Supplementary Material (ESI) for Catalysis Science & Technology

SBA-15-Pr-SO_3H as nanoreactor catalyzed oxidation of sulfides into sulfoxides

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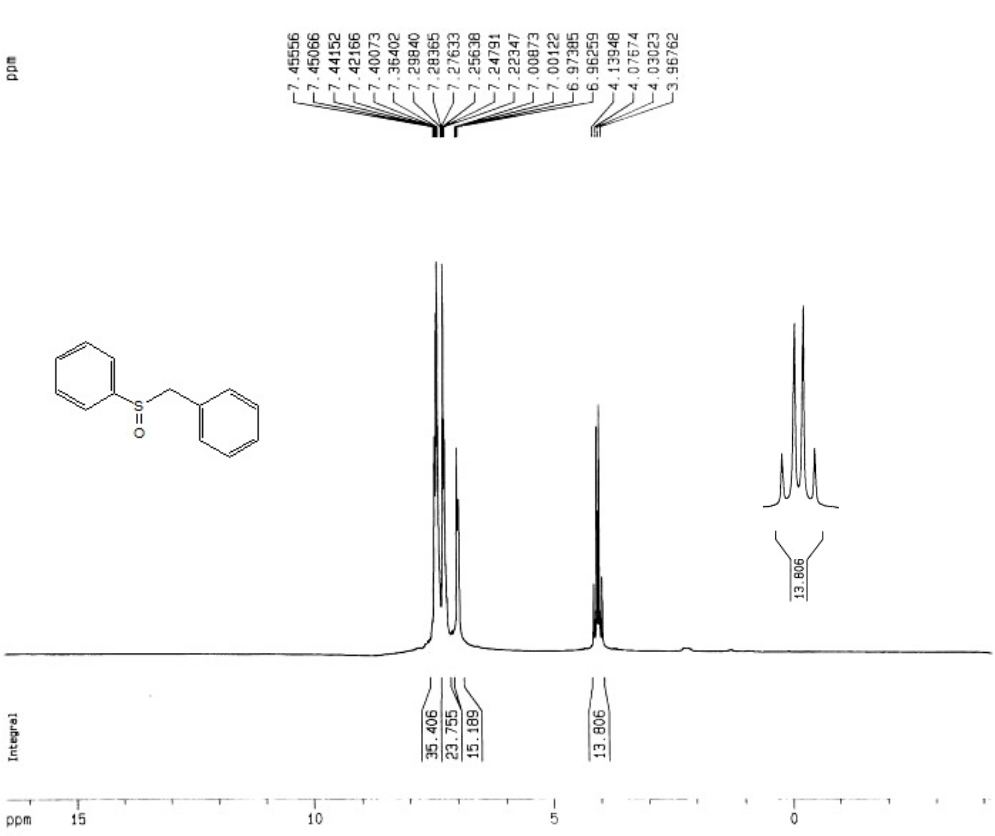
Experimental section

Materials and Methods: All starting materials were available and used without any purification. Melting points were determined in a capillary tube and are not corrected. ^{1}H NMR spectra were recorded on a 200-MHz spectrometer using TMS as internal standard.

General procedure for the oxidation of sulfides: In a sealed tube equipped with a stir bar, a solution of sulfide (1 mmol) in acetonitrile (10 mL) was prepared. Aqueous 30% H_2O_2 (2 mmol, 0.2 mL) and SBA-15-Pr-SO_3H (0.6 mmol, 0.6 g, –SO_3H groups) were added and the mixture was stirred at 40 ˚C for the time period specified in Table 1. After the completion of the reaction, the reaction mixture was diluted with ethanol and filtered to remove the catalyst. Evaporation gave the corresponding sulfoxide as the only product. All of the products are known compounds and were easily characterized by comparison with authentic samples (^{1}H NMR, mp).

^{1}H NMR spectra of sulfoxides (S2-S7)

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PROCNO                      1

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PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                         12
DS                          0
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FIDRES             0.063157 Hz
AQ                 7.9157986 sec
RG                        362
DW                   120.800 usec
DE                     7.50 usec
TE                    300.0 K
D1                 1.00000000 sec

============ CHANNEL f1 =============
NUC1                       1H
P1                      10.70 usec
PL1                     -2.00 dB
SFO1              200.1312359 MHz

F2 - Processing parameters
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SF                200.1300051 MHz
WDW                        EM
SSB                         0
LB                       0.30 Hz
GB                          0
PC                       1.00

1D NMR plot parameters
CX                      20.00 cm
F1P                     16.491 ppm
F1                    3300.34 Hz
F2P                     -4.191 ppm
F2                    -838.73 Hz
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HZCM                206.95364 Hz/cm
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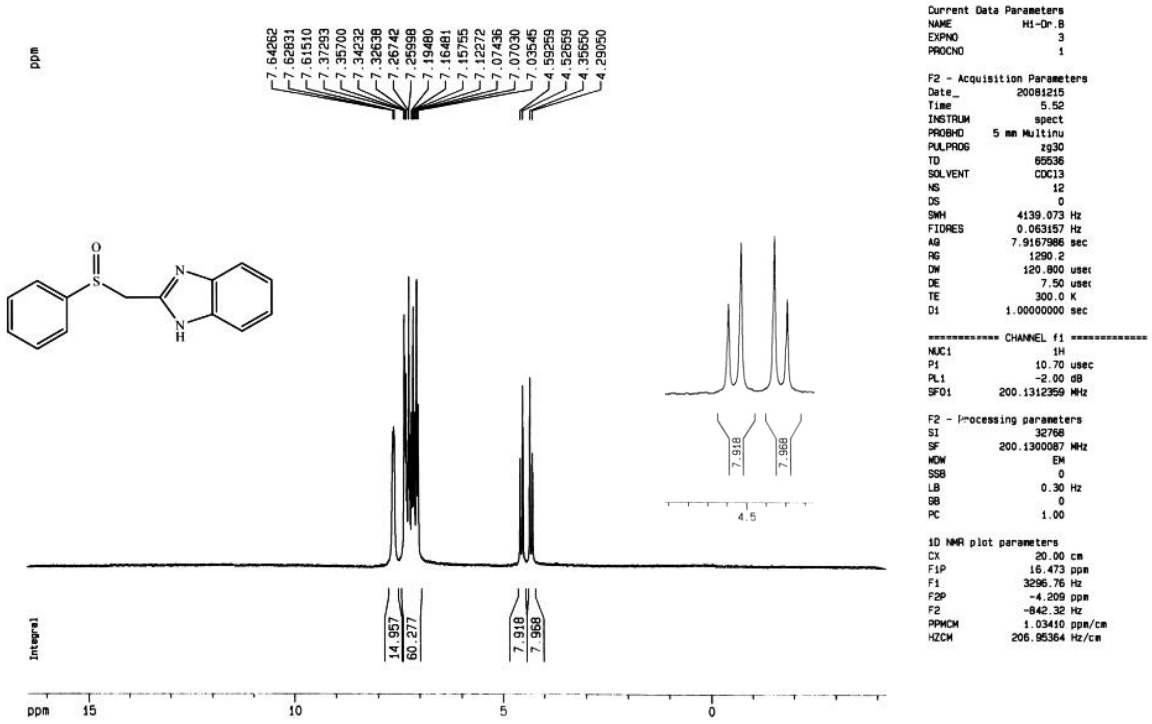
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7.35700
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7.26742
7.25998
7.19480
7.16481
7.15755
7.12272
7.07436
7.07030
7.03545
4.59259
4.52659
4.35650
4.29050
O
S
N
N
H
7.918
7.968
4.5
Integral
14.957
60.277
7.918
7.968
ppm
15
10
5
0
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PROCNO 1
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PULPROG zg30
TD 65536
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NS 12
DS 0
SWH 4139.073 Hz
FIDRES 0.063157 Hz
AQ 7.9167986 sec
RG 1290.2
DW 120.800 usec
DE 7.50 usec
TE 300.0 K
D1 1.00000000 sec
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P1 10.70 usec
PL1 -2.00 dB
SF01 200.1312359 MHz
F2 - Processing parameters
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SF 200.1300087 MHz
WDW EM
SSB 0
LB 0.30 Hz
GB 0
PC 1.00
1D NMR plot parameters
CX 20.00 cm
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F2P -4.209 ppm
F2 -842.32 Hz
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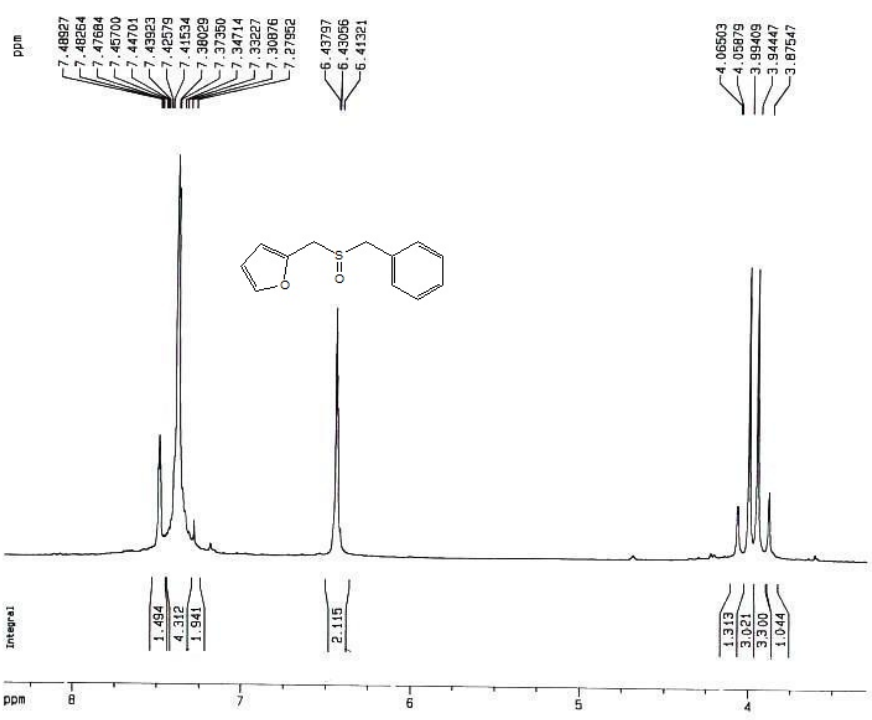
HZCM 206.95364 Hz/cm

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PROCNO                      1

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PULPROG                 zg30
TD                     65536
SOLVENT                CDCl3
NS                        12
DS                         0
SWH                4139.073 Hz
FIDRES             0.063157 Hz
AQ                 7.9167986 sec
RG                       362
DW                   120.800 usec
DE                     7.50 usec
TE                    300.0 K
D1                 1.00000000 sec

========== CHANNEL f1 ==========
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P1                      10.30 usec
PL1                     -2.00 dB
SFO1              200.1312359 MHz

F2 - Processing parameters
SI                       32768
SF                200.1300045 MHz
WDW                         EM
SSB                          0
LB                        0.30 Hz
GB                           0
PC                        1.00

1D NMR plot parameters
CX                       20.00 cm
F1P                       8.408 ppm
F1                     1682.69 Hz
F2P                       3.296 ppm
F2                      659.59 Hz
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HZCM                  51.15490 Hz/cm
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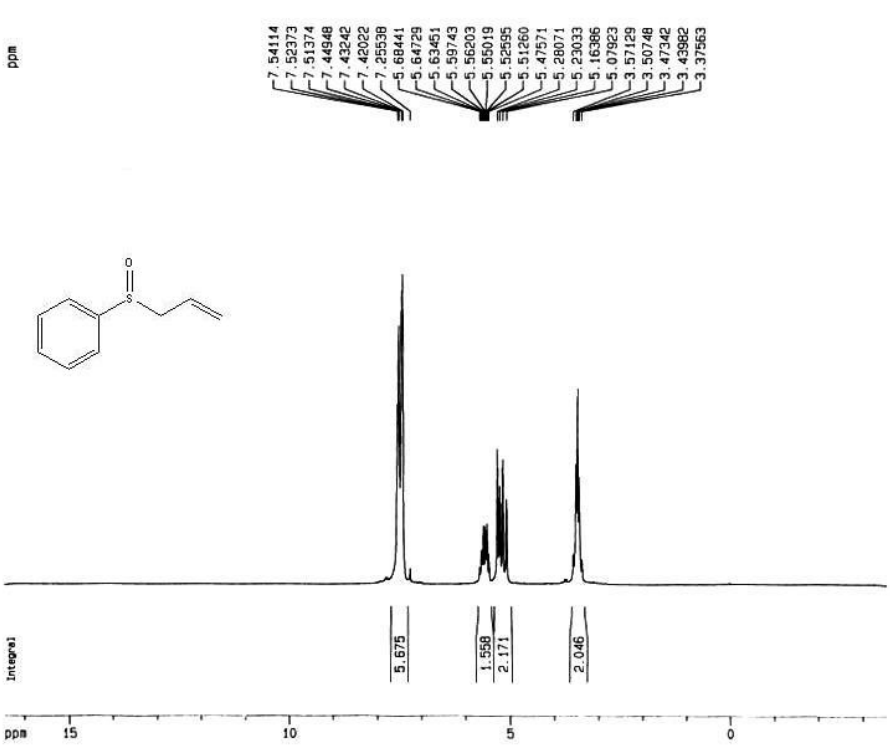


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PROCNO                      1

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PULPROG                 zg30
TD                     32768
SOLVENT                CDCl3
NS                         12
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FIDRES              0.122266 Hz
AQ                  4.0894966 sec
RG                        128
DW                    124.800 usec
DE                      7.50 usec
TE                     300.0 K
D1                  2.00000000 sec

============ CHANNEL f1 ============
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PL1                     -2.00 dB
SFO1               200.1313008 MHz

F2 - Processing parameters
SI                         32768
SF                 200.1300095 MHz
WDW                           EM
SSB                            0
LB                          1.00 Hz
GB                             0
PC                          1.00

1D NMR plot parameters
CX                         20.00 cm
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F1                       3294.53 Hz
F2P                        -3.557 ppm
F2                       -711.88 Hz
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HZCM                   200.32050 Hz/cm
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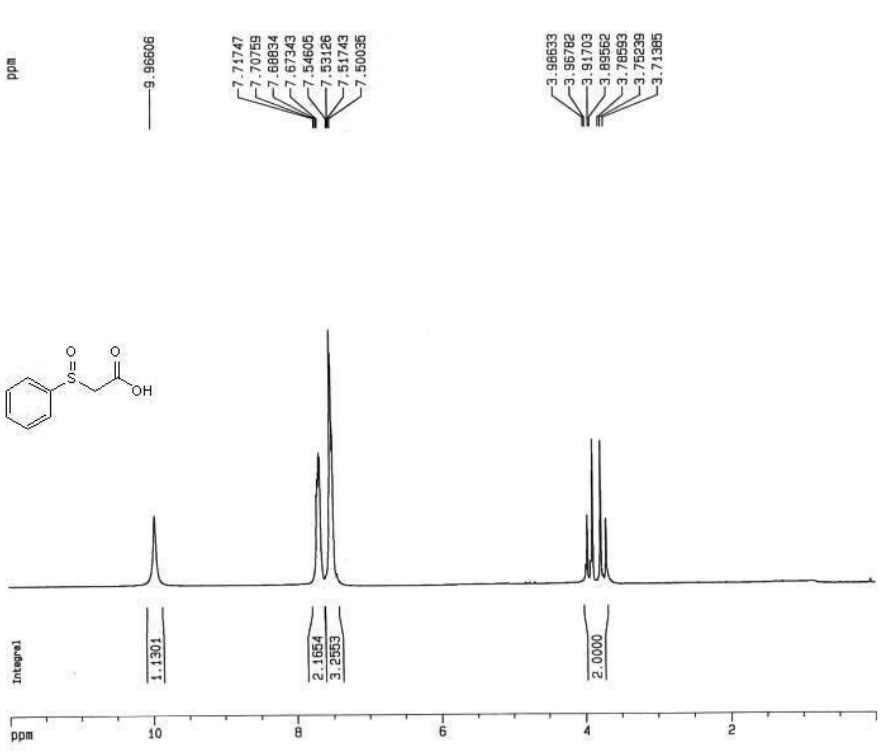


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PROCNO                    1

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PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                       12
DS                        0
SWH                4139.073 Hz
FIDRES             0.063157 Hz
AQ                 7.9167986 sec
RG                      362
DW                   120.800 usec
DE                     6.00 usec
TE                    300.0 K
D1                 1.00000000 sec

========== CHANNEL f1 ==========
NUC1                      1H
P1                     10.30 usec
PL1                    -2.00 dB
SFO1              200.1315975 MHz

F2 - Processing parameters
SI                       32768
SF                200.1300080 MHz
WDW                         EM
SSB                          0
LB                        0.30 Hz
GB                           0
PC                        1.00

1D NMR plot parameters
CX                       20.00 cm
F1P                      12.000 ppm
F1                      2401.56 Hz
F2P                       0.000 ppm
F2                        0.00 Hz
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HZCM                 120.07800 Hz/cm
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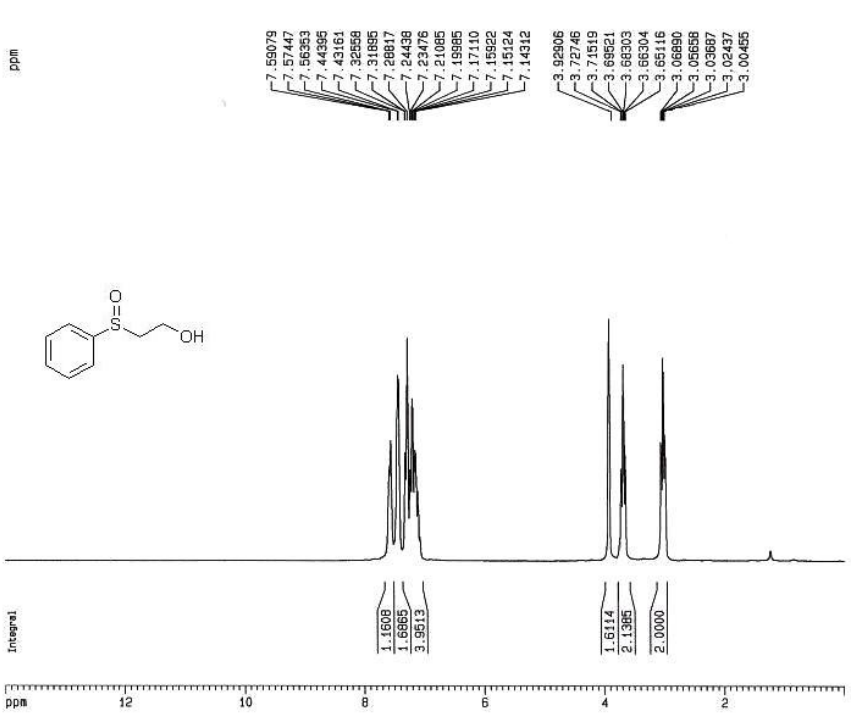


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Current Data Parameters
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EXPNO                     10
PROCNO                     1

F2 - Acquisition Parameters
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Time                   13.35
INSTRUM                spect
PROBHD      5 mm Multinu
PULPROG                zg30
TD                    65536
SOLVENT               CDCl3
NS                        12
DS                         0
SWH               4139.073 Hz
FIDRES            0.063157 Hz
AQ                7.9167986 sec
RG                        64
DW                 120.800 usec
DE                   6.00 usec
TE                   300.0 K
D1                1.00000000 sec

============ CHANNEL f1 ============
NUC1                      1H
P1                    10.30 usec
PL1                   -2.00 dB
SFO1             200.1315975 MHz

F2 - Processing parameters
SI                        32768
SF               200.1300075 MHz
WDW                       EM
SSB                        0
LB                     0.30 Hz
GB                         0
PC                      1.00

1D NMR plot parameters
CX                     20.00 cm
F1P                   14.000 ppm
F1                  2801.82 Hz
F2P                    0.000 ppm
F2                     0.00 Hz
PPMCM                0.70000 ppm/cm
HZCM               140.09100 Hz/cm
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