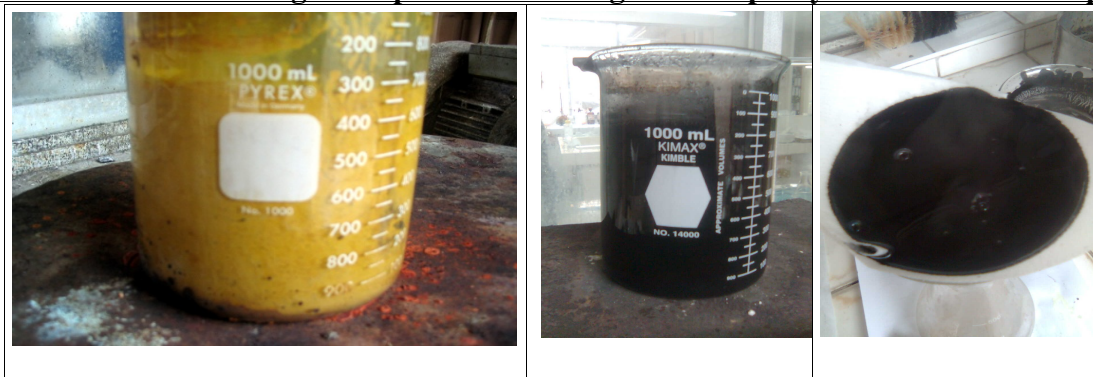


Manufacture of nano-magnetita particles starting from Heptahydrated Ferrous Sulphate



Iron (transparent) yellow oxide nano

	357.85	357.85		
Iron sulphate	Sodium Hydroxide	Iron hydroxide	Na Sulphate	
FeSO₄.7H₂O+	2NaOH=	Fe(OH)₂+	Na₂SO₄+	7H₂O
277.85	80.00	89.85	142.00	126.00
1000.00	287.93	323.38	511.07	453.48
	195.70	195.70		
Iron Hydroxide	Air (blowing)	Iron oxide yellow		
2Fe(OH)₂+	1/2O₂=	Fe₂O₃.H₂O+	H₂O	
179.70	16.00	177.70	18.00	
323.38	28.79	319.78	32.39	

Nano Magnetite

	535.55	535.55		
Iron oxide yellow	Iron sulphate	Sodium Hydroxide	Nano magnetite	
Fe₂O₃.H₂O+	FeSO₄.7H₂O+	2NaOH=	Fe₃O₄+	Na₂SO₄+
177.70	277.85	80.00	231.55	142.00
319.78	500.00	143.96	416.68	255.53
				9H₂O
				162.00
				291.52

Procedure:

In a stainless steel tank equipped with a stirrer, 5m³ capacity, put 2,400 liters of water, pour 1,000 kilos of ferrous sulfate heptahydrate, and dissolve by stirring.

Once the sulfate is dissolved, add, slowly and with stirring, 300 kilos of sodium hydroxide dissolved in 600 liters of water. (or a 50% concentration solution of the same)

We have now a suspension of about 323 kilos of ferrous hydroxide (as a gel) and 511 kilos of dissolved sodium sulphate.

Then we start blowing air into it until it turns light yellow in color: This being a suspension of Yellow iron (ochre) in nanoparticles. Stop blowing air when overnantant solution is clear.

Then, while stirring we add to this suspension 500 kilos of heptahydrated iron sulphate, then we add 150 kilos of sodium hydroxide dissolved in 300 liters of water (or a 50% concentration solution of the same). While stirring we heat the mix up to about 80-100°C until it turns deep dark in color.

Afterwards we filter the nano-magnetite formed and wash it off free of all the sodium sulphate dissolved in the mother liquor. The filtered magnetite pulp (Fe₃O₄) is conveniently flash or spray dried .