Electronic Supplementary Information

Carbon dioxide sequestration by mineral carbonation via iron complexation using bipyridine chelating ligands

Javier F. Reynes[a]*, Guy Mercier[b], Jean-François Blais[b], Louis-César Pasquier[b]

a. Departamento de Química Orgánica e Inorgánica, Facultad de Química,Universidad de Oviedo, Av. Julián Clavería, 8, 33006 Oviedo, Asturias, Spain

b. Institut National de la Recherche Scientifique (Centre Eau, Terre et Environnement), Université du Québec, 490 rue de la Couronne, Québec G1K 9A9, Canada

*Corresponding author. E-mail addresses : (J.F.Reynes) fernandezreyjavier@uniovi.es, javier.reynes@hotmail.com

1. Materials and Methods

1.1 Synthesis

Table S1. Buffer solution preparation and pH measured.

Compound name	Buffer Solution	Theoretical Buffer Solution pH	pH measure	NaOH 0.1M added (ml)	HCl 0.1M added (ml)
Sodium Chloride	50 ml 0.2 M NaCl	1	1.01	0	0
Hydrochlorid acid	134 ml 0.2 M HCl				
Sodium Chloride	51 ml 0.2 M NaCl	2	1.90	0	0
Chlorhydric acid	13 ml 0.2 M HCl				
Potassium hydrogen phthalate	100 ml 0.1 M $C_8H_5KO_4$	3	3.05	0	0
Hydrochlorid acid	44.6 ml 0.1 M HCl				
Acetic Acid	164 ml 0.1 M CH_3COOH	4	3.90	0	0
Sodium Acetate	36 ml 0.1 M $C_2H_3NaO_2$				
Acetic Acid	59 ml 0.1 M CH_3COOH	5	4.98	0	0
Sodium Acetate	141 ml 0.1 M $C_2H_3NaO_2$				
Potassium dihydrogen phosphate	50 ml 0.2 M KH_2PO_4	6	6.00	7	0
Sodium hydroxide	100 ml 0.2 M NaOH				
Potassium dihydrogen phosphate	50 ml 0.2 M KH_2PO_4	7	7.01	19	0
Sodium hydroxide	100 ml 0.2 M NaOH				
Potassium dihydrogen phosphate	50 ml 0.2 M KH_2PO_4	8	8.00	28	0
Sodium hydroxide	100 ml 0.2 M NaOH				
Borax	100 ml 0.025 M $Na_2[B_4O_5(OH)_4]\cdot 8H_2O$	9	9.02	0	16
Hydrochlorid acid	9.2 ml 0.1 M HCl				
Borax	47 ml 0.025 M $Na_2[B_4O_5(OH)_4]\cdot 8H_2O$	10	10.10	0	0
Sodium hydroxide	250 ml 0.1 M NaOH				
Sodium hydrogen carbonate	34.2 ml 0.05 M $NaHCO_3$	11	11.04	0	0
Sodium hydroxide	45.4 ml 0.2M NaOH				
Sodium hydrogen carbonate	100 ml 0.05 M $NaHCO_3$	12	12.02	0	0
Sodium hydroxide	48.4 ml 0.2M NaOH				

2. Results and Discussion

2.1 IR spectra of the $[Fe(bipy)_3]^{2+}$ complex solution

IR spectroscopy analysis of the $[Fe(bipy)_3]^{2+}$ complex at its natural pH (3.27) and ambient temperature was performed in order to confirm the complex formation.

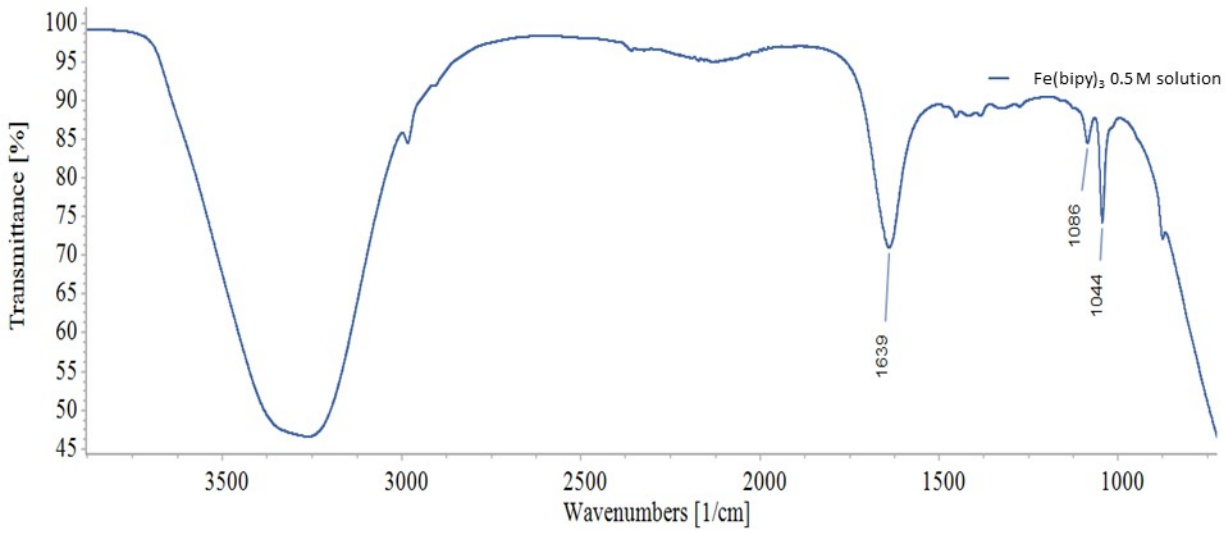

Figure S1. IR spectra of the $[Fe(bipy)_3]^{2+}$ complex solution (0.5 M) at its natural pH (3.27) and ambient temperature.

2.2 pH-dependent stability of $[Fe(bipy)_3]^{2+}$

UV-VIS spectroscopy analysis of the $[Fe(bipy)_3]^{2+}$ complex at each pH were done to study its long-term stability after 7 days (**Figure S2).**

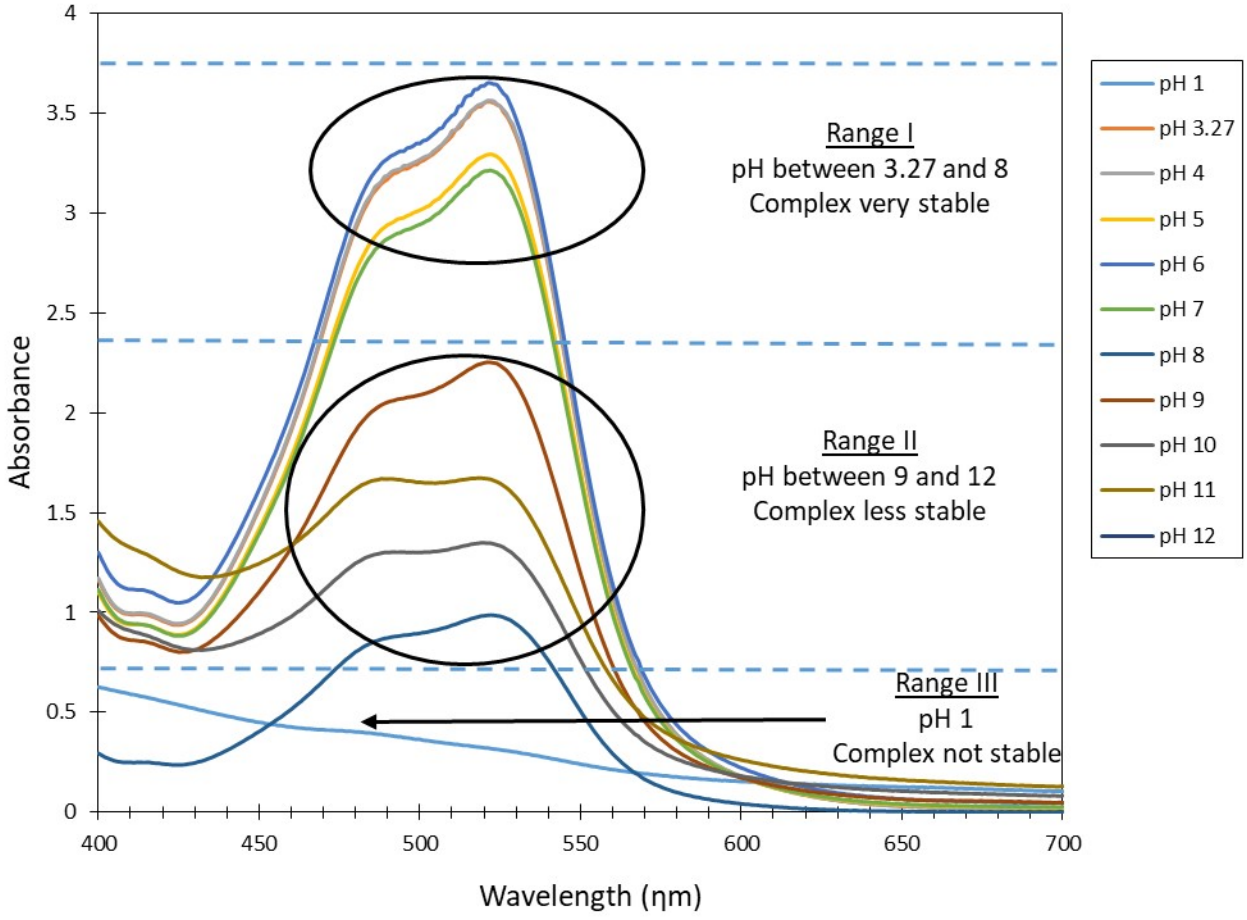

Figure S2. UV-Vis spectra (400–700 nm) of $[Fe(bipy)_3]^{2+}$ complex solution (0.015 M) at pH 1–12 on day 7.

2.3 SEM Images and EDS analysis

SEM-EDS analysis of the $FeCO_3$ obtained at three different temperatures (21, 60 and 80 ºC) were performed in order to study the particle morphology and composition (**Figure S3**)

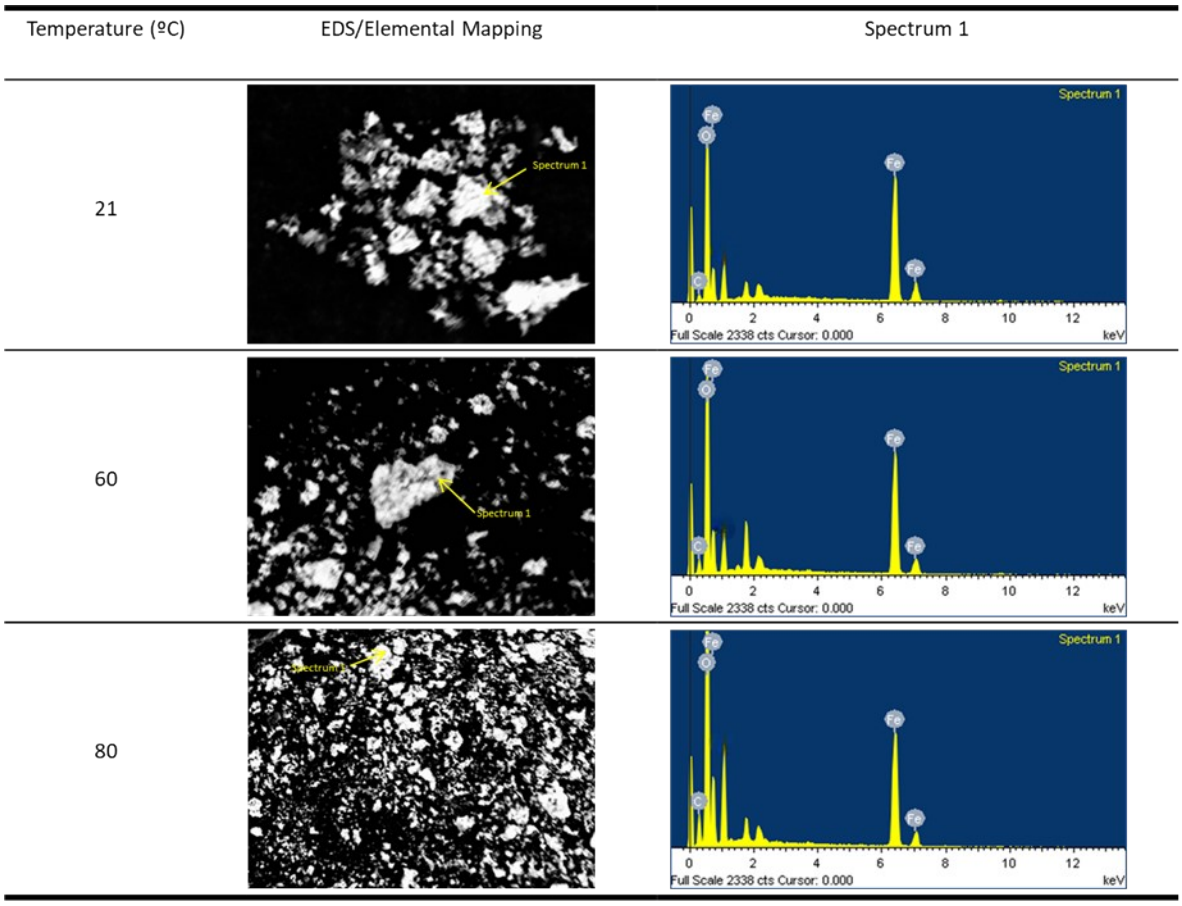

Figure S3. EDS elemental mapping analysis of samples prepared at 21, 60 and 80 ºC, using a polished section of the solid precipitate formed in the carbonation reaction