

<b>Journal:</b>	<b>RSC Advances</b>
<b>Manuscript ID :</b>	<b>RA-ART-01-2015-000717.R1</b>
<b>Title:</b>	<b>“Alcamines as Corrosion Inhibitors for Reinforced Steel and Their Effect on Cement Based Materials and Mortar Performanc ”</b>
<b>Complete List of Authors:</b>	<b>abdelaziz, Hasan; Faculty of Science, El -Mansoura University, Chemistry Department; El Arish Cement Company, Fouda, abd El-aziz; Faculty of Science, El -Mansoura University, Chemistry Department shalabi, kamal; Faculty of Science, El -Mansoura University, Chemistry Department Elewady, G.Y.; Faculty of Science, El -Mansoura University, Chemistry Department</b>

## Supplementary data

Chemical analysis of working electrode observed in the table 1

Tab. 1 Mechanical and chemical analysis of Grade B400B-R Ezz reinforcement steel (12mm diameter).

Mechanical Properties		Chemical Analysis	
Yield Strength (N/mm <sup>2</sup> )	525	Chemical	Content
Tensile Strength (N/mm <sup>2</sup> )	658	C	0.37
%Elongation	15.5	P	0.02
		S	0.034

Chemical analysis of the raw materials that used in preparing cement samples observed the quality of clinker, gypsum and limestone

Tab.2: XRF chemical analysis of cement raw materials

Cement Raw Materilas	XRF analysis										Bouge calculation			
	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	CaO	MgO	SO <sub>3</sub>	K <sub>2</sub> O	Na <sub>2</sub> O	Cl	Free CaO	C3S	C2S	C3A	C4AF
Clinker	21.83	5.94	4.29	65.66	0.76	0.65	0.43	0.33	0.021	0.49	51.43	23.81	8.49	13.04
Gypsum	2.18	0.29	0.17	33.46	1.53	42.0	0.05	0.03	0.021		-----			
Limestone	1.06	0.26	0.05	54.73	0.36	0.01	0.06	0.05	0.02		-----			

Chemical analysis of cement samples to measure the optimization of cement components

Tab.3: Chemical and mineralogical composition of cement (95%Clinker + 5%Gypsum) and cement (95%Clinker + 5%Gypsum + 4%Limestone)

Comp.	Conc., ppm	Chemical composition percentage										LOI	FL	Blaine cm <sup>2</sup> /g	Cement moduli			Mineralogical composition			
		SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	CaO	MgO	SO <sub>3</sub>	K <sub>2</sub> O	Na <sub>2</sub> O	Cl	LSF				SM	AM	C3S	C2S	C3A	C4AF	
Blank I	---	20.43	5.65	4.07	64.15	0.73	2.85	0.32	0.28	0.05	0.83	0.68	3317	93.44	2.1	1.39	51.14	20.01	8.09	12.37	
TIPA85	150	20.68	5.67	4.11	64.42	0.74	2.81	0.32	0.27	0.04	0.85	0.62	3366	92.84	2.11	1.38	50.5	21.21	8.08	12.49	
CA92	150	20.5	5.63	4.09	64.73	0.72	2.88	0.33	0.27	0.05	0.85	0.55	3358	94.02	2.11	1.38	53.52	18.42	8.01	12.43	
Blank II	---	19.65	5.47	3.96	64.59	0.69	2.89	0.34	0.25	0.06	2.3	0.8	3570	97.69	2.08	1.38	59.62	11.38	7.8	12.04	
TIPA85	150	19.68	5.5	3.98	64.6	0.69	2.9	0.32	0.27	0.05	2.35	0.67	3615	97.49	2.08	1.38	59.7	11.41	7.85	12.1	
CA92	150	19.64	5.6	3.72	64.01	0.75	3.15	0.31	0.28	0.07	2.43	0.69	3625	96.54	2.11	1.51	56.51	13.7	8.55	11.31	

Flexural and Compressive strength for 3 mould of cement mortars for 2 days and 28 days

Tab.4: The results of Flexural and Compressive strength of cement mortars for 2 days and 28 days according to EN-197-1

Cement-based materials							
Comp.,	Conc., ppm	Cement strength (2 days)			Cement strength ( 28 days)		
		Flexural (N/mm <sup>2</sup> )	Compressive (N/mm <sup>2</sup> )	Compressive (N/mm <sup>2</sup> )	Flexural (N/mm <sup>2</sup> )	Compressive (N/mm <sup>2</sup> )	Compressive (N/mm <sup>2</sup> )
Blank I	--	5.2	30	28.8	7.7	58.6	56.7
		5.6	30	28.8	8.0	59.3	60.3
		5.3	27.5	28.7	6.8	56.7	55.7
		AV <sub>2</sub> ,=5.4	AV <sub>2</sub> ,=29		AV <sub>28</sub> ,=7.5	AV <sub>28</sub> ,=57.9	
TIPA85	150	5.3	27	29.0	7.8	61.0	60.3
		5.1	25.9	27.8	8.2	67.1	66.3
		5.4	26.5	28.2	8.1	65.2	62.8
		Av <sub>2</sub> ,=5.3	Av <sub>2</sub> ,=27.4		Av <sub>28</sub> ,=8.1	Av <sub>28</sub> ,=63.8	
CA92	150	5.5	30.3	29.2	7.7	61.2	58.3
		5.5	29.7	30.5	7.7	60.7	58.3
		5.0	29.8	30.9	7.1	57.2	58.1
		AV <sub>2</sub> ,=5.4	AV <sub>2</sub> ,=30.1		AV <sub>28</sub> ,=7.5	AV <sub>28</sub> ,=58.96	
Blank II	--	5.3	25.6	25.4	8.2	54.3	54.8
		5.2	26.3	26.5	8.6	57.0	56.5
		4.7	26.8	26.0	8.5	55.3	56.8
		AV <sub>2</sub> ,=5.1	AV <sub>2</sub> ,=26.1		AV <sub>28</sub> ,=8.4	AV <sub>28</sub> ,=55.8	
TIPA85	150	5.5	30.8	32.1	8.7	66.1	64.5
		4.9	28.8	29.5	8.4	60.8	61.3
		5.1	30.8	29.1	8.5	64.7	61.6
		AV <sub>2</sub> ,=5.2	AV <sub>2</sub> ,=30.2		AV <sub>28</sub> ,=8.6	AV <sub>28</sub> ,=63.2	
CA92	150	5.7	33.2	33.7	8.6	64.7	66.4
		5.7	33.8	34.2	8.6	62.4	62.9
		6.0	34.5	33.2	9.1	60.3	64.5
		AV <sub>2</sub> ,=5.8	AV <sub>2</sub> ,=33.7		AV <sub>28</sub> ,=8.8	AV <sub>28</sub> ,=63.5	