

# MRG-059-ZC: Irradiation of [Ru(bpy)3]Cl2 \* 6 H2O in the ChemSpeed robot, fully automated peripherals - pH Screening with Na2SiF6

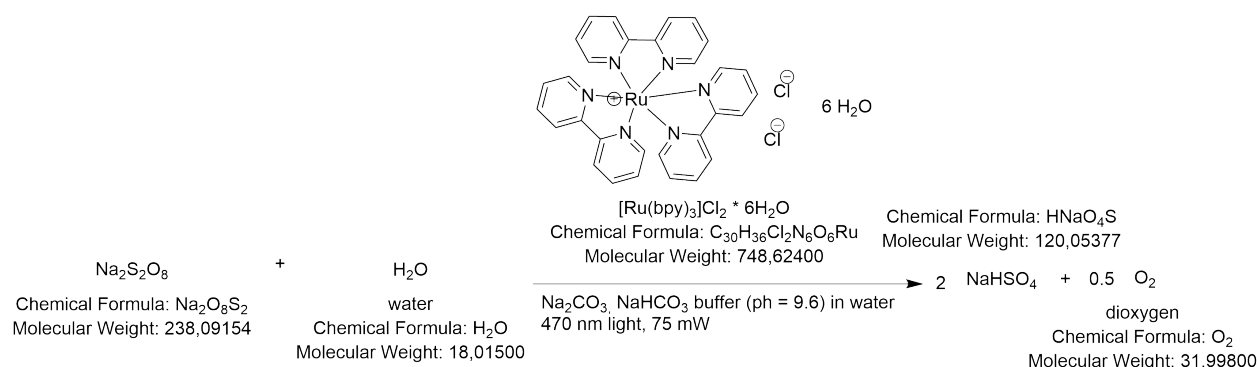
Date: 2024-09-11

Tags: Radiation O2 [Ru(bpy)3]Cl2\*6 H2O HTE MRG

Status: Done

Created by: Michael Ringleb

## Reaction scheme/sample structure



## Literature/reference experiments

Literature	<a href="https://doi.org/10.1021/acscatal.6b02595">https://doi.org/10.1021/acscatal.6b02595</a>
Reproduction	/
Related experiment	see below  <a href="#">AE-347: Preparation of stock solutions for the irradiation of [Ru(bpy)3]Cl2 * 6 H2O</a> <a href="#">AE-JSC-321: Manufacturing and calibration of new 10 mL HTE with sensor spots I</a>  <a href="#">MRG-059-Z: Irradiation of [Ru(bpy)3]Cl2 * 6 H2O in the ChemSpeed robot, fully automated peripherals - 1st screening of pH (9.2 - 10.4)</a> <a href="#">MRG-059-ZA - Irradiation of [Ru(bpy)3]Cl2 * 6 H2O in the ChemSpeed robot - 2nd pH screening (5.8 -12)</a> <a href="#">MRG-059-ZB: Irradiation of [Ru(bpy)3]Cl2 * 6 H2O in the ChemSpeed robot, fully automated peripherals - screening of light intensity</a>

## Reagents

### Constant parameters

Name	Abbreviation of solution	CAS Number / Experiment Number	Amount [mmol]	concentration used	Molar mass [g/mol]	Volume [mL]	concentration obtained
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Sodium bicarbonate solution	NaHCO3 and NaHCO3/Na2CO3	144-55-8	see varied parameters table below	see varied parameters table below	84.006	see varied parameters table below	/
Sodium carbonate (anhydrous) solution	NaHCO3/Na2CO3	497-19-8	see varied parameters table below	see varied parameters table below	105.988	see varied parameters table below	/
Sodium hexafluoro silicate	Na2SiF6	16893-85-9	see varied parameters table below	see varied parameters table below	188.06	see varied parameters table below	/
Sodium persulfate solution	Ox	7775-27-1	0.051	60 mol/L	238.09	0.85	6 mM
[Ru(bpy)3]Cl2 * 6 H2O solution	Ru	50525-27-4	0.085 µmol	20 µmol/L	748.62	0.425	10 µM
Milli-Q water		7732-18-5	/	/	18.015	see varied parameters table below	/

## Varied parameters

\*final volume of all reaction solutions is 8.5 mL

Experiment determiner	pH value	Used CO3 solution	Used NaHCO3/Na2CO3 concentration [mM]	Amount NaHCO3/Na2CO3 [µmol]	concentration NaHCO3/Na2CO3 in final solution [mmol/L]	Volume (NaHCO3/Na2CO3 solution) [mL]	Used Na2SiF6 concentration [mM]	Amount Na2SiF6 [µmol]	concentration Na2SiF6 in final solution [mmol/L]	Volume (Na2SiF6 solution) [mL]	volume Milli-Q water [mL]
MRG-059-ZC-1-1	9.2	NaHCO3/Na2CO3	800	389.30/389.30	45.8/45.8	0.487	35	72.25	8.5	2.064	4.674
MRG-059-ZC-1-2	9.2	NaHCO3/Na2CO3	800	389.30/389.30	45.8/45.8	0.487	35	72.25	8.5	2.064	4.674
MRG-059-ZC-2-1	8.6	NaHCO3/Na2CO3	800	382.50/382.50	45.0/45.0	0.478	35	84.15	9.9	2.404	4.343
MRG-059-ZC-2-2	8.6	NaHCO3/Na2CO3	800	382.50/382.50	45.0/45.0	0.478	35	84.15	9.9	2.404	4.343
MRG-059-ZC-2-3	8.6	NaHCO3/Na2CO3	800	382.50/382.50	45.0/45.0	0.478	35	84.15	9.9	2.404	4.343
MRG-059-ZC-2-4	8.6	NaHCO3/Na2CO3	800	382.50/382.50	45.0/45.0	0.478	35	84.15	9.9	2.404	4.343
MRG-059-ZC-3-1	8.6	NaHCO3	1000	850.00/0	100/0	0.85	35	0.00	0	0.0	6.375
MRG-059-ZC-3-2	8.6	NaHCO3	1000	850.00/0	100/0	0.85	35	0.00	0	0.0	6.375
MRG-059-ZC-3-3	8.6	NaHCO3	1000	850.00/0	100/0	0.85	35	0.00	0	0.0	6.375
MRG-059-ZC-4-1	7.5	NaHCO3	1000	812.60/0	95.6/0	0.813	35	37.40	4.4	1.069	5.344
MRG-059-ZC-4-2	7.5	NaHCO3	1000	812.60/0	95.6/0	0.813	35	37.40	4.4	1.069	5.344
MRG-059-ZC-5-1	7.0	NaHCO3	1000	765.00/0	90.0/0	0.765	35	85.00	10.0	2.429	4.031
MRG-059-ZC-5-2	7.0	NaHCO3	1000	765.00/0	90.0/0	0.765	35	85.00	10.0	2.429	4.031
MRG-059-ZC-6-1	6.0	NaHCO3	1000	697.00/0	82.0/0	0.697	35	153.00	18.8	4.371	2.157
MRG-059-ZC-6-2	6.0	NaHCO3	1000	697.00/0	82.0/0	0.697	35	153.00	18.8	4.371	2.157

## Irradiation Parameters

Power measured using [Power Meter] 843-R-USB + 919P-020-12 unless specified otherwise.

Oxygen sensor	Light Source Name	Wavelength [nm]	Power Setting [mW]	Analog input control voltage [V] using Equipment - Joy-it JT-RD6006 DC POWER SUPPLY
FireSting Fiber-Optic Oxygen Meter	Light Source - LCS-0470-50-22	470	75	0.18

Used beam combiner [Name or None]	none
Irradiation distance [cm]	9.5
Thermostat temperature [°C]	/
Stirring speed [rpm]	400
Start time irradiation [s]	see csv/json
End time irradiation [s]	see csv/json

## Procedure/observations

Date	Time	Step	Observations
		The Experiment <a href="#">AE-JSC-321: Manufacturing and calibration of new 10 mL HTE with sensor spots I</a> was used The protocol for a fully automated workflow ( <a href="#">Protocol - Operation of automated workflow for investigation of oxygen evolution</a> ) was utilized with a rare earth metal stir bar	<a href="#">used rare earth metal stir bar.jpg</a> ; canula position; utilized vial; position of reagent vials
		everything was set up according to the <a href="#">Protocol - Operation of automated workflow for investigation of oxygen evolution</a>	
		The python script is loaded as described in <a href="#">Protocol - Operation of automated workflow for investigation of oxygen evolution</a> and the "experiment.yml" is initialized with four experiments (see reagents table for volumes of reactants) with the "run"-parameter = "true" and one at the end of the queue with "run" = "false"	
		The python script is executed with "python run.py"	
		AutoSuite program was started	

		from this point on the execution was done fully automatic according to the table with steps executed by the automated platform in the <a href="#">Protocol - Operation of automated workflow for investigation of oxygen evolution</a>	at this point the setpum in the vial lid was pierced 0 times
11.09.24	9:10-9:41	all the above steps were done during the execution of <a href="#">MRG-059-ZB</a> lid changed, refill of water, refill of Ru and Ox with newly made solutions (see: <a href="#">AE-347: Preparation of stock solutions for the irradiation of [Ru(bpy)3]Cl2 * 6 H2O</a> ) --> now: mix of the old and new solution placing of vial with NaHCO3 and Na2CO3 in robot platform (place of buffer_solution_1) placing o vial with Na2SiF6 in robot platform (place of buffer_solution_2)	
	9:41	<b>MRG-059-ZC-1-1 was started with priming prior to reaction</b>	at this point the setpum in the vial lid was pierced 0 times --> <b>rate =see comparison of rates table below</b>
	ca.: 11:03	<b>MRG-059-ZC-2-1 was started</b>	at this point the setpum in the vial lid was pierced 11 times --> <b>rate =see comparison of rates table below</b>
	ca. 12:05	<b>MRG-059-ZC-1-2 was started</b>	at this point the setpum in the vial lid was pierced 22 times--> <b>rate =see comparison of rates table below</b>
	ca. 13:07	<b>MRG-059-ZC-2-2 was started</b>	at this point the setpum in the vial lid was pierced 33 times--> <b>rate =see comparison of rates table below</b> --> potentially repetition of ZC-2-1 and 2-2 needed after look at data
	ca. 14:09	<b>end of ZC-2-2</b>	at this point the setpum in the vial lid was pierced 44 times --> <a href="#">pictures of septum top, bottom</a>
	16:45-16:52	<b>change of vial with NaHCO3/Na2CO3 to a vial with only NaHCO3 --&gt; see table: varied parameters</b> <b>furthermore: refill of vial with Na2SiF6</b>	
	16:55	<b>MRG-059-ZC-6-1 was started</b> <b>--&gt; problems at degassing stage --&gt; autostop was triggered --&gt; need to be repeated --&gt; this experiment was named: <a href="#">ZC-6-1-degassing_stopped</a></b>	at this point the setpum in the vial lid was pierced 0 times --> <b>rate =see comparison of rates table below</b>

12.09.24	6:45-6:51	no apparative problem visible --> change of lid and also of degassing canula this time the degassing canula was inserted less deep into the vial to avoid the backflow of liquid into it during the filling of the vial	
	6:51	MRG-059-ZC-3-1 was started	at this point the setpum in the vial lid was pierced 0 times --> <b>rate =see comparison of rates table below</b>
	ca. 8:14	MRG-059-ZC-6-1 was started --> problems at degassing stage --> autostop was triggered --> this experiment was named: <b>ZC-6-1-degassing stopped2</b> potential explanation: fluoride in the solution messes with the sensor	at this point the setpum in the vial lid was pierced 8 times --> <b>rate =see comparison of rates table below</b>
	9:45-9:51	change of lid, refill H2O, NaHCO3, Na2SiF6	
	9:56	MRG-059-ZC-3-2 was started	at this point the setpum in the vial lid was pierced 0 times--> <b>rate =see comparison of rates table below</b>
	ca. 11:12	MRG-059-ZC-4-1 was started	at this point the setpum in the vial lid was pierced 8 times--> <b>rate =see comparison of rates table below</b>
	ca. 12:34	MRG-059-ZC-3-3 was started	at this point the setpum in the vial lid was pierced 18 times--> <b>rate =see comparison of rates table below</b>
	ca. 13:49	MRG-059-ZC-4-2 was started	at this point the setpum in the vial lid was pierced 26 times--> <b>rate =see comparison of rates table below</b>
	ca. 15:13	end of ZC-4-2	at this point the setpum in the vial lid was pierced 36 times --> <a href="#">pictures of septum top, bottom</a>
		change of lid and refill of Ru vial	
	ca. 15:13	MRG-059-ZC-5-1 was started	at this point the setpum in the vial lid was pierced 0 times --> <b>rate =see comparison of rates table below</b>

	ca. 15:40	<p><b>did not work (potentially too much fluorine in the solution for the sensor spots to work properly)</b></p> <p><b>--&gt; no second try because it will most probably not work!</b></p> <p><b>--&gt; skip 5-2 --&gt; directly to 2-3 and so on</b></p>	
	-15:55	<b>change of lid, change of vial with NaHCO<sub>3</sub> for vial with Na<sub>2</sub>CO<sub>3</sub>/NaHCO<sub>3</sub> and refill Ox and Na<sub>2</sub>SiF<sub>6</sub> vial</b>	
	ca. 15:55	<p><b>MRG-059-ZC-2-3 was started</b></p> <p><b>repetition of ZC-2-1 and 2-2</b></p>	at this point the setpump in the vial lid was pierced 0 times --> <b>rate =see comparison of rates table below</b>
	ca. 17:18	<p><b>MRG-059-ZC-1-3 was started</b></p> <p><b>repetition of ZC-1-1 and 1-2</b></p>	at this point the setpump in the vial lid was pierced 11 times --> <b>rate =see comparison of rates table below</b>
	ca. 18:41	<b>MRG-059-ZC-2-4 was started</b>	at this point the setpump in the vial lid was pierced 22 times --> <b>rate =see comparison of rates table below</b>
	ca. 20:04	<b>MRG-059-ZC-1-4 was started</b>	at this point the setpump in the vial lid was pierced 33 times--> <b>rate =see comparison of rates table below</b>
	ca. 21:07	<b>end of ZC-1-4</b>	at this point the setpump in the vial lid was pierced 44 times --> <a href="#">pictures of septum top, bottom</a>
13.09.24	8:15-8:45	disassembly of setup	

## Analysis

## Quantitative Interpretation

### Comparison of rates

experiment determiner	pH value	Used CO3 solution	rate constant (utilizing Jacobs fit)	more information
MRG-059-ZC-1-1	9.2	NaHCO3/Na2CO3		lid (and septum) change beforehand
MRG-059-ZC-2-2	8.6	NaHCO3/Na2CO3		septum pierced 11 times beforehand
MRG-059-ZC-1-2	9.2	NaHCO3/Na2CO3		septum pierced 22 times beforehand
MRG-059-ZC-2-2	8.6	NaHCO3/Na2CO3		septum pierced 33 times beforehand
MRG-059-ZC-6-1	6.0	NaHCO3		lid (and septum) change beforehand --> did not work
MRG-059-ZC-3-1	8.6	NaHCO3		septum pierced 0 times beforehand
MRG-059-ZC-6-1	6.0	NaHCO3		did not work
MRG-059-ZC-3-2	8.6	NaHCO3		septum pierced 0 times beforehand
MRG-059-ZC-4-1	7.5	NaHCO3		septum pierced 8 times beforehand

MRG-059-ZC-3-3	8.6	NaHCO <sub>3</sub>		septum pierced 18 times beforehand
MRG-059-ZC-4-2	7.5	NaHCO <sub>3</sub>		septum pierced 26 times beforehand
MRG-059-ZC-5-1	7.0	NaHCO <sub>3</sub>		lid (and septum) change beforehand
MRG-059-ZC-2-3	8.6	NaHCO <sub>3</sub> /Na <sub>2</sub> CO <sub>3</sub>		lid (and septum) change beforehand
MRG-059-ZC-1-3	9.2	NaHCO <sub>3</sub> /Na <sub>2</sub> CO <sub>3</sub>		septum pierced 11 times beforehand
MRG-059-ZC-2-4	8.6	NaHCO <sub>3</sub> /Na <sub>2</sub> CO <sub>3</sub>		septum pierced 22 times beforehand
MRG-059-ZC-1-4	9.2	NaHCO <sub>3</sub> /Na <sub>2</sub> CO <sub>3</sub>		septum pierced 33 times beforehand

## Comparison of [O<sub>2</sub>]

experiment determiner	pH value	Used CO <sub>3</sub> solution	rate constant (from implemented ODE fit from Jacob)	[O <sub>2</sub> ] degassing	[O <sub>2</sub> ] pre-reaction baseline	[O <sub>2</sub> ] reaction	Δ [O <sub>2</sub> ] with underlying oxygen "penetration" through septum	[O <sub>2</sub> ] post reaction baseline	more information
				[μmol/L]	[μmol/L]	[μmol/L]	[μmol/L]	[μmol/L]	
MRG-059-ZC-1-1	9.2	NaHCO <sub>3</sub> /Na <sub>2</sub> CO <sub>3</sub>		248 --> 4.3	4.3 --> 7	7 --> 86 (ca. 10 min)	ca. 80	86 - -> 79.5	lid (and septum) change beforehand



MRG-059-ZC-2-1	8.6	NaHCO <sub>3</sub> /Na <sub>2</sub> CO <sub>3</sub>		240 --> 3.2	3.2 --> 5.3	5.3 --> 44.8 (ca. 10 min)	ca. 40	44.8 --> 52	septum pierced 11 times beforehand
MRG-059-ZC-1-2	9.2	NaHCO <sub>3</sub> /Na <sub>2</sub> CO <sub>3</sub>		229 --> 3.1	3.1 --> 11.7	11.7 --> 109 (ca. 10 min)	ca. 100	109 --> 120	septum pierced 22 times beforehand
MRG-059-ZC-2-2	8.6	NaHCO <sub>3</sub> /Na <sub>2</sub> CO <sub>3</sub>		237 --> 3.4	3.4 --> 21.7	21.7 --> 130 (ca. 10 min)	ca. 110	130 --> 138	septum pierced 33 times beforehand
MRG-059-ZC-6-1- degassing_stopped	6.0	NaHCO <sub>3</sub>		109 --> 84 --> 164					lid (and septum) change beforehand --> did not work potentially problem with too much fluorine in the solution which messes with sensor spots
MRG-059-ZC-3-1	8.6	NaHCO <sub>3</sub>		228 --> 4.4	4.4 --> 11.2	11.2 --> 121 (ca. 5.5 min) --> 126 (ca. 1 min) --> fluctuation around 126 (ca. 1 min) -->122 (ca. 2.5 min)	ca.110	122 --> 112	septum pierced 0 times beforehand
MRG-059-ZC-6-1- degassing_stopped_2	6.0	NaHCO <sub>3</sub>		67 --> 76 - -> 59					did not work potentially problem with too much fluorine in the solution which messes with sensor spots
MRG-059-ZC-3-2	8.6	NaHCO <sub>3</sub>		244 --> 10.7	10.7 --> 29.3	29.3 --> 147 (ca. 6 min) --> 156 (ca. 2.5 min) --> fluctuation 154 - 156 (ca. 1.5 min)	ca. 120	155 --> 154	septum pierced 0 times beforehand
MRG-059-ZC-4-1	7.5	NaHCO <sub>3</sub>		229 --> 12	12 --> 71	71 --> 213 (ca. 10 min)	ca. 140	213 --> 226	septum pierced 8 times beforehand
MRG-059-ZC-3-3	8.6	NaHCO <sub>3</sub>		260 --> 11.5	11.5 --> 58	58 --> 196 (ca. 10 min)	ca. 140	196 --> 207	septum pierced 18 times beforehand
MRG-059-ZC-4-2	7.5	NaHCO <sub>3</sub>		227 --> 14.7	14.7 --> 53.8	53.8 --> 187	ca. 135	187 --> 207	septum pierced 26 times beforehand
MRG-059-ZC-5-1- degassing_stopped	7.0	NaHCO <sub>3</sub>		157 --> 144 -->148 --> 130					lid (and septum) change beforehand  potentially problem with too much fluorine in the solution which messes with sensor spots --> but: seems as if in this case the sensor levelled out after a while --> but: levelling out did not happen fast enough -> run was stopped by degassing check

MRG-059-ZC-2-3	8.6	NaHCO <sub>3</sub> /Na <sub>2</sub> CO <sub>3</sub>		227 --> 7.2	7.2 --> 5.4	5.4 --> 30.7	ca. 25	30.7 --> 28	lid (and septum) change beforehand --> decreasing O <sub>2</sub> content during prereaction baseline -> untypical! (vial = very tightly closed as potential reason)
MRG-059-ZC-1-3	9.2	NaHCO <sub>3</sub> /Na <sub>2</sub> CO <sub>3</sub>		219 --> 4.7	4.7 --> 4.4	4.4 --> 82.5	ca. 80	82.5 --> 71	septum pierced 11 times beforehand --> decreasing O <sub>2</sub> content during prereaction baseline -> untypical! (vial = very tightly closed as potential reason)
MRG-059-ZC-2-4	8.6	NaHCO <sub>3</sub> /Na <sub>2</sub> CO <sub>3</sub>		238 --> 5	5 --> 4.6	4.6 --> 34.3	ca. 30	34.3 --> 30.6	septum pierced 22 times beforehand --> decreasing O <sub>2</sub> content during prereaction baseline -> untypical! (vial = very tightly closed as potential reason)
MRG-059-ZC-1-4	9.2	NaHCO <sub>3</sub> /Na <sub>2</sub> CO <sub>3</sub>		251 --> 5.5	5.5 --> 6	6 --> 88	ca. 80	88 --> 78	septum pierced 33 times beforehand --> decreasing O <sub>2</sub> content during prereaction baseline -> untypical! (vial = very tightly closed as potential reason)

## Conclusions:

- experiments with much (>2 mL) Na<sub>2</sub>SiF<sub>6</sub> at low pH did not work properly --> potentially a problem with the degassing and the sensor (sensor showed odd values for [O<sub>2</sub>] at beginning of degassing)

--> should be left out for future experiments

- reproducibility not as good as in experiments until MRG-059-ZA --> 3 possible reasons:

1. setup stood for a few weeks and was not utilized;

2. random order of experiments does have influence on outcome because the setup/sensors alter over the course of one experiment row (4 experiments) --> more information first available, when Jacob has executed the rate evaluation;

3. the needle position during the degassing is important and it should not be put too deep into the vial to avoid backflow of solution into the canula and the syringe for degassing

- for future: only work with carbonate buffer and test the edges of its buffer capacity but not with the fluorosilicate buffer as it produces problem with the sensors**

## Linked experiments

- AE-262: Irradiation of PhPDA (AE-257), 1.5 mg/mg SDS, 2 mg/mL PhPDA after 3 d
- AE-265: Preparation of stock solutions for the irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$
- AE-266: Calibration of oxygen and temperature sensor spots in the 10 mL HTE vial
- AE-267: Irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$
- AE-271: Irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$  in the ChemSpeed robot, with manual light control
- AE-272: Irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$  in the ChemSpeed robot, with manual light control I
- MRG-059-A: Irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$  in the ChemSpeed robot, using a rare earth metal stir bar, fully automated peripherals
- MRG-059-B: Irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$  in the ChemSpeed robot, using a rare earth metal stir bar, fully automated peripherals II
- MRG-059-C: Irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$  in the ChemSpeed robot, using a rare earth metal stir bar, fully automated peripherals III
- MRG-059-D: Irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$  in the ChemSpeed robot, using a rare earth metal stir bar, fully automated peripherals IV
- MRG-059-E: Irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$  in the ChemSpeed robot, using a rare earth metal stir bar, fully automated peripherals V
- MRG-059-F: Irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$  in the ChemSpeed robot, using a rare earth metal stir bar, fully automated peripherals VI
- MRG-059-Q: Irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$  in the ChemSpeed robot, using a rare earth metal stir

bar, fully automated peripherals - 4th try I

- MRG-059-R: Irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$  in the ChemSpeed robot, using a rare earth metal stir bar, fully automated peripherals - 4th try II

- MRG-059-S: Irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$  in the ChemSpeed robot, using a rare earth metal stir bar, fully automated peripherals - 4th try III

- MRG-059-T: Irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$  in the ChemSpeed robot, using a rare earth metal stir bar, fully automated peripherals - 4th try IV

- MRG-059-U: Irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$  in the ChemSpeed robot, using a rare earth metal stir bar, fully automated peripherals - 4th try V

- AE-JSC-321: Manufacturing and calibration of new 10 mL HTE with sensor spots I

- AE-323: Preparation of stock solutions for the irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$

- MRG-059-V: Irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$  in the ChemSpeed robot, fully automated peripherals  
- 1st screening of Ru-cat concentration

- MRG-059-W: Preparation of stock solutions for the irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$  screenings (MRG-059-X, -Y, -Z)

- MRG-059-X: Irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$  in the ChemSpeed robot, fully automated peripherals  
- 1st screening of sacrificial oxidant

- MRG-059-Y: Irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$  in the ChemSpeed robot, fully automated peripherals - 2nd screening of [Ru]

- MRG-059-Z: Irradiation of  $[\text{Ru}(\text{bpy})_3]\text{Cl}_2 \cdot 6 \text{ H}_2\text{O}$  in the ChemSpeed robot, fully automated peripherals  
- 1st screening of pH (9.2 - 10.4)

## Linked items

Equipment - [Irradiation Set-Up](#)

Equipment - [Joy-it JT-RD6006 DC POWER SUPPLY](#)

Light Source - [UHP LED 470 nm](#)

Protocol - [Operation of automated workflow for investigation of oxygen evolution - as of 03.07.2024](#)

## Attached files

MRG-059-ZC-data.zip

sha256: 03967ff59e35fc2a150946e28dde722075fb577f62b747426ad4bbf4aa0bb03d

ZC-12\_3and4\_top.jpg

sha256: 543be469d119793ceb8b9953615add5c7e4e21c7655f396ab8e5b00f74c5a1e



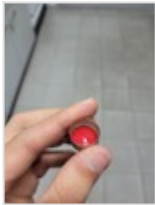
ZC-12\_3and4\_top2.jpg

sha256: 1026cdb5e46c1352029ee726a73124d00466adb37f38ae603ef366fb0d36a8bd



ZC-12\_3and4\_bottom.jpg

sha256: 139fe188b48e01cdacbdcf8c919f3620c0e0d5cb41aff4a754910229a53ac518



ZC-12\_3and4\_bottom2.jpg

sha256: 4c96247d6e0a1311ceb248c917f7561cd7f43bde66ee8c5c6d7f78c5d4a66eba



ZC-3\_2and3\_4\_1and2\_top.jpg

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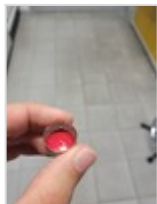
ZC-3\_2and3\_4\_1and2\_top2.jpg

sha256: da4e72615ded1e66b2582ea7901b560ebe2238015f7828b0b28a4392f86e7257



ZC-3\_2and3\_4\_1and2\_bottom.jpg

sha256: b02c1bd860811d69606abeaad908e891fd20ce9b22220beaf8ec2637c31ce92e



ZC-3\_2and3\_4\_1and2\_bottom2.jpg

sha256: f4e395556ff00bf1146b81df460fe43b8ac4a1ad69b73577be07d003567ea383



ZC-12\_1and2\_top.jpg

sha256: bacd771e1283129678ada8656e367aaa3d52d0beccbf6926c078cad3ad4838d



ZC-12\_1and2\_top2.jpg

sha256: 59b51a91b9fc7b3f5089f51882a9fb9b24ddd1643ef19e343804d8b10e033298



ZC-12\_1and2\_bottom.jpg

sha256: 49e0b8175c0132809f2e0531003bd4bfc551d24520104c02a282f77a2c0d1aba



ZC-12\_1and2\_bottom2.jpg

sha256: 329ed350cce1c9bce45cb12dab103cb2a57499edf406f7e482094ba80fec7572



Unique eLabID: 20240911-d4328002dad5e391c0087f2109b2e083ae118efa  
Link: <https://elab.water-splitting.org/experiments.php?mode=view&id=1350>