PHOENIXNMR

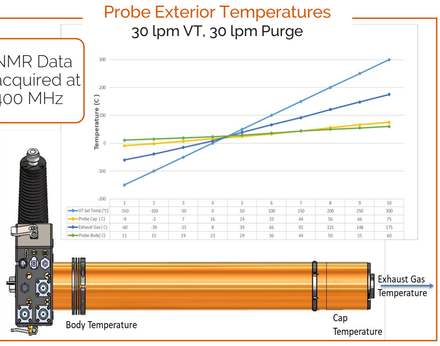
Elevating your science

High Pressure High Temperature NMR with PhoenixNMR

Probe Exterior Temperatures

30 lpm VT, 30 lpm Purge

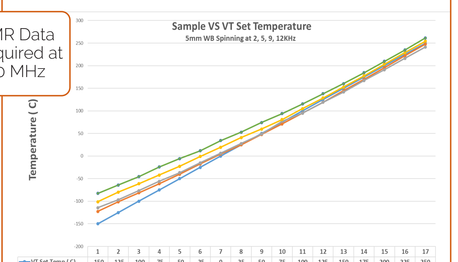
NMR Data acquired at 400 MHz



	1	2	3	4	5	6	7	8	9	10
VT Set Temp (°C)	-150	-100	-50	0	50	100	150	200	250	300
Probe Cap (°C)	-9	-2	7	16	24	33	44	56	66	75
Exhaust Gas (°C)	-60	-39	-15	8	39	66	92	121	148	175
Probe Body (°C)	11	15	19	23	29	36	44	50	55	60

$PbNO_3$ Sample Temperature up to 250°C

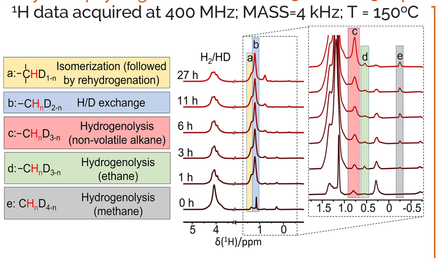
NMR Data acquired at 400 MHz



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
VT Set Temp (°C)	-150	-125	-100	-75	-50	-25	0	25	50	75	100	125	150	175	200	225	250
Sample Temp 2KHz	-122.4	-101.2	-81.2	-61.3	-40.1	-17.6	4.4	25.0	47.8	71.2	95.4	119.3	144.5	169.8	195.7	221.8	247.7
Sample Temp 5KHz	-114.4	-96.6	-76.6	-56.0	-36.6	-15.1	6.3	27.7	48.8	76.9	94.9	119.3	141.9	167.1	191.0	216.2	241.5
Sample Temp 9KHz	-101.2	-79.9	-61.3	-42.2	-22.2	-0.8	19.5	40.9	59.8	80.8	104.9	128.6	152.9	177.7	203.4	228.9	254.2
Sample Temp 12KHz	-82.6	-64.0	-45.4	-24.1	-5.5	11.7	34.3	52.9	74.1	94.1	115.3	137.9	160.5	184.4	209.6	234.8	261.4

Polymer Upcycling monitored In situ at 300°C and 300 psi

^{1}H data acquired at 400 MHz; MASS=4 kHz; T = 150°C

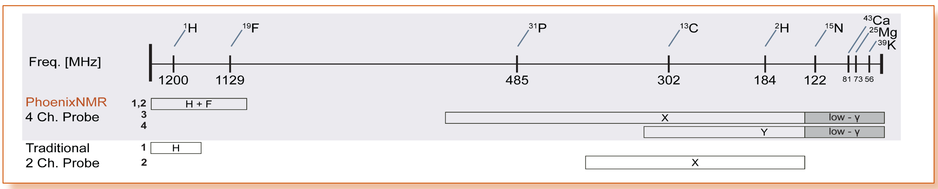


Reactants and catalyst were loaded into a PhoenixNMR HPHT 5mm rotor, pressurized to 300 psi with H_2 gas, then heated to 300°C. At times shown, the rotor was transferred to a standard HX probe and NMR data collected at 150°C.
Data courtesy of F.A. Perras. (Zhao, et. al., *Macromolecules 2023*, 56, 4287-4295.)

High T and High P Options for SSNMR

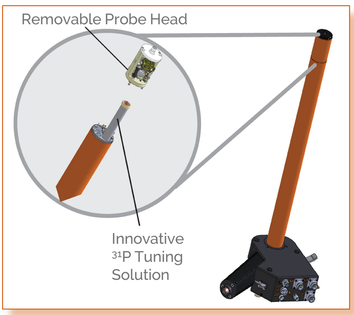
- High Pressure Rotors available for NB and WB probes.
  - Rotors are capable of 400 bar at 20°C; 225 bar at 250°C.
  - Rotors may be pressurized with supercritical CO_2, H_2 gas and other gases.
  - Rotors are compatible with existing HTHP Probe,
    - *Or* a new PhoenixNMR HTHP Probe with HTHP Rotors,
    - *Or* for HP applications using a standard PhoenixNMR Probe at standard VT range.
- High Temperature Probe reaches up to 300°C for WB probes.
  - Probe is compatible with the high-pressure rotors for High T/High P work.
  - Probe Purge runs from base up through the probe body and splits into separate flows just below the probe head to reduce the outer temperature of the probe and stack.
  - Inner Purge cools RF components and spin module before exiting the top of the probe.
  - Outer Purge flows along the outer surface of the probe and stack and exits at the top of the magnet.

and Ultra-High Field NMR with PhoenixNMR



The 1.2 GHz HFXY PhoenixNMR Probe

- Only SSNMR Probe that is capable of irradiating and receiving on all NMR-active nuclei in a 28.2 T magnet (1.2 GHz ^{1}H frequency).
- 4 Active NMR nuclei are simultaneously available, configurable to any nucleus combination.
- ^{31}P Problem is Solved. At high fields (>600 MHz), ^{31}P tuning has historically been difficult.
  - An innovative tuning solution is now available for ^{31}P above 600 MHz.
  - No sacrifice is made at lower frequency or SN to achieve ^{31}P.
  - Tuning range on X channel goes as low as 15 MHz up to ^{31}P.
  - Tuning range on Y channel goes as low as 15 MHz up to ^{23}Na.
- Removable probe heads allow different sample spinning sizes for optimization of multiple applications on the same probe.
- Transmission line tuning (T_3, Tune Tubes) allows tuning from ^{31}P to lower frequency nuclei, without compromise, on the same 1.2 GHz probe.



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