
AbSciCon
2019

1
00:00:00,790 --> 00:00:07,320
[Music]

2
00:00:12,939 --> 00:00:08,709
[Applause]

3
00:00:15,879 --> 00:00:12,949
I will introduce mixed in studies at

4
00:00:19,390 --> 00:00:15,889
mixed Phillip solutions and experimental

5
00:00:24,429 --> 00:00:19,400
measurements in the is a field of

6
00:00:26,560 --> 00:00:24,439
probability biotic chemistry from the

7
00:00:30,100 --> 00:00:26,570
increasing complexity from the ability

8
00:00:32,409 --> 00:00:30,110
to have the biochemistry critical step

9
00:00:36,279 --> 00:00:32,419
is the formation of chemical bonds

10
00:00:39,459 --> 00:00:36,289
between nitrogen and carbon and in the

11
00:00:41,529 --> 00:00:39,469
absence of enzymatic catalysis on early

12
00:00:46,319 --> 00:00:41,539
planets this reaction occur with

13
00:00:49,689 --> 00:00:46,329

difficulties and we suggest that it uses

14
00:00:52,840 --> 00:00:49,699
nitrogen species of intermediate red

15
00:00:56,979 --> 00:00:52,850
redox state which are less stable so

16
00:01:02,739 --> 00:00:56,989
much more reactive than any traitor or

17
00:01:05,740 --> 00:01:02,749
even ammonium important here is this

18
00:01:09,399 --> 00:01:05,750
behavior of the nitrogen species annoyed

19
00:01:12,700 --> 00:01:09,409
the less stable one and we focused on

20
00:01:17,940 --> 00:01:12,710
hard ways in reduced form of nitrogen

21
00:01:21,130 --> 00:01:17,950
used in special and nuclear industry

22
00:01:25,420 --> 00:01:21,140
this species is a reduced form of

23
00:01:27,910 --> 00:01:25,430
nitrogen and II it is a very efficient

24
00:01:30,810 --> 00:01:27,920
reducer in aqueous solution but it

25
00:01:34,950 --> 00:01:30,820
remains stable at low temperature and

26
00:01:39,030 --> 00:01:34,960
low dimension and in reduced condition

27
00:01:42,130 --> 00:01:39,040
in order to evaluate its possible in the

28
00:01:46,840 --> 00:01:42,140
biotech chemistry we connected in

29
00:01:47,650 --> 00:01:46,850
parallel detailed spacian in alkaline

30
00:01:49,360 --> 00:01:47,660
and reduced

31
00:01:53,310 --> 00:01:49,370
solutions that we believed to be

32
00:01:55,990 --> 00:01:53,320
favorable for the emergence of life and

33
00:01:59,770 --> 00:01:56,000
laboratory measurements to determine its

34
00:02:03,700 --> 00:01:59,780
chemical properties let's begin with a

35
00:02:07,330 --> 00:02:03,710
field data we began analysis 10 years

36
00:02:10,890 --> 00:02:07,340
ago in paternal Brazil this environment

37
00:02:13,240 --> 00:02:10,900
characterized by numerous small legs

38
00:02:16,840 --> 00:02:13,250

saline and

39
00:02:20,620 --> 00:02:16,850
alkaline legs subjected to evaporation

40
00:02:23,770 --> 00:02:20,630
and we monitor it the accused's

41
00:02:28,450 --> 00:02:23,780
chemistry busts in the legs and also in

42
00:02:31,060 --> 00:02:28,460
deep aquifers from Kissimmee turn I will

43
00:02:36,250 --> 00:02:31,070
put in here but sorry

44
00:02:42,100 --> 00:02:36,260
I reported here the ESP H data of the

45
00:02:46,300 --> 00:02:42,110
lakes and aquifers and on the and we

46
00:02:49,570 --> 00:02:46,310
found hydrazine in some of the flags one

47
00:02:53,530 --> 00:02:49,580
legs is representing here the

48
00:02:56,290 --> 00:02:53,540
concentration of hydrazine versus pH and

49
00:02:59,440 --> 00:02:56,300
the origin of this hydrogen is not clear

50
00:03:01,840 --> 00:02:59,450
could be a biotic but also it could be

51
00:03:08,260 --> 00:03:01,850
from by the decomposition of anammox

52
00:03:10,590 --> 00:03:08,270
bacteria after the first tentative we

53
00:03:13,690 --> 00:03:10,600
focused on another context the hyper

54
00:03:16,120 --> 00:03:13,700
alkaline Springs from by the deep

55
00:03:19,750 --> 00:03:16,130
integration of continued telomere in

56
00:03:22,180 --> 00:03:19,760
water wizz with photography quirks we

57
00:03:24,600 --> 00:03:22,190
have the main currents all around the

58
00:03:30,820 --> 00:03:24,610
world and we sampled some of them

59
00:03:33,580 --> 00:03:30,830
continual ones here in almond dizzy

60
00:03:34,240 --> 00:03:33,590
other side where anammox bacteria can be

61
00:03:37,630 --> 00:03:34,250
discarded

62
00:03:42,400 --> 00:03:37,640
we found a rising again you have an

63
00:03:48,100 --> 00:03:42,410

example of typical Springs with high pH

64
00:03:51,100 --> 00:03:48,110
pH values there are very extreme in

65
00:03:55,630 --> 00:03:51,110
italia we found a loss in again in

66
00:03:58,360 --> 00:03:55,640
similar springs we lost picture and even

67
00:04:02,130 --> 00:03:58,370
very nice Frank's forming a natural pool

68
00:04:07,180 --> 00:04:02,140
and two weeks ago we sampled

69
00:04:11,199 --> 00:04:07,190
alkaline solution from 150 meters def

70
00:04:12,960 --> 00:04:11,209
bore holes in an aromatic inclusions any

71
00:04:16,020 --> 00:04:12,970
foreign origin again

72
00:04:20,650 --> 00:04:16,030
so let's return to the chemistry I

73
00:04:25,860 --> 00:04:20,660
plotted here in HP atrium all the

74
00:04:28,870 --> 00:04:25,870
measured data and with annoyed

75
00:04:31,570 --> 00:04:28,880
in with the situation with high erosion

76
00:04:36,219 --> 00:04:31,580
and in doing in weather saturation with

77
00:04:39,969 --> 00:04:36,229
oxygen and the data are very scattered

78
00:04:45,850 --> 00:04:39,979
but if he used the nitrogen's position

79
00:04:50,939 --> 00:04:45,860
as a h4 here nitrite and nitrate a

80
00:04:53,980 --> 00:04:50,949
couple and the nitrate ammonia couple

81
00:04:57,490 --> 00:04:53,990
the corresponding H value fits the

82
00:05:00,730 --> 00:04:57,500
highest measured value by by a party

83
00:05:04,180 --> 00:05:00,740
known problem and we also measure the

84
00:05:06,760 --> 00:05:04,190
accused oxygen by an oximeter and the

85
00:05:13,020 --> 00:05:06,770
corresponding we found concentration on

86
00:05:20,170 --> 00:05:13,030
1 ppm or 0.1 ppm with corresponding pH

87
00:05:23,409 --> 00:05:20,180
values in here not still here concerning

88
00:05:27,960 --> 00:05:23,419

hydrazine I plotted here the measured

89
00:05:31,750 --> 00:05:27,970
values as values the H measured by the

90
00:05:36,580 --> 00:05:31,760
Platinum problem the highest

91
00:05:40,719 --> 00:05:36,590
concentrations falls in pH range much

92
00:05:42,939 --> 00:05:40,729
higher than the values calculated from

93
00:05:47,550 --> 00:05:42,949
the South a potent cell of oxidation of

94
00:05:50,560 --> 00:05:47,560
hydrogen here in blue that means suggest

95
00:05:55,600 --> 00:05:50,570
transients process for the formation of

96
00:05:58,390 --> 00:05:55,610
the species some words about the

97
00:06:02,469 --> 00:05:58,400
experiment experimental world I use this

98
00:06:05,200 --> 00:06:02,479
kind of device designed for hydro

99
00:06:08,950 --> 00:06:05,210
thermal reactions up to 300 degrees it

100
00:06:12,100 --> 00:06:08,960
is connected to HPLC prompt to renew the

101
00:06:15,189 --> 00:06:12,110
solution and equipped with internal

102
00:06:20,399 --> 00:06:15,199
probes allowing the in situ monitoring

103
00:06:22,990 --> 00:06:20,409
of H and pH we use it 10 years ago to

104
00:06:26,529 --> 00:06:23,000
measure of the standard potential for

105
00:06:30,909 --> 00:06:26,539
the first the decomposition rate of

106
00:06:33,519 --> 00:06:30,919
hydrazine versus temperature and also pH

107
00:06:35,810 --> 00:06:33,529
and we found an intra singham species

108
00:06:40,340 --> 00:06:35,820
and low pH is more stable we

109
00:06:46,130 --> 00:06:40,350
even suggest a single load to fit the

110
00:06:48,050 --> 00:06:46,140
data and we also measured the Sun a

111
00:06:52,010 --> 00:06:48,060
potential of the oxidation of hydrazine

112
00:06:53,990 --> 00:06:52,020
by processes eh pH data here at high

113
00:06:59,350 --> 00:06:54,000

temperature because it was for another

114
00:07:02,180 --> 00:06:59,360
purpose and you have the equilibrate

115
00:07:06,710 --> 00:07:02,190
reaction in england and corresponding

116
00:07:10,250 --> 00:07:06,720
nancy question here we continue this

117
00:07:15,860 --> 00:07:10,260
work at lower temperature and lower pH

118
00:07:22,210 --> 00:07:15,870
because at low pH in racine is also Knox

119
00:07:25,190 --> 00:07:22,220
Eliza it is reduced in in ammonium this

120
00:07:27,620 --> 00:07:25,200
this figure showed that in the

121
00:07:32,720 --> 00:07:27,630
intermediate eh range hydrazine is not

122
00:07:35,570 --> 00:07:32,730
stable and it's it is oxidized in in

123
00:07:40,640 --> 00:07:35,580
nitrogen and reduced in ammonia is

124
00:07:42,520 --> 00:07:40,650
typical a disproportionation reaction of

125
00:07:46,220 --> 00:07:42,530
the questions how does it form in an

126
00:07:51,860 --> 00:07:46,230
extreme either by reduction of nitrate

127
00:07:54,710 --> 00:07:51,870
or by oxidation of ammonia we test ten

128
00:07:58,100 --> 00:07:54,720
years ago the reduction of nitrate by

129
00:08:02,780 --> 00:07:58,110
hydrogen using iron as a catalyst it was

130
00:08:08,200 --> 00:08:02,790
for another purpose and we found nitrite

131
00:08:16,040 --> 00:08:12,230
currently experimenting the oxidation of

132
00:08:20,540 --> 00:08:16,050
ammonia using ion magnetite or imitate

133
00:08:23,150 --> 00:08:20,550
as catalyst and in someone's with we we

134
00:08:26,750 --> 00:08:23,160
found twice of hydrazine for the higher

135
00:08:31,420 --> 00:08:26,760
pH values this rock is not finished and

136
00:08:36,260 --> 00:08:31,430
this data should be confirmed well

137
00:08:39,230 --> 00:08:36,270
another question is also produced what

138
00:08:41,839 --> 00:08:39,240

is the stability of hydrazine with

139
00:08:42,620 --> 00:08:41,849
respect with other actual species we

140
00:08:46,250 --> 00:08:42,630
experimented

141
00:08:48,259 --> 00:08:46,260
several assemblage to test several

142
00:08:51,829 --> 00:08:48,269
pathways

143
00:08:54,559 --> 00:08:51,839
I reported here the pollution of ammonia

144
00:08:58,129 --> 00:08:54,569
against the rest of our lesson I will

145
00:08:59,840 --> 00:08:58,139
not detail or all these experiments

146
00:09:03,019 --> 00:08:59,850
the idea is to distinguish between

147
00:09:04,639 --> 00:09:03,029
different paths while the pure oxidation

148
00:09:07,639 --> 00:09:04,649
the pure election and the

149
00:09:10,939 --> 00:09:07,649
disproportionation here the conclusion

150
00:09:14,389 --> 00:09:10,949
is that the oxidation of hydrogen is

151
00:09:17,930 --> 00:09:14,399
easy by Acuras oxygen only not by any

152
00:09:20,120 --> 00:09:17,940
trade for example and even even its

153
00:09:23,870 --> 00:09:20,130
radiation by hydrogen is not easy it

154
00:09:25,970 --> 00:09:23,880
requires a catalyst so oxygen is a more

155
00:09:34,960 --> 00:09:25,980
active species within erosion in the

156
00:09:38,269 --> 00:09:34,970
natural environment and to conclude the

157
00:09:42,470 --> 00:09:38,279
using all these data we propose the

158
00:09:49,189 --> 00:09:42,480
following scheme hydrogen is produced by

159
00:09:53,420 --> 00:09:49,199
oxidation of ammonia news o face and

160
00:09:57,819 --> 00:09:53,430
before it is completely oxidized in

161
00:10:01,249 --> 00:09:57,829
nitrogen it can react with other

162
00:10:04,179 --> 00:10:01,259
organics in the water to produce amino

163
00:10:06,100 --> 00:10:04,189

acid and this is currently in

164
00:10:12,060 --> 00:10:06,110
experimental in tourism

165
00:10:17,299 --> 00:10:14,699
[Applause]

166
00:10:19,739 --> 00:10:17,309
we have some time for questions or I

167
00:10:22,859 --> 00:10:19,749
actually have a question yeah so you

168
00:10:25,499 --> 00:10:22,869
invoke these of Steel powder yeah

169
00:10:28,079 --> 00:10:25,509
have you the and that was to degrade the

170
00:10:31,919 --> 00:10:28,089
hydrazine is that was that the rate or

171
00:10:37,139 --> 00:10:31,929
to produce the hydrazine I use it first

172
00:10:43,049 --> 00:10:37,149
to decompose the compost he tried to

173
00:10:45,239 --> 00:10:43,059
reduced it right in ammonia then I use

174
00:10:50,279 --> 00:10:45,249
it because I found that it was a

175
00:10:54,929 --> 00:10:50,289
catalyst so I use it to to reduced

176
00:11:01,650 --> 00:10:54,939
hydrazine and also to except to oxidized

177
00:11:04,169 --> 00:11:01,660
ammonia so do you know how flexible the

178
00:11:07,229 --> 00:11:04,179
system is to the type of powder that you

179
00:11:09,210 --> 00:11:07,239
use is steel the only type of powder

180
00:11:12,150 --> 00:11:09,220
that will cause these things or is it

181
00:11:14,279 --> 00:11:12,160
pretty open that Allah a larger number

182
00:11:15,289 --> 00:11:14,289
of different metal ions would produce

183
00:11:19,859 --> 00:11:15,299
the same effect

184
00:11:24,299 --> 00:11:19,869
I first case I test iron steel different

185
00:11:27,460 --> 00:11:24,309
kind of iOS in carbon steel and stone in

186
00:11:33,040 --> 00:11:29,140
the behavior was a little bit different

187
00:11:36,930 --> 00:11:33,050
and concerning the oxidation of ammonia

188
00:11:43,680 --> 00:11:36,940

I used different for most of Ireland

189
00:11:49,240 --> 00:11:45,850
there was just a different because the

190
00:11:54,819 --> 00:11:49,250
EH pH was different Israel if use carbon

191
00:11:57,220 --> 00:11:54,829
steel the pH will increase and the eh

192
00:12:00,910 --> 00:11:57,230
which decreased is imitated different

193
00:12:03,460 --> 00:12:00,920
and so on and what I'm doing now is to

194
00:12:07,509 --> 00:12:03,470
test is the different way and to look