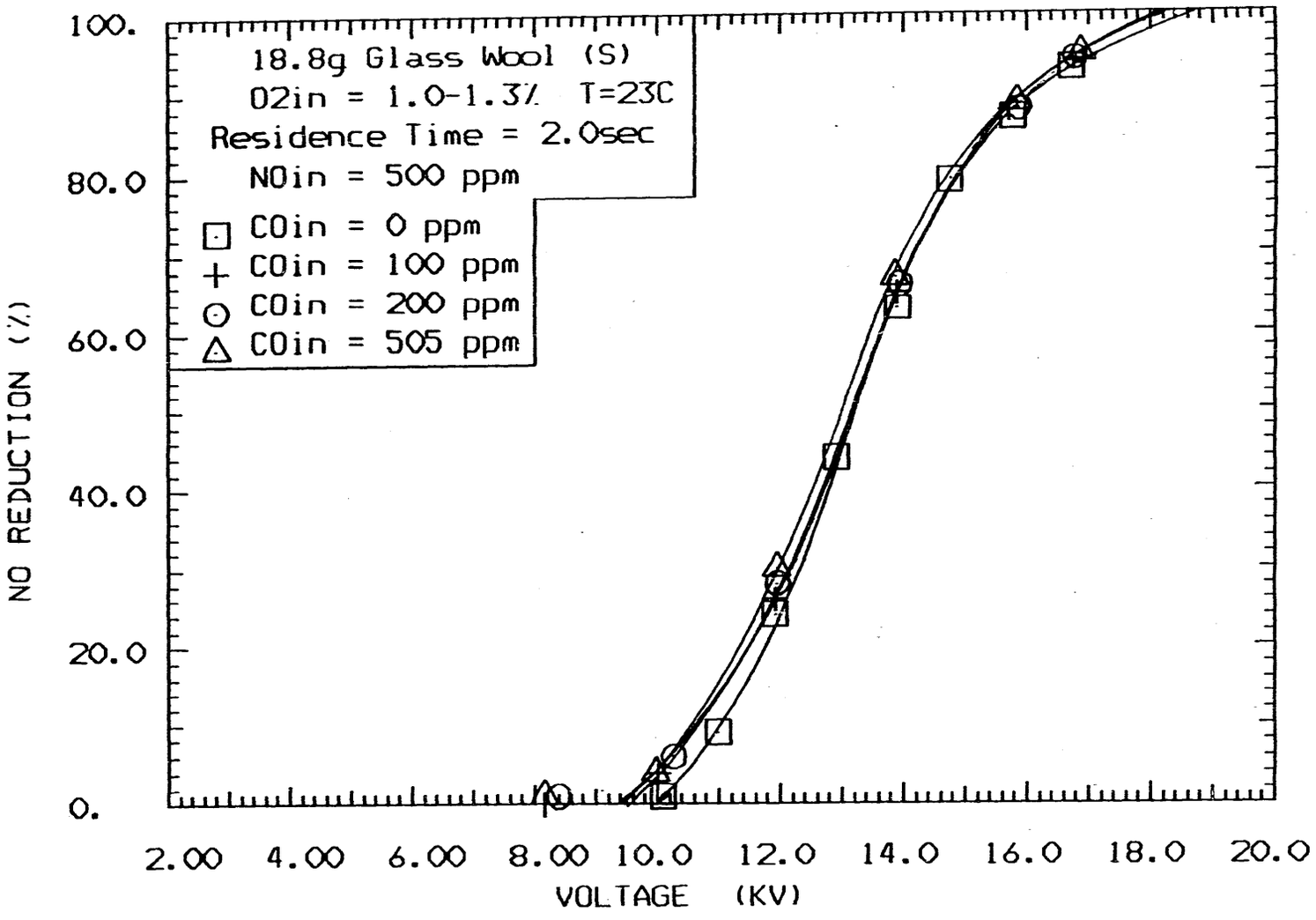


Fig. 17: Effect of Carbon Monoxide Concentration on NO Reduction with 1.0-1.3% Oxygen

across the secondary side series resistor to determine the current in the system. The voltage drop across the reactor is also measured. The power is then obtained by integrating the product of the voltage and current over a cycle.

Using the primary voltage and current measurements, as in the earlier method, the power consumption calculated for a gas with an inlet concentration of 500 ppm NO in N_2, a residence time of 1.7 seconds, and with an NO conversion of 99% was 106 watts. For the same reactor conditions and level of conversion, the power consumed in the reactor as measured by the modified method was 5.7 watts. This shows that under these reactor conditions 95% of the power consumed, as calculated from the transformer primary current and voltage (earlier method), is reactive power in the circuit or consumed in the circuit losses. Only 5% is actually supplied to the reactor to decompose NO. Measurements using the modified method to determine the power, outside the scope of this contract, are continuing to be made.

PROPOSED MECHANISM

A critical review of the data obtained from this study reveals that the mechanism proposed by Person et al. [13] for combined NO_x / SO_x removal by radiation initiated emission control technologies is not likely to be the mechanism responsible for the NO reduction observed here. In their proposed mechanism Person et al. have emphasized the importance of OH radicals, generated by reactions involving water vapor, in the removal of NO_x. Our experiments have shown that introducing water vapor to the gas stream reduced the level of NO conversion and reduction instead of enhancing it. NO conversion dropped from 99.8% to 55.7% at 15 KVAC when the inlet water vapor

concentration was increased from 0.11% to 1.1%. It was also observed that the passing of a bone dry stream of N_2 and NO did not show any decrease in NO reduction.

Visvanathan [9,10] conducted experiments on NO reduction in an electric discharge and proposed the following possible pathways for the reduction process.

I(a)	$NO \rightarrow N + O$
I(b)	$N+N \rightarrow N_2$
I(c)	$O+O \rightarrow O_2$
I(d)	$2NO \rightarrow N_2 + O_2$
II(a)	$2NO + O_2 \rightarrow 2NO_2$
II(b)	$2NO_2 \rightarrow N_2 + 2O_2$

The reaction II(a) and II(b) suggest the decomposition through an intermediate, NO_2. Another possible reaction could be:

$$NO + O_3 \rightarrow NO_2 + O_2 + h\nu$$

NO_2 could then decompose as II(b).

In the first pathway sequence (I), energetic electrons in the discharge field may possess enough energy to overpower the kinetic barrier to break the N-O bond and allow N and O to combine to form N_2 and O_2. However, there is no satisfactory reason as to why N and O would not recombine to form NO. Since no NO has been detected in many of our experiments, pathway I is not considered plausible.

In pathway II, energetic electrons bombard NO molecules thereby weakening the N-O bond. This is discussed by Shelef and Kummer [1] as applied to high temperature NO decomposition in presence of catalysts. However, in the gas phase reactions, the chances of electrons striking and

attaching to the NO molecules are not very high. The lower NO conversions observed in our experiments with no packing were probably due to that reason.

Effect of Glass Wool

It was observed that the glass wool packing between the electrodes significantly enhanced NO conversion. The effect of glass wool may be due to both electric and surface effects.

The electric effect can be a result of two factors. First, the presence of a high dielectric material in the reactor space enhances the local field in the gas space permitting higher instantaneous field strengths within the reactor gas space, while avoiding spark breakdown across the electrode gap. As a result, for the same applied potential a more intense discharge with a higher electron density takes place.

The second electric effect is that the dielectric material causes the discharge to be distributed both axially and radially. The radial distribution of the discharge probably plays the dominant role. In a corona discharge free electrons are produced where there is a large gradient in the electric field. This occurs around the center electrode in a system using a wire and cylinder geometry with no dielectric packing. Much of the gas mixture can thus bypass the corona discharge zone of the reactor by travelling along the outer portion of the cylinder where there are no energetic free electrons to cause NO decomposition.

Physical Shape of the Dielectric Material

The physical shape of the dielectric material is considered to be an important parameter in this process. The dielectric packing, particularly that in fibrous form, may induce gradients in the electric field throughout the reactor distributing the discharge and providing a uniform stable corona

filling the gas space between the two electrodes. The imperfections on the surface of the fibers provide "discharge sites." It is due to this effect that the fibrous nature of the packing material plays an important role. The discharge sites on the surface of the fibers as well as the ends of the fibers provide an excellent location for discharge due to high local electric field gradient. It is observed that molecular sieves in the form of pellets, though having a much larger surface area than glass wool, are not as effective in NO reduction.

The following additional work, outside the scope of this contract, is in progress to further confirm the proposed mechanism.

(1) Experiments are being conducted with a given amount of glass fibers. These fibers will be made into beads and experiments will be conducted again at the same experimental condition as before. The effect of shapes (fibers vs beads) will be observed and measured.

(2) Experiments will be conducted using the glass wool fibers with TiO_2 (dielectric constant of 80) to study the effect of high dielectric constant.

CONCLUSIONS

The following conclusions can be drawn from this study:

Phase I

1. The use of an AC potential applied to the reactor in the presence of metal wools resulted in about 85% NO conversion compared to 50% without the use of a catalyst.
2. Increasing the gas residence time or decreasing the inlet NO concentration resulted in an increase in NO conversion. At 500 ppm NO in the inlet gas, the conversion at 14 KVAC increased from 40 to

85% when the residence time was increased from 1.6 to 5.4 seconds. The NO conversion increased from 37 to 70% when the inlet gas NO concentration was decreased from 700 to 196 ppm at a gas residence time of 2.1 - 2.2 seconds.

3. Increasing the reactor temperature from 30 to 200°C did not significantly effect the NO conversion.

4. The addition of both oxygen and water vapor, gases commonly found in combustion exhaust streams, reduced the NO conversion.

Phase II

1. The use of a non-conducting material such as glass wool as the catalyst between the two electrodes considerably increased the NO conversion when compared to an empty gas space in the system.

2. An NO conversion to nitrogen and oxygen of over 98% was achieved.

3. Decreasing the distance between the electrodes decreased the required applied voltage for 98% NO conversion with no increase in current flow, resulting in lower power requirements.

4. The presence of sulfur dioxide in the nitrogen - nitric oxide inlet stream (470 ppm) did not adversely effect the electro-catalytic activity of the glass wool.

5. Glass wool is an inexpensive material and helps the economics of the process.

6. Removal of nitric oxide from a nitrogen - nitric oxide stream using an electro-catalytic process appears to be technically feasible.

RECOMMENDATIONS

1. The use of electric fields in the presence of dielectric catalyst

materials may be a feasible technology for removing nitrogen oxides from combustion exhaust streams. The high levels of NO conversion and reduction achieved in this study are encouraging but much more research work is needed before this technology can be evaluated for commercialization.

2. The major obstacle in the use of only electrical discharges without catalysts to remove NO_x from gas streams has been the high power consumption to achieve significant removal rates. The minimum power necessary to achieve suitable conversion rates in the presence of catalysts should be investigated to determine the economic feasibility of this process.

3. The current effort to reduce NO_x emissions is focused on stationary sources such as utility boilers. Since the exhaust from these plants contains up to 4% oxygen and 10% water vapor, the effects of these gases on NO conversion and reduction using dielectric materials as catalysts must be further studied. The effects of carbon dioxide, carbon monoxide, and sulfur dioxide on NO reduction should also be further investigated.

4. Another parameter that is of major importance in this process is the electric field strength. This is a function of many variables including the magnitude and frequency of the applied voltage, discharge current, reactor geometry, and dielectric properties of the catalyst material. It is recommended that the effect of these parameters be investigated to optimize the NO reduction to N_2 and O_2 at the minimum cost.

5. At this time it is considered that the NO removal achieved using

dielectric catalyst materials is due to both a surface effect of the material and an electric effect enhanced by the dielectric properties and physical shape of the catalyst material. To understand the reaction mechanism the nature of the catalyst surface as well as the dielectric properties of the catalyst need to be investigated. It is interesting to note that molecular sieves, with a high surface area, did not achieve the level of NO conversion attained using glass wool in the same reactor volume and at the same experimental conditions. Understanding the mechanism of NO reduction in this process will be a major step towards optimization of the process with respect to various operating parameters and establishing scale-up procedures for reactor design.

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Appendix C

Table 1

Catalyst Material: Glass Wool (F)

Catalyst Mass (g): 12.5

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 30

Gas Residence Time (s): 2.0

Bed Length (in): 8

Inlet O2 (%): 0.012

Inlet H2O (%): -17.7

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
2.16	495	495	495	0.0	0.0	16	87
4.00	495	495	495	0.0	0.0	31	148
6.12	495	480	480	3.0	3.0	47	219
8.00	495	445	455	10.1	8.1	61	284
10.02	495	355	370	28.3	25.3	76	359
12.08	495	175	190	64.6	61.6	91	462
14.00	495	51	57	89.7	88.5	104	587
16.08	495	5	6	99.0	98.8	120	767
17.08	495	2	3	99.6	99.4	128	896

Table 2

Catalyst Material: Glass Wool (F)

Catalyst Mass (g): 12.5

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 30

Gas Residence Time (s): 2.1

Bed Length (in): 8

Inlet O2 (%): 0.009

Inlet H2O (%): 0.14

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
2.10	200	200	200	0.0	0.0	16	85
4.02	200	200	200	0.0	0.0	31	148
6.04	200	183	185	8.5	7.5	46	214
8.10	200	159	165	20.5	17.5	61	284
12.04	200	12	14	94.0	93.0	91	460
12.80	200	1	2	99.5	99.0	96	505
14.00	200	0.5	0.5	99.8	99.8	105	586

Table 3

Catalyst Material: Glass Wool (F)

Catalyst Mass (g): 12.5

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 30

Gas Residence Time (s): 2.0

Bed Length (in): 8

Inlet O2 (%): 0.011

Inlet H2O (%): 0.15

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
4.08	695	695	695	0.0	0.0	31	150
6.08	695	680	680	2.2	2.2	46	216
8.00	695	650	660	6.5	5.0	61	283
10.08	695	555	575	20.1	17.3	77	360
12.08	695	340	380	51.1	45.3	91	464
14.06	695	160	180	77.0	74.1	106	600
16.16	695	66	75	90.5	89.2	120	771
18.04	695	28	36	96.0	94.8	136	1006

Table 4

Catalyst Material: EMPTY BED

Catalyst Mass (g): 0.0

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 29

Gas Residence Time (s): 2.1

Bed Length (in): 8

Inlet O2 (%): 0.008

Inlet H2O (%): 0.14

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.02	198	198	198	0.0	0.0	46	221
8.02	198	198	198	0.0	0.0	62	299
10.08	198	193	195	2.5	1.5	78	389
12.04	198	150	163	24.2	17.7	94	515
14.02	198	93	110	53.0	44.4	108	664
16.00	198	53	65	73.2	67.2	123	856
16.40	198	42	52	78.8	73.7	126	885

Table 5

Catalyst Material: EMPTY BED

Catalyst Mass (g): 0.0

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 30

Gas Residence Time (s): 2.0

Bed Length (in): 8

Inlet O2 (%): .011

Inlet H2O (%): 0.14

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.02	700	700	700	0.0	0.0	62	295
10.02	700	695	700	0.7	0.0	78	381
12.06	700	640	660	8.6	5.7	94	509
14.02	700	575	610	17.9	12.9	115	640
16.08	700	530	565	24.3	19.3	123	937
16.40	700	520	560	25.7	20.0	126	860

Table 6

Catalyst Material: EMPTY BED

Catalyst Mass (g): 0.0

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 30

Gas Residence Time (s): 2.0

Bed Length (in): 8

Inlet O2 (%): 0.009

Inlet H2O (%): 0.14

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.04	500	500	500	0.0	0.0	46	220
8.06	500	500	500	0.0	0.0	62	298
10.04	500	495	495	1.0	1.0	78	386
12.02	500	445	460	11.0	8.0	96	510
14.08	500	380	410	24.0	18.0	108	658
16.04	500	335	370	33.0	26.0	123	841
16.40	500	325	360	35.0	28.0	126	883

Table 7

Catalyst Material: GLASS WOOL (F)

Catalyst Mass (g): 12.6

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 30

Gas Residence Time (s): 2.0

Bed Length (in): 8

Inlet O2 (%): 0.010

Inlet H2O (%): 0.12

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.14	198	198	198	0.0	0.0	47	228
8.04	198	194	194	2.0	2.0	63	303
9.04	198	175	175	11.6	11.6	71	346
10.00	198	55	55	72.2	72.2	78	395
12.14	198	1	2	99.5	99.0	93	500
14.00	198	0.5	1.5	99.7	99.2	108	640

Table 8

Catalyst Material: GLASS WOOL (F)

Catalyst Mass (g): 12.6

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 31

Gas Residence Time (s): 2.0

Bed Length (in): 8

Inlet O2 (%): 0.010

Inlet H2O (%): 0.13

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.02	500	500	500	0.0	0.0	47	223
8.10	500	495	495	1.0	1.0	64	306
10.08	500	340	360	32.0	28.0	79	393
12.06	500	115	120	77.0	76.0	93	500
14.10	500	24	28	95.2	94.4	109	649
15.70	500	20	24	96.0	95.2	121	793

Table 9

Catalyst Material: GLASS WOOL (F)

Catalyst Mass (g): 12.6

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 31

Gas Residence Time (s): 2.0

Bed Length (in): 8

Inlet O2 (%): 0.010

Inlet H2O (%): 0.14

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.08	700	700	700	0.0	0.0	47	224
10.10	700	550	560	21.4	20.0	79	392
12.02	700	230	250	67.1	64.3	93	495
14.06	700	95	110	86.4	84.3	108	645
16.00	700	30	40	95.7	94.3	124	828

Table 10

Catalyst Material: KAOWOOL

Catalyst Mass (g): 15.0

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 31

Gas Residence Time (s): 2.0

Bed Length (in): 8

Inlet O2 (%): 0.010

Inlet H2O (%): 0.12

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.02	500	500	500	0.0	0.0	46	225
8.00	500	500	500	0.0	0.0	62	302
10.04	500	460	470	8.0	6.0	78	393
12.04	500	190	210	62.0	58.0	93	496
13.40	500	40	52	92.0	89.6	106	601

Table 11

Catalyst Material: COTTON

Catalyst Mass (g): 9.17

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 30

Gas Residence Time (s): 2.0

Bed Length (in): 8

Inlet O2 (%): 0.011

Inlet H2O (%): 0.10

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.08	500	500	500	0.0	0.0	48	230
8.12	500	500	500	0.0	0.0	64	310
10.02	500	490	495	2.0	1.0	79	397
11.02	500	470	480	6.0	4.0	87	456
12.04	500	310	340	38.0	32.0	96	524
12.48	500	260	290	48.0	42.0	99	555
12.80	500	220	250	56.0	50.0	101	571
13.00	500	190	220	62.0	56.0	104	595

Table 12

Catalyst Material: EMPTY BED
Catalyst Mass (g): 0.0
Inner Elect. Diam. (mm): 15.0
Reactor Temperature (°C): 30
Gas Residence Time (s): 2.0

Bed Length (in): 8
Inlet O2 (%): 0.010
Inlet H2O (%): 0.10

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
4.08	500	500	500	0.0	0.0	16	86
4.08	500	490	495	2.0	1.0	31	150
6.06	500	435	450	13.0	10.0	47	211
8.04	500	330	370	34.0	26.0	62	275
10.08	500	180	220	64.0	56.0	76	342
12.00	500	88	115	82.4	77.0	90	429
14.06	500	26	38	94.8	92.4	107	570
15.04	500	6	11	98.8	97.8	115	650
15.42	500	2	6	99.6	98.8	118	686

Table 13

Catalyst Material: EMPTY BED
Catalyst Mass (g): 0.0
Inner Elect. Diam. (mm): 15.0
Reactor Temperature (°C): 25
Gas Residence Time (s): 2.0

Bed Length (in): 8
Inlet O2 (%): 0.019
Inlet H2O (%): 0.12

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
2.12	500	500	500	0.0	0.0	17	89
4.00	500	490	490	2.0	2.0	31	150
6.00	500	435	455	13.0	9.0	46	212
8.02	500	310	345	38.0	31.0	62	276
10.02	500	185	228	63.0	54.4	76	342
11.00	500	145	175	71.0	65.0	83	378
12.06	500	100	125	80.0	75.0	92	431
13.04	500	62	82	87.6	83.6	100	495
14.04	500	38	51	92.4	89.8	108	568
15.12	500	18	26	96.4	94.8	116	666

Table 14

Catalyst Material: EMPTY BED

Catalyst Mass (g): 0.0

Inner Elect. Diam. (mm): 17.2

Reactor Temperature (°C): 25

Gas Residence Time (s): 1.5

Bed Length (in): 8

Inlet O2 (%): 0.041

Inlet H2O (%): 0.10

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
2.04	495	495	495	0.0	0.0	16	86
4.02	495	495	495	0.0	0.0	32	153
6.00	495	350	380	29.3	23.2	46	220
7.04	495	300	325	39.4	34.3	54	247
8.04	495	255	280	48.5	43.4	61	273
9.02	495	220	250	55.6	49.5	68	299
10.02	495	190	210	61.6	57.6	76	330

Table 15

Catalyst Material: GLASS WOOL (F)

Catalyst Mass (g): 24.6

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 23

Gas Residence Time (s): 2.0

Bed Length (in): 8

Inlet O2 (%): 0.013

Inlet H2O (%): 0.15

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
5.98	500	500	500	0.0	0.0	31	156
7.99	500	485	485	3.0	3.0	62	306
10.02	500	200	215	60.0	57.0	78	397
10.89	500	110	125	78.0	75.0	85	440
11.87	500	50	60	90.0	88.0	92	490
12.90	500	8.5	12.5	98.3	97.5	96	562
13.96	500	0.35	0.45	99.9	99.9	110	654

Table 16

Catalyst Material: GLASS WOOL (F)

Catalyst Mass (g): 24.6

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 23

Gas Residence Time (s): 1.9

Bed Length (in): 8

Inlet O2 (%): 0.014

Inlet H2O (%): 0.15

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.08	700	695	695	0.7	0.7	63	305
10.02	700	630	640	10.0	8.6	79	392
10.96	700	470	495	32.9	29.3	86	438
11.93	700	290	320	58.6	54.3	94	501
12.91	700	155	170	77.9	75.7	102	570
13.88	700	55	70	92.1	90.0	109	654
14.89	700	12	15	98.3	97.9	117	732
15.66	700	1	2.5	99.9	99.6	124	818

Table 17

Catalyst Material: GLASS WOOL (F)
Catalyst Mass (g): 24.6
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 1.9

Bed Length (in): 8
Inlet O2 (%): 0.010
Inlet H2O (%): 0.15

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.10	200	200	200	0.0	0.0	47	225
8.10	200	195	195	2.5	2.5	63	303
10.08	200	172	175	14.0	12.5	79	392
10.99	200	48	55	76.0	72.5	87	441
11.93	200	2	3.2	99.0	98.4	94	497
12.47	200	0.35	0.4	99.8	99.8	98	539

Table 18

Catalyst Material: GLASS WOOL (F)
Catalyst Mass (g): 24.6
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 1.9

Bed Length (in): 8
Inlet O2 (%): 0.013
Inlet H2O (%): 0.15

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.17	500	500	500	0.0	0.0	48	229
8.08	500	500	500	0.0	0.0	64	304
10.02	500	445	460	11.0	8.0	79	390
10.95	500	320	345	36.0	31.0	86	437
11.99	500	180	205	64.0	59.0	96	505
12.80	500	67	87	86.6	82.6	102	586
13.90	500	9	14.5	98.2	97.1	109	648
14.87	500	0.4	1	99.9	99.8	117	731

Table 19

Catalyst Material: GLASS WOOL (F)
Catalyst Mass (g): 24.6
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 1.9

Bed Length (in): 8
Inlet O2 (%): 1.0
Inlet H2O (%): 0.15

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
9.82	500	500	500	0.0	0.0	71	342
10.06	500	470	480	6.0	4.0	80	391
10.96	500	370	410	26.0	18.0	86	437
12.00	500	245	320	51.0	36.0	95	504
12.96	500	160	220	68.0	56.0	102	577
13.95	500	100	155	80.0	69.0	110	656
14.93	500	60	98	88.0	80.4	118	744
15.89	500	52	79	89.6	84.2	126	846

Table 20

Catalyst Material: GLASS WOOL (F)

Catalyst Mass (g): 24.6

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 23

Gas Residence Time (s): 1.9

Bed Length (in): 8

Inlet O2 (%): 3.1

Inlet H2O (%): 0.13

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
9.98	500	465	485	7.0	3.0	79	398
11.00	500	360	440	28.0	12.0	87	451
11.97	500	265	380	47.0	24.0	96	513
12.94	500	200	320	60.0	36.0	103	587
14.82	500	160	245	68.0	51.0	117	750
15.82	500	170	250	66.0	50.0	125	850

Table 21

Catalyst Material: GLASS WOOL (F)

Catalyst Mass (g): 24.6

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 23

Gas Residence Time (s): 1.9

Bed Length (in): 8

Inlet O2 (%): 0.15

Inlet H2O (%): 0.29

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.10	500	475	480	5.0	4.0	63	307
8.97	500	445	450	11.0	10.0	70	342
10.02	500	370	375	26.0	25.0	79	393
10.93	500	310	320	38.0	36.0	85	435
11.94	500	265	275	47.0	45.0	93	491
12.91	500	240	250	52.0	50.0	100	548
13.90	500	220	235	56.0	53.0	109	629
14.78	500	205	220	59.0	56.0	116	714
15.89	500	187	200	62.6	60.0	125	838
16.79	500	170	183	66.0	63.4	134	963

Table 22

Catalyst Material: GLASS WOOL (F)

Catalyst Mass (g): 24.6

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 23

Gas Residence Time (s): 1.9

Bed Length (in): 8

Inlet O2 (%): .013

Inlet H2O (%): 1.16

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.97	500	490	490	2.0	2.0	52	208
8.85	500	450	455	10.0	9.0	68	316
10.89	500	410	420	18.0	16.0	85	427
12.89	500	365	380	27.0	24.0	101	561
14.85	500	335	350	33.0	30.0	117	729
16.77	500	300	320	40.0	36.0	133	960

Table 23

Catalyst Material: GLASS WOOL (F)
Catalyst Mass (g): 24.6
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 2.0

Bed Length (in): 8
Inlet O2 (%): .013
Inlet H2O (%): 0.15
INLET SO2 (ppm): 470

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
7.10	500	500	500	0.0	0.0	55	265
9.10	500	495	495	1.0	1.0	71	348
10.08	500	445	450	11.0	10.0	79	396
11.06	500	310	330	38.0	34.0	87	444
11.92	500	185	207	63.0	58.6	94	502
12.99	500	75	85	85.0	83.0	102	569
14.95	500	9	13	98.2	97.4	117	736
15.86	500	4.5	6	99.1	98.8	125	840

Table 24

Catalyst Material: GLASS WOOL (F)
Catalyst Mass (g): 7.68
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 2.1

Bed Length (in): 8
Inlet O2 (%): .012
Inlet H2O (%): 0.15

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.10	500	500	500	0.0	0.0	47	230
7.93	500	495	495	1.0	1.0	61	301
9.02	500	480	480	4.0	4.0	70	348
9.94	500	385	405	23.0	19.0	77	391
11.02	500	260	280	48.0	44.0	86	447
11.87	500	145	185	71.0	63.0	93	501
12.85	500	100	112	80.0	77.6	101	570
13.86	500	62	72	87.6	85.6	108	637
14.74	500	38	43	92.4	91.4	115	720
15.81	500	20	24	96.0	95.2	124	828

Table 25

Catalyst Material: GLASS WOOL (F)

Catalyst Mass (g): 7.68

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 23

Bed Length (in): 8

Inlet O2 (%): .014

Inlet H2O (%): 0.15

Gas Residence Time (s): 2.0

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
7.04	700	700	700	0.0	0.0	54	261
9.10	700	690	690	1.4	1.4	71	345
10.07	700	660	670	5.7	4.3	73	390
10.93	700	535	560	23.6	20.0	85	343
11.94	700	390	430	44.3	38.6	93	495
12.90	700	235	260	66.4	62.9	101	564
13.79	700	173	195	75.3	72.1	108	637
14.92	700	103	145	85.3	79.3	116	731
15.79	700	96	110	86.3	84.3	124	823

Table 26

Catalyst Material: GLASS WOOL (F)

Catalyst Mass (g): 3.72

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 23

Bed Length (in): 8

Inlet O2 (%): .010

Inlet H2O (%): 0.15

Gas Residence Time (s): 2.0

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.10	500	500	500	0.0	0.0	47	230
7.99	500	485	490	3.0	2.0	62	307
8.99	500	470	470	6.0	6.0	70	348
9.95	500	435	450	13.0	10.0	78	392
10.99	500	390	400	22.0	20.0	86	444
11.94	500	260	270	48.0	46.0	94	507
12.88	500	182	200	63.6	60.0	101	574
13.85	500	144	165	71.2	67.0	108	646
14.79	500	107	123	78.6	75.4	117	742
15.83	500	90	100	82.0	80.0	124	831

Table 27

Catalyst Material: GLASS WOOL (F)
Catalyst Mass (g): 3.72
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 2.0

Bed Length (in): 8
Inlet O2 (%): .010
Inlet H2O (%): 0.15

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.12	700	700	700	0.0	0.0	47	227
8.01	700	695	695	0.7	0.7	62	300
9.01	700	685	685	2.1	2.1	70	342
9.97	700	660	665	5.7	5.0	78	387
10.94	700	600	620	14.3	11.4	86	437
11.91	700	500	525	28.6	25.0	94	495
12.90	700	325	355	53.6	49.3	102	572
13.83	700	260	280	62.9	60.0	109	646
14.80	700	220	240	68.6	65.7	116	723
15.77	700	200	220	71.4	68.6	124	825

Table 28

Catalyst Material: EMPTY BED
Catalyst Mass (g): 0.0
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 2.0

Bed Length (in): 8
Inlet O2 (%): .011
Inlet H2O (%): 0.14

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
7.12	500	500	500	0.0	0.0	56	272
8.14	500	500	500	0.0	0.0	64	313
9.00	500	495	495	1.0	1.0	70	350
10.05	500	495	495	1.0	1.0	79	401
11.00	500	495	495	1.0	1.0	87	455
11.95	500	435	460	13.0	8.0	94	524
12.88	500	400	425	20.0	15.0	101	590
13.81	500	380	410	24.0	18.0	108	657
14.73	500	360	390	28.0	22.0	116	744
15.71	500	340	370	32.0	26.0	124	851

Table 29

Catalyst Material: EMPTY BED

Catalyst Mass (g): 0.0

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 23

Gas Residence Time (s): 2.0

Bed Length (in): 8

Inlet O2 (%): .012

Inlet H2O (%): 0.14

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.11	700	695	695	0.7	0.7	63	306
9.06	700	695	695	0.7	0.7	71	345
10.16	700	695	695	0.7	0.7	80	399
11.04	700	695	695	0.7	0.7	87	449
11.92	700	630	650	10.0	7.1	94	515
12.89	700	600	625	14.3	10.7	101	580
13.83	700	575	610	17.9	12.9	108	655
14.79	700	555	590	20.7	15.7	116	741
15.75	700	535	570	23.6	18.6	124	848

Table 30

Catalyst Material: GLASS WOOL (F)

Catalyst Mass (g): 24.6

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 23

Gas Residence Time (s): 2.0

Bed Length (in): 8

Inlet O2 (%): 1.1

Inlet H2O (%): 0.15

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.16	500	500	500	0.0	0.0	48	231
7.93	500	480	490	4.0	2.0	62	303
9.00	500	440	470	12.0	6.0	70	348
9.96	500	360	410	28.0	18.0	78	394
10.85	500	260	320	48.0	36.0	86	439
11.92	500	190	240	62.0	52.0	93	498
12.78	500	145	190	71.0	62.0	100	557
13.74	500	120	160	76.0	68.0	107	630
14.85	500	100	135	80.0	73.0	116	726
15.84	500	85	115	83.0	77.0	124	828

Table 31

Catalyst Material: GLASS WOOL (F)
Catalyst Mass (g): 24.6
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 2.0

Bed Length (in): 8
Inlet O2 (%): 1.1
Inlet H2O (%): 1.3

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.09	490	470	480	4.1	2.0	48	219
7.93	490	440	460	10.2	6.1	62	290
8.98	490	420	450	14.3	8.2	70	337
9.92	490	400	440	18.4	10.2	78	382
10.88	490	330	390	32.7	20.4	85	434
11.98	490	280	340	42.9	30.6	94	504
12.79	490	260	320	46.9	34.7	100	551
13.76	490	240	300	51.0	38.8	108	627
14.80	490	220	280	55.1	42.9	116	716
15.87	490	200	260	59.2	46.9	124	830

Table 32

Catalyst Material: GLASS WOOL (F)
Catalyst Mass (g): 24.6
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 2.0

Bed Length (in): 8
Inlet O2 (%): 3.0
Inlet H2O (%): 0.15

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
7.97	500	500	500	0.0	0.0	62	304
10.00	500	470	480	6.0	4.0	78	395
11.94	500	280	380	44.0	24.0	94	511
13.93	500	170	260	66.0	48.0	109	665
15.76	500	190	270	62.0	46.0	124	839

Table 33

Catalyst Material: GLASS WOOL (F)
Catalyst Mass (g): 24.6
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 2.0

Bed Length (in): 8
Inlet O2 (%): 3.1
Inlet H2O (%): 1.2

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
7.91	495	425	460	14.1	7.1	61	283
9.90	495	370	430	25.3	13.1	78	379
11.90	495	280	375	43.4	24.2	94	501
13.81	495	240	335	51.5	32.3	108	639
15.76	495	210	300	57.6	39.4	124	832

Table 34

Catalyst Material: GLASS WOOL (F)

Catalyst Mass (g): 24.6
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 2.0

Bed Length (in): 8
Inlet O2 (%): 6.2
Inlet H2O (%): 1.1

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
7.84	500	430	470	14.0	6.0	61	281
9.92	500	380	450	24.0	10.0	78	381
11.85	500	280	400	44.0	20.0	93	495
13.81	500	240	375	52.0	25.0	108	644
15.76	500	230	370	54.0	26.0	124	823

Table 35

Catalyst Material: MOLECULAR SIEVES, LINDE 4A

Catalyst Mass (g): 55.2
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 24
Gas Residence Time (s): 2.0

Bed Length (in): 8
Inlet O2 (%): .013
Inlet H2O (%): 0.16

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.02	500	490	490	2.0	2.0	46	219
8.02	500	480	480	4.0	4.0	62	293
9.97	500	320	320	36.0	36.0	78	374
11.87	500	135	145	73.0	71.0	91	479
12.88	500	105	125	79.0	75.0	100	552
13.84	500	95	105	81.0	79.0	108	629
14.88	500	90	100	82.0	80.0	116	721
15.91	500	90	100	82.0	80.0	124	835

Table 36

Catalyst Material: SILANIZED GLASS WOOL (S)

Catalyst Mass (g): 7.71
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 24
Gas Residence Time (s): 2.1

Bed Length (in): 8
Inlet O2 (%): .017
Inlet H2O (%): 0.15

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.19	500	500	500	0.0	0.0	48	234
8.01	500	495	495	1.0	1.0	62	308
9.01	500	485	490	3.0	2.0	70	350
10.13	500	450	460	10.0	8.0	80	403
10.97	500	345	370	31.0	26.0	86	448
12.00	500	200	230	60.0	54.0	94	514
12.85	500	63	80	87.4	84.0	102	582
13.86	500	5.5	8.5	98.9	98.3	110	663
14.77	500	0.4	1.2	99.9	99.8	117	746

Table 37

Catalyst Material: SILANIZED GLASS WOOL (S)

Catalyst Mass (g): 7.71 | Bed Length (in): 8

Inner Elect. Diam. (mm): 3.5 | Inlet O2 (%): .017

Reactor Temperature (°C): 24 | Inlet H2O (%): 0.15

Gas Residence Time (s): 2.1

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.03	700	700	700	0.0	0.0	46	226
8.02	700	690	695	1.4	0.7	62	302
8.98	700	680	690	2.9	1.4	70	346
10.04	700	665	665	5.0	5.0	79	396
10.97	700	545	570	22.1	18.6	86	441
11.93	700	400	435	42.9	37.9	94	506
12.91	700	200	230	71.4	67.1	102	578
13.86	700	80	95	88.6	86.4	110	660
14.88	700	20	26	97.1	96.3	118	750
15.74	700	2.8	5.8	99.6	99.2	125	846

Table 38

Catalyst Material: SILANIZED GLASS WOOL (S)

Catalyst Mass (g): 7.71 | Bed Length (in): 8

Inner Elect. Diam. (mm): 3.5 | Inlet O2 (%): 0.99

Reactor Temperature (°C): 24 | Inlet H2O (%): 0.13

Gas Residence Time (s): 2.1

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
7.03	500	500	500	0.0	0.0	55	268
8.08	500	490	495	2.0	1.0	63	311
9.01	500	480	490	4.0	2.0	71	353
10.03	500	460	480	8.0	4.0	78	398
10.98	500	380	425	24.0	15.0	86	450
11.99	500	280	350	44.0	30.0	95	522
12.89	500	195	260	61.0	48.0	102	586
14.81	500	85	128	83.0	74.4	118	750
15.79	500	64	100	87.2	80.0	126	853
16.83	500	50	78	90.0	84.4	135	995

Table 39

Catalyst Material: SILANIZED GLASS WOOL (S)

Catalyst Mass (g): 7.71 | Bed Length (in): 8

Inner Elect. Diam. (mm): 3.5 | Inlet O2 (%): 3.1

Reactor Temperature (°C): 24 | Inlet H2O (%): 0.14

Gas Residence Time (s): 2.1

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
7.02	500	500	500	0.0	0.0	54	261
8.97	500	490	500	2.0	0.0	70	342
10.97	500	385	460	23.0	8.0	86	440
11.90	500	325	415	35.0	17.0	94	503
12.90	500	255	380	49.0	24.0	102	580
13.90	500	200	320	60.0	36.0	110	660
14.78	500	180	280	64.0	44.0	118	750
15.75	500	180	265	64.0	47.0	126	850
16.78	500	185	260	63.0	48.0		

Table 40

Catalyst Material: SILANIZED GLASS WOOL (S)

Catalyst Mass (g): 7.71 | Bed Length (in): 8

Inner Elect. Diam. (mm): 3.5 | Inlet O2 (%): .019

Reactor Temperature (°C): 24 | Inlet H2O (%): 0.39

Gas Residence Time (s): 2.1

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
7.00	500	490	495	2.0	1.0	57	260
8.96	500	435	460	13.0	8.0	70	338
10.92	500	345	400	31.0	20.0	85	431
12.81	500	245	310	51.0	38.0	101	564
14.75	500	160	215	68.0	57.0	117	740
16.74	500	110	160	78.0	68.0	133	970

Table 41

Catalyst Material: EMPTY BED

Catalyst Mass (g): 0.0 | Bed Length (in): 8

Inner Elect. Diam. (mm): 3.5 | Inlet O2 (%): .039

Reactor Temperature (°C): 24 | Inlet H2O (%): 0.13

Gas Residence Time (s): 4.0

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.13	500	490	495	2.0	1.0	63	313
10.00	500	485	490	3.0	2.0	78	400
12.02	500	405	440	19.0	12.0	95	537
13.90	500	280	330	44.0	34.0	110	692
15.76	500	205	250	59.0	50.0	125	884

Table 42

Catalyst Material: EMPTY BED

Catalyst Mass (g): 0.0

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 24

Gas Residence Time (s): 5.1

Bed Length (in): 8

Inlet O2 (%): .034

Inlet H2O (%): 0.14

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.07	500	490	495	2.0	1.0	62	307
10.18	500	485	490	3.0	2.0	80	405
11.90	500	400	440	20.0	12.0	95	524
13.86	500	250	300	50.0	40.0	110	689
15.83	500	160	200	68.0	60.0	125	891

Table 43

Catalyst Material: ZIRCONIA KAOWOOL

Catalyst Mass (g): 7.78

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 24

Gas Residence Time (s): 2.0

Bed Length (in): 5.25

Inlet O2 (%): .020

Inlet H2O (%): 0.18

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.04	500	500	500	0.0	0.0	62	305
10.08	500	485	485	3.0	3.0	78	400
11.01	500	355	375	29.0	25.0	86	453
11.95	500	250	280	50.0	44.0	94	518
12.96	500	160	185	68.0	63.0	104	600
13.96	500	75	90	85.0	82.0	112	701
14.92	500	26	34	94.8	93.2	120	805
15.87	500	4	8	99.2	98.4	128	920

Table 44

Catalyst Material: GLASS WOOL (S)

Catalyst Mass (g): 7.69

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 24

Gas Residence Time (s): 2.1

Bed Length (in): 8.1

Inlet O2 (%): .012

Inlet H2O (%): 0.22

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.00	500	475	475	5.0	5.0	62	307
8.97	500	420	425	16.0	15.0	70	348
10.00	500	310	315	38.0	37.0	78	395
10.88	500	182	200	63.6	60.0	84	438
11.88	500	100	130	80.0	74.0	92	495
12.81	500	38	70	92.4	86.0	100	560
13.84	500	8	35	98.4	93.0	108	638
14.78	500	2	24	99.6	95.2	116	733
15.78	500	1	20	99.8	96.0	124	836

Table 45

Catalyst Material: EMPTY BED

Catalyst Mass (g): 0.0

Inner Elect. Diam. (mm): 17.1

Reactor Temperature (°C): 24

Gas Residence Time (s): 2.0

Bed Length (in): 8

Inlet O2 (%): .015

Inlet H2O (%): 0.13

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
4.07	500	500	500	0.0	0.0	30	152
4.99	500	435	450	13.0	10.0	37	178
6.02	500	380	405	24.0	19.0	45	207
6.94	500	280	340	44.0	32.0	52	235
7.99	500	230	290	54.0	42.0	60	263
9.94	500	175	242	65.0	51.6	74	321
11.89	500	113	173	77.4	65.4	89	403
13.86	500	61	108	87.8	78.4	106	544

Table 46

Catalyst Material: GLASS WOOL (S)

Catalyst Mass (g): 6.90

Inner Elect. Diam. (mm): 17.1

Reactor Temperature (°C): 24

Gas Residence Time (s): 2.0

Bed Length (in): 8

Inlet O2 (%): .014

Inlet H2O (%): 0.12

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
4.21	500	500	500	0.0	0.0	32	153
5.03	500	400	400	20.0	20.0	38	180
5.97	500	190	190	62.0	62.0	45	210
6.92	500	97	106	80.6	78.8	51	321
7.91	500	30	42	94.0	91.6	59	257
8.96	500	2	11	99.6	97.8	67	288
9.93	500	0.1	7	100.0	98.6	74	317

Table 47

Catalyst Material: EMPTY BED

Catalyst Mass (g): 0.0

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 24

Gas Residence Time (s): 2.0

Bed Length (in): 8

Inlet O2 (%): .016

Inlet H2O (%): 0.15

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
11.93	500	420		16.0		94	530
13.77	500	360	145	28.0	71.0	109	675
15.67	500	320	370	36.0	26.0	124	871

Table 48

Catalyst Material: EMPTY BED

Catalyst Mass (g): 0.0

Inner Elect. Diam. (mm): 6.3

Reactor Temperature (°C): 24

Gas Residence Time (s): 2.0

Bed Length (in): 8

Inlet O2 (%): .015

Inlet H2O (%): 0.16

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
9.96	500	495	495	1.0	1.0	77	390
11.92	500	450	470	10.0	6.0	93	513
13.87	500	320	360	36.0	28.0	110	690
15.72	500	260	310	48.0	38.0	124	874

Table 49

Catalyst Material: EMPTY BED

Catalyst Mass (g): 0.0

Inner Elect. Diam. (mm): 9.5

Reactor Temperature (°C): 28

Gas Residence Time (s): 2.0

Bed Length (in): 8

Inlet O2 (%): .013

Inlet H2O (%): 0.17

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
9.11	500	495	495	1.0	1.0	70	347
11.99	500	360	405	28.0	19.0	94	514
12.41	500	315	365	37.0	27.0	97	549
13.93	500	240	300	52.0	40.0	108	664
15.76	500	185	225	63.0	55.0	124	853

Table 50

Catalyst Material: GLASS WOOL (S)

Catalyst Mass (g): 7.90

Inner Elect. Diam. (mm): 9.5

Reactor Temperature (°C): 31

Gas Residence Time (s): 2.0

Bed Length (in): 8

Inlet O2 (%): .015

Inlet H2O (%): 0.22

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.04	500	500	500	0.0	0.0	45	225
8.07	500	300	320	40.0	36.0	60	304
9.92	500	117	140	76.6	72.0	74	372
11.89	500	14	34	97.2	93.2	90	469
13.79	500	1.4	17	99.7	96.6	106	608

Table 51

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 7.90
Inner Elect. Diam. (mm): 9.5
Reactor Temperature (°C): 31
Gas Residence Time (s): 1.5

Bed Length (in): 8
Inlet O2 (%): .013
Inlet H2O (%): 0.24

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.99	500	500	500	0.0	0.0	52	258
8.14	500	480	485	4.0	3.0	62	304
9.95	500	230	260	54.0	48.0	76	388
11.81	500	65	85	87.0	83.0	89	478
13.81	500	7	17	98.6	96.6	106	628

Table 52

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 7.90
Inner Elect. Diam. (mm): 9.5
Reactor Temperature (°C): 31
Gas Residence Time (s): 1.0

Bed Length (in): 8
Inlet O2 (%): .013
Inlet H2O (%): 0.24

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
7.00	500	500	500	0.0	0.0	52	258
7.99	500	495	495	1.0	1.0	60	298
9.95	500	400	430	20.0	14.0	76	383
11.87	500	180	200	64.0	60.0	91	497
13.81	500	82	98	83.6	80.4	106	635
15.72	500	28	38	94.4	92.4	122	820

Table 53

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 2.0

Bed Length (in): 8.25
Inlet O2 (%): .024
Inlet H2O (%): 0.11

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.01	500	500	500	0.0	0.0	63	307
10.07	500	475	484	5.0	3.2	79	401
11.03	500	400	420	20.0	16.0	87	452
11.98	500	240	270	52.0	46.0	95	517
12.93	500	95	112	81.0	77.6	103	590
13.82	500	22	27	95.6	94.6	110	670
14.88	500	0.8	2.6	99.8	99.5	118	770

Table 54

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 2.1
Bed Length (in): 8.25
Inlet O2 (%): 1.11
Inlet H2O (%): 0.12

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
10.09	500	485	495	3.0	1.0	80	400
10.99	500	420	455	16.0	9.0	86	450
11.94	500	320	380	36.0	24.0	95	510
12.95	500	210	280	58.0	44.0	103	590
13.91	500	115	185	77.0	63.0	111	690
14.75	500	55	105	89.0	79.0	118	760
15.78	500	26	66	94.8	86.8	125	860
16.73	500	3	35	99.4	93.0	133	990

Table 55

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 2.1
Bed Length (in): 8.25
Inlet O2 (%): 1.02
Inlet H2O (%): 0.12
Inlet CH4 (ppm): 690

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
10.03	500	475	485	5.0	3.0	80	390
10.96	500	410	450	18.0	10.0	96	440
11.91	500	320	380	36.0	24.0	94	510
13.82	500	165	235	67.0	53.0	110	670
14.86	500	90	150	82.0	70.0	118	770
16.77	500	40	86	92.0	82.8	133	1000

Table 56

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 2.1
Bed Length (in): 8.25
Inlet O2 (%): .023
Inlet H2O (%): 0.10
Inlet CH4 (ppm): 770

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.15	500	490	490	2.0	2.0	64	310
9.03	500	470	475	6.0	5.0	71	350
10.00	500	415	425	17.0	15.0	79	390
10.95	500	325	340	35.0	32.0	86	442
11.92	500	210	240	58.0	52.0	94	510
12.82	500	100	120	80.0	76.0	102	570
13.92	500	18	35	96.4	93.0	111	680
14.83	500	1.5	20	99.7	96.0	118	760

Table 57

Catalyst Material: GLASS WOOL (S)

Catalyst Mass (g): 18.8

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 23

Gas Residence Time (s): 2.0

Bed Length (in): 8.25

Inlet O2 (%): 0.50

Inlet H2O (%): 0.12

Inlet CO (ppm): 450

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.03	500	495	495	1.0	1.0	63	310
9.04	500	485	490	3.0	2.0	71	354
11.01	500	370	410	26.0	18.0	87	452
12.92	500	170	225	66.0	55.0	102	590
14.79	500	22	56	95.6	88.8	118	770
16.71	500	0.3	6	99.9	98.8	133	1000

Table 58

Catalyst Material: GLASS WOOL (S)

Catalyst Mass (g): 18.8

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 23

Gas Residence Time (s): 2.0

Bed Length (in): 8.25

Inlet O2 (%): 0.50

Inlet H2O (%): 0.12

Inlet CO (ppm): 200

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.11	500	495	495	1.0	1.0	64	310
9.13	500	485	490	3.0	2.0	72	352
10.99	500	385	420	23.0	16.0	86	445
12.90	500	175	235	65.0	53.0	102	590
14.78	500	19	55	96.2	89.0	117	760
16.71	500	0.3	8	99.9	98.4	133	1000

Table 59

Catalyst Material: GLASS WOOL (S)

Catalyst Mass (g): 18.8

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 23

Gas Residence Time (s): 2.0

Bed Length (in): 8.25

Inlet O2 (%): 1.02

Inlet H2O (%): 0.10

Inlet CO (ppm): 500

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.17	500	495	495	1.0	1.0	64	315
9.98	500	465	480	7.0	4.0	78	400
11.96	500	280	350	44.0	30.0	95	520
13.90	500	100	165	80.0	67.0	110	680
15.87	500	3	57	99.4	88.6	126	890
16.88	500	0.3	26	99.9	94.8	134	1010

Table 60

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 2.0

Bed Length (in): 8.25
Inlet O2 (%): 1.02
Inlet H2O (%): 0.11
Inlet CO (ppm): 200

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.39	500	495	495	1.0	1.0	66	320
10.27	500	450	470	10.0	6.0	80	400
11.98	500	285	360	43.0	28.0	95	510
13.96	500	105	170	79.0	66.0	111	680
15.85	500	9	61	98.2	87.8	126	880
16.78	500	0.3	29	99.9	94.2	134	1000

Table 61

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 2.0

Bed Length (in): 8.25
Inlet O2 (%): 1.06
Inlet H2O (%): 0.11
Inlet CO (ppm): 100

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.17	500	495	495	1.0	1.0	64	306
10.01	500	460	480	8.0	4.0	79	390
11.93	500	295	370	41.0	26.0	94	501
13.90	500	115	175	77.0	65.0	111	670
15.72	500	13	62	97.4	87.6	125	860
16.77	500	0.2	30	100.0	94.0	133	980

Table 62

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 2.0

Bed Length (in): 8.25
Inlet O2 (%): 1.13
Inlet H2O (%): 0.11
Inlet CO (ppm): 500
Inlet CO2 (%): 10

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.17	495	495	495	0.0	0.0	64	309
8.99	495	495	495	0.0	0.0	70	344
10.31	495	480	495	3.0	0.0	81	409
12.14	495	380	450	23.2	9.1	96	530
13.97	495	225	320	54.5	35.4	112	700
15.85	495	135	210	72.7	57.6	126	890
16.70	495	115	182	76.8	63.2	133	990

Table 63

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 2.0

Bed Length (in): 8.25
Inlet O2 (%): 1.13
Inlet H2O (%): 0.11
Inlet CO (ppm): 200
Inlet CO2 (%): 10

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.23	495	490	495	1.0	0.0	65	309
10.10	495	480	490	3.0	1.0	80	394
12.02	495	375	440	24.2	11.1	95	510
13.99	495	220	320	55.6	35.4	112	680
15.74	495	135	207	72.7	58.2	124	850
16.73	495	115	178	76.8	64.0	133	1000

Table 64

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 12.7
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): .023
Inlet H2O (%): 0.13

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
7.96	500	470	470	6.0	6.0	62	303
8.88	500	400	410	20.0	18.0	69	344
11.07	500	182	205	63.6	59.0	86	449
12.19	500	87	110	82.6	78.0	95	515
13.15	500	24	37	95.2	92.6	103	590

Table 65

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 12.7
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 5.6
Inlet H2O (%): 0.16

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
11.10	500	340	460	32.0	8.0	87	458
11.73	500	300	440	40.0	12.0	92	500
12.48	500	250	420	50.0	16.0	98	552
13.30	500	220	390	56.0	22.0	105	617
14.38	500	210	370	58.0	26.0	114	708
15.03	500	225	390	55.0	22.0	119	765
15.53	500	260	380	48.0	24.0	123	810

Table 66

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 12.7
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 24
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 2.0
Inlet H2O (%): 0.14

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
10.36	500	480	500	4.0	0.0	82	405
11.10	500	400	460	20.0	8.0	88	446
12.36	500	280	380	44.0	24.0	98	537
12.78	500	260	350	48.0	30.0	102	569
13.84	500	190	280	62.0	44.0	110	555
14.59	500	160	245	68.0	51.0	116	722
15.63	500	147	220	70.6	56.0	124	831

Table 67

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 12.7
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 25
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 1.0
Inlet H2O (%): 0.13

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.76	500	490	495	2.0	1.0	68	340
9.07	500	485	490	3.0	2.0	71	352
10.69	500	460	480	8.0	4.0	84	433
11.91	500	320	380	36.0	24.0	94	509
12.65	500	250	320	50.0	36.0	100	565
13.87	500	135	190	73.0	62.0	110	667
14.93	500	82	120	83.6	76.0	118	762
15.74	500	80	120	84.0	76.0	124	844

Table 68

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 12.7
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 25
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 2.9
Inlet H2O (%): 0.14

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
9.76	500	480	490	4.0	2.0	76	376
11.05	500	400	460	20.0	8.0	87	445
11.70	500	360	440	28.0	12.0	92	485
12.91	500	270	380	46.0	24.0	102	575
14.34	500	190	300	62.0	40.0	114	710
15.74	500	165	250	67.0	50.0	123	846

Table 69

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 12.7
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 25
Gas Residence Time (s): 1.7
Bed Length (in): 8.25
Inlet O2 (%): 3.9
Inlet H2O (%): 0.14

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
9.55	500	480	490	4.0	2.0	74	362
11.34	500	390	465	22.0	7.0	90	460
12.50	500	300	420	40.0	16.0	99	548
13.14	500	260	400	48.0	20.0	104	603
14.35	500	205	340	59.0	32.0	114	710
15.69	500	170	300	66.0	40.0	124	854

Table 70

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 12.7
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 25
Gas Residence Time (s): 1.7
Bed Length (in): 8.25
Inlet O2 (%): 4.9
Inlet H2O (%): 0.13

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.79	500	480	490	4.0	2.0	68	328
10.59	500	475	480	5.0	4.0	83	415
10.74	500	460	480	8.0	4.0	84	423
11.92	500	340	450	32.0	10.0	94	500
13.35	500	245	410	51.0	18.0	106	620
14.53	500	205	380	59.0	24.0	116	735
15.69	500	180	330	64.0	34.0	125	855

Table 71

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 1.7
Bed Length (in): 8.25
Inlet O2 (%): 5.9
Inlet H2O (%): 0.11

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.16	500	470	490	6.0	2.0	63	311
9.63	500	420	480	16.0	4.0	76	379
10.91	500	360	460	28.0	8.0	86	446
11.77	500	280	420	44.0	16.0	92	501
12.59	500	235	390	53.0	22.0	100	560
13.89	500	192	360	61.6	28.0	110	672
15.49	500	170	340	66.0	32.0	123	840

Table 72

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 4.9
Inlet H2O (%): 0.12

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.29	500	485	500	3.0	0.0	65	314
9.56	500	480	500	4.0	0.0	75	370
10.58	500	420	480	16.0	4.0	83	424
11.87	500	340	450	32.0	10.0	94	502
12.75	500	240	400	52.0	20.0	102	572
13.77	500	190	360	62.0	28.0	110	664
15.65	500	155	300	69.0	40.0	124	855

Table 73

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 3.9
Inlet H2O (%): 0.12

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
7.17	500	490	500	2.0	0.0	56	266
9.56	500	465	490	7.0	2.0	75	367
10.93	500	420	480	16.0	4.0	86	440
11.83	500	360	450	28.0	10.0	94	500
12.85	500	250	400	50.0	20.0	102	579
13.49	500	205	350	59.0	30.0	107	640

Table 74

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 3.0
Inlet H2O (%): 0.11

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
9.13	500	480	500	4.0	0.0	72	355
10.64	500	460	480	8.0	4.0	83	431
11.62	500	380	440	24.0	12.0	92	492
12.53	500	280	390	44.0	22.0	100	559
13.22	500	230	340	54.0	32.0	105	623
14.65	500	155	260	69.0	48.0	116	751
15.75	500	127	230	74.6	54.0	125	862

Table 75

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 2.0
Inlet H2O (%): 0.12

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.53	500	490	500	2.0	0.0	66	323
10.40	500	450	480	10.0	4.0	82	413
11.27	500	420	460	16.0	8.0	88	464
12.38	500	320	400	36.0	20.0	98	544
13.42	500	210	300	58.0	40.0	107	634
14.17	500	155	235	69.0	53.0	112	695
15.75	500	93	165	81.4	67.0	125	855

Table 76

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 1.0
Inlet H2O (%): 0.11

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
9.56	500	480	480	4.0	4.0	75	366
10.90	500	430	460	14.0	8.0	86	435
12.02	500	340	400	32.0	20.0	96	513
13.01	500	230	280	54.0	44.0	104	590
14.26	500	115	175	77.0	65.0	114	707
15.72	500	51	92	89.8	81.6	125	843

Table 77

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 24
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): .036
Inlet H2O (%): 0.11

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
7.82	500	500	500	0.0	0.0	61	299
8.90	500	490	495	2.0	1.0	69	345
10.47	500	450	460	10.0	8.0	82	422
11.81	500	300	320	40.0	36.0	93	503
12.46	500	165	190	67.0	62.0	98	548
13.83	500	38	50	92.4	90.0	110	668
15.74	500	1	2	99.8	99.6	125	867

Table 78

Catalyst Material: GLASS WOOL (S)

Catalyst Mass (g): 18.8

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 24

Gas Residence Time (s): 1.7

Bed Length (in): 8.25

Inlet O2 (%): 0.65

Inlet H2O (%): 0.13

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
10.62	480	460	470	4.2	2.1	84	432
12.04	480	390	430	18.8	10.4	95	521
12.91	480	300	360	37.5	25.0	102	590
13.71	480	220	270	54.2	43.8	109	665
14.55	480	160	200	66.7	58.3	116	747
15.79	480	100	130	79.2	72.9	126	878

Table 79

Catalyst Material: GLASS WOOL (S)

Catalyst Mass (g): 18.8

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 22

Gas Residence Time (s): 1.7

Bed Length (in): 8.25

Inlet O2 (%): 6.0

Inlet H2O (%): 1.07

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
5.74	480	440	480	8.3	0.0	44	214
6.35	480	445	480	7.3	0.0	50	242
7.75	480	420	470	12.5	2.1	61	297
9.41	480	385	465	19.8	3.1	74	371
10.66	480	340	460	29.2	4.2	84	434
11.84	480	300	460	37.5	4.2	93	510
12.85	480	280	470	41.7	2.1	102	591
14.11	480	260	480	45.8	0.0	112	702
15.67	480	260	490	45.8	-2.1	125	870

Table 80

Catalyst Material: GLASS WOOL (S)

Catalyst Mass (g): 18.8

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 25

Gas Residence Time (s): 1.7

Bed Length (in): 8.25

Inlet O2 (%): 6.1

Inlet H2O (%): 0.14

Inlet CO2 (%): 10

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
9.36	500	480	495	4.0	1.0	72	366
10.69	500	440	480	12.0	4.0	84	434
11.55	500	340	460	32.0	8.0	91	489
12.58	500	240	440	52.0	12.0	100	571
13.57	500	205	410	59.0	18.0	107	652
14.33	500	205	410	59.0	18.0	114	723
15.79	500	205	400	59.0	20.0	125	873

Table 81

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 22
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): .018
Inlet H2O (%): 0.11

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
10.31	300	280	280	6.7	6.7	82	416
11.30	300	215	230	28.3	23.3	89	470
11.59	300	165	185	45.0	38.3	92	491
11.98	300	115	130	61.7	56.7	95	518
12.78	300	30	36	90.0	88.0	101	578
13.51	300	4	5	98.7	98.3		
14.31	300	0.3	0.5	99.9	99.8	113	704
15.71	300	0.1	0.3	100.0	99.9	125	847

Table 82

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 22
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 2.9
Inlet H2O (%): 0.12

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
9.59	300	280	290	6.7	3.3	75	372
10.80	300	250	280	16.7	6.7	85	434
11.74	300	190	260	36.7	13.3	93	493
12.59	300	125	230	58.3	23.3	100	558
13.76	300	52	160	82.7	46.7	110	666
14.35	300	30	130	90.0	56.7	114	714
15.71	300	5	37	98.3	87.7	125	860

Table 83

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 22
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 4.9
Inlet H2O (%): 0.12

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.95	300	285	290	5.0	3.3	70	339
10.13	300	270	290	10.0	3.3	80	396
11.31	300	200	280	33.3	6.7	90	464
12.50	300	115	250	61.7	16.7	100	549
13.61	300	52	220	82.7	26.7	109	650
14.38	300	33	195	89.0	35.0	114	720
15.75	300	27	162	91.0	46.0	125	860

Table 84

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 21
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): .023
Inlet H2O (%): 0.10

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.43	500	490	490	2.0	2.0	66	327
9.69	500	480	490	4.0	2.0	77	385
10.80	500	440	450	12.0	10.0	85	444
11.47	500	340	360	32.0	28.0	91	481
12.06	500	260	280	48.0	44.0	96	525
13.01	500	115	140	77.0	72.0	103	600
13.70	500	48	58	90.4	88.4	109	657
14.28	500	27	33	94.6	93.4	114	706
15.69	500	3	4	99.4	99.2	124	857

Table 85

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 21
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 3.0
Inlet H2O (%): 0.10

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
10.04	480	460	480	4.2	0.0	80	396
11.30	480	390	440	18.8	8.3	90	467
12.31	480	310	410	35.4	14.6	98	540
13.16	480	230	350	52.1	27.1	105	610
14.12	480	170	290	64.6	39.6	112	699
15.76	480	110	215	77.1	55.2	126	875

Table 86

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 21
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 5.9
Inlet H2O (%): 0.10

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
9.60	480	460	475	4.2	1.0	76	372
10.56	480	410	470	14.6	2.1	84	420
11.68	480	340	450	29.2	6.3	93	489
12.67	480	270	420	43.8	12.5	101	567
13.50	480	215	400	55.2	16.7	108	643
14.45	480	160	360	66.7	25.0	115	736
15.72	480	140	320	70.8	33.3	125	867

Table 87

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 22
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 6.0
Inlet H2O (%): 1.1

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.32	500	440	480	12.0	4.0	50	240
7.45	500	420	480	16.0	4.0	58	285
8.53	500	400	475	20.0	5.0	67	330
9.65	500	370	470	26.0	6.0	76	381
10.41	500	350	470	30.0	6.0	83	426
11.34	500	330	480	34.0	4.0	90	480
12.19	500	300	480	40.0	4.0	96	530
13.33	500	280	490	44.0	2.0	105	630
14.22	500	280	505	44.0	-1.0	113	708
15.76	500	275	520	45.0	-4.0	125	872

Table 88

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 22
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): .037
Inlet H2O (%): 0.10

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
14.34	500	10	15	98.0	97.0	113	708
15.70	500	0.3	0.9	99.9	99.8	124	850

Table 89

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 22
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 4.9
Inlet H2O (%): 0.11

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
6.33	390	380	385	2.6	1.3	50	239
9.01	390	360	380	7.7	2.6	71	347
10.46	390	260	360	33.3	7.7	82	416
11.67	390	160	320	59.0	17.9	92	492
12.47	390	125	300	67.9	23.1	99	550
15.30	390	110	280	71.8	28.2	105	614
14.19	390	110	260	71.8	33.3	113	698
15.77	390	195	240	50.0	38.5	125	862

Table 90

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (^{o}C): 22
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 5.0
Inlet H2O (%): 0.11

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
7.16	200	195	195	2.5	2.5	56	268
8.78	200	190	195	5.0	2.5	69	334
10.94	200	93	180	53.5	10.0	86	442
11.82	200	20	165	90.0	17.5	94	498
12.71	200	0.5	135	99.8	32.5	101	566
13.70	200	0.3	105	99.9	47.5	109	651
14.71	200	0.3	88	99.9	56.0	117	749
15.69	200	0.3	105	99.9	47.5	124	849

Table 91

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (^{o}C): 22
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 5.0
Inlet H2O (%): 0.11

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.51	100	98	98	2.0	2.0	67	326
9.71	100	82	98	18.0	2.0	76	382
10.72	100	26	89	74.0	11.0	85	436
11.67	100	0.3	74	99.7	26.0	92	492
12.56	100	0.2	54	99.8	46.0	100	561
13.68	100	0.1	28	99.9	72.0	110	660
15.59	100	0.1	20	99.9	80.0	124	865

Table 92

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 22
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): .021
Inlet H2O (%): 1.13

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
5.72	100	98	99	2.0	1.0	43	184
8.61	100	95	96	5.0	4.0	67	327
9.68	100	91	94	9.0	6.0	76	380
10.55	100	82	84	18.0	16.0	83	427
11.23	100	68	73	32.0	27.0	88	470
11.95	100	60	68	40.0	32.0	94	513
12.62	100	52	63	48.0	37.0	99	555
13.44	100	46	58	54.0	42.0	106	624
14.07	100	45	58	55.0	42.0	110	680
14.75	100	36	50	64.0	50.0	116	737
14.70	100	34	51	66.0	49.0	124	846

Table 93

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 22
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): .017
Inlet H2O (%): 1.04

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.77	485	460	460	5.2	5.2	68	306
9.76	485	440	445	9.3	8.2	76	380
10.63	485	415	420	14.4	13.4	83	424
11.48	485	370	380	23.7	21.6	90	477
12.50	485	330	350	32.0	27.8	98	547
13.34	485	300	320	38.1	34.0	104	617
13.94	485	265	300	45.4	38.1	110	667
15.03	485	238	270	50.9	44.3	119	777
15.68	485	215	250	55.7	48.5	124	850

Table 94

Catalyst Material: GLASS WOOL (S)

Catalyst Mass (g): 18.8

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 23

Gas Residence Time (s): 1.7

Bed Length (in): 8.25

Inlet O2 (%): 1.1

Inlet H2O (%): 0.11

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
9.23	490	470	480	4.1	2.0	72	362
9.74	490	460	475	6.1	3.1	76	385
10.32	490	440	460	10.2	6.1	81	413
10.63	490	420	450	14.3	8.2	84	428
11.72	490	325	385	33.7	21.4	92	496
12.95	490	200	270	59.2	44.9	102	590
14.26	490	110	170	77.6	65.3	113	710
15.69	490	62	110	87.3	77.6	124	850

Table 95

Catalyst Material: GLASS WOOL (S)

Catalyst Mass (g): 18.8

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 23

Gas Residence Time (s): 1.7

Bed Length (in): 8.25

Inlet O2 (%): 1.1

Inlet H2O (%): 0.11

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
9.03	97	91	96	6.2	1.0	71	346
8.52	97	95	97	2.1	0.0	67	323
8.81	97	93	96	4.1	1.0	69	337
10.10	97	72	88	25.8	9.3	80	395
11.57	97	14	56	85.6	42.3	91	479
12.85	97	0.2	18	99.8	81.4	102	582
13.82	97	0.2	5	99.8	94.8	110	663

Table 96

Catalyst Material: GLASS WOOL (S)

Catalyst Mass (g): 18.8

Inner Elect. Diam. (mm): 3.5

Reactor Temperature (°C): 23

Gas Residence Time (s): 1.7

Bed Length (in): 8.25

Inlet O2 (%): 1.1

Inlet H2O (%): 0.11

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.90	195	190	194	2.6	0.5	70	339
9.20	195	187	193	4.1	1.0	72	352
9.63	195	180	190	7.7	2.6	76	372
10.88	195	130	165	33.3	15.4	86	434
12.29	195	58	108	70.3	44.6	97	530
13.79	195	0.2	34	99.9	82.6	109	664
15.12	195	0.2	10	99.9	94.9	120	792

Table 97

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 23
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 1.1
Inlet H2O (%): 0.11

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
9.22	290	280	290	3.4	0.0	72	352
9.95	290	270	280	6.9	3.4	78	384
10.72	290	235	260	19.0	10.3	84	426
11.93	290	150	205	48.3	29.3	94	505
13.27	290	67	125	76.9	56.9	105	610
14.55	290	0.3	51	99.9	82.4	115	740
15.69	290	0.2	23	99.9	92.1	124	855

Table 98

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 24
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 1.1
Inlet H2O (%): 0.12

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.00	395	380	385	3.8	2.5	62	308
7.26	395	390	390	1.3	1.3	56	277
7.56	395	390	390	1.3	1.3	59	290
8.39	395	380	385	3.8	2.5	66	324
9.38	395	370	380	6.3	3.8	74	367
10.15	395	350	370	11.4	6.3	80	403
11.60	395	260	310	34.2	21.5	92	477
13.14	395	130	200	67.1	49.4	104	600
14.57	395	55	105	86.1	73.4	115	730
15.80	395	21	70	94.7	82.3	125	850

Table 99

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 24
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 3.5
Inlet H2O (%): 0.12

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
7.94	96	93	95	3.1	1.0	62	299
8.90	96	88	95	8.3	1.0	70	339
10.03	96	68	92	29.2	4.2	79	391
11.88	96	0.5	70	99.5	27.1	94	494
13.78	96	0.3	30	99.7	68.8	110	660

Table 100

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 24
Gas Residence Time (s): 1.7
Bed Length (in): 8.25
Inlet O2 (%): 3.5
Inlet H2O (%): 0.12

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
7.12	197	192	195	2.5	1.0	56	265
7.70	197	192	195	2.5	1.0	60	288
8.42	197	191	195	3.0	1.0	66	317
9.37	197	183	194	7.1	1.5	73	359
9.99	197	170	190	13.7	3.6	78	390
11.96	197	60	160	69.5	18.8	95	506
13.89	197	0.5	105	99.7	46.7		
15.71	197	0.4	62	99.8	68.5	125	850

Table 101

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 24
Gas Residence Time (s): 1.7
Bed Length (in): 8.25
Inlet O2 (%): 3.6
Inlet H2O (%): 0.12

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.68	290	285	290	1.7	0.0	68	328
9.59	290	280	290	3.4	0.0	75	369
10.34	290	255	280	12.1	3.4	81	406
11.86	290	155	260	46.6	10.3	94	500
13.89	290	57	195	80.3	32.8	110	665
15.76	290		130		55.2	125	850

Table 102

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 22
Gas Residence Time (s): 1.7
Bed Length (in): 8.25
Inlet O2 (%): 3.6
Inlet H2O (%): 0.10

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.77	400	395	400	1.3	0.0	69	341
9.43	400	380	400	5.0	0.0	74	370
10.93	400	320	380	20.0	5.0	86	446
12.52	400	205	330	48.8	17.5	99	560
14.05	400	115	255	71.3	36.3	112	700
15.85	400	78	190	80.5	52.5	126	875

Table 103

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 22
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 3.5
Inlet H2O (%): 0.11

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.44	500	495	500	1.0	0.0	66	320
9.51	500	480	500	4.0	0.0	75	367
10.75	500	420	475	16.0	5.0	85	429
12.34	500	305	430	39.0	14.0	98	540
14.02	500	185	325	63.0	35.0	112	680
15.69	500	135	255	73.0	49.0	124	855

Table 104

Catalyst Material: GLASS WOOL (S)
Catalyst Mass (g): 18.8
Inner Elect. Diam. (mm): 3.5
Reactor Temperature (°C): 22
Gas Residence Time (s): 1.7

Bed Length (in): 8.25
Inlet O2 (%): 5.0
Inlet H2O (%): 0.11

Voltage (KVAC)	Inlet NO (ppm)	Outlet NO (ppm)	Outlet NOx (ppm)	NO Conversion (%)	NO Reduction (%)	Primary Voltage (V)	Primary Current (mA)
8.20	200	195	198	2.5	1.0	64	308
8.96	200	190	197	5.0	1.5	70	341
10.54	200	135	190	32.5	5.0	83	416
12.35	200	32	175	84.0	12.5	98	529
14.03	200	0.4	130	99.8	35.0	112	700
15.83	200	0.3	80	99.9	60.0	126	890

END

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