Non-Technical Note

Electrochemical preparation of Naphthoquinone from Naphthalene using Cerium (IV)methanesulphonate

1. Title of the process: Preparation of Naphthoquinone from Naphthalene using electrochemically generated cerium(IV) methanesulphonate.

2. Product: 1,4-Naphthoquinone

3. About the process:

The novelty of the technology relates to the electrochemical oxidation of cerium(III)methanesulphonate in methanesulphonic acid to cerium(IV)methanesulphonate and using this electrogenerated cerium(IV)methanesulphonate, naphthalene was chemically oxidized to naphthoquinone in a separate chemical reactor. In the course of chemical oxidation, cerium(IV)methanesulphonate was converted back to cerium(III) methanesulphonate, which was re-circulated for electrochemical oxidation to get the cerium(IV) methane sulphonate.

4. Advantages:

More economical method than other methods involving inorganic oxidizing agents, because the oxidant can be regenerated and used, has excellent selectivity and avoids disposal of spent reagents.

5. Stage of commercialization: Ready for commercial exploitation

6. Level of development: 100 grams of the product per batch

7. Estimated Demand: 2000 – 5000 MT per annum

8. Purity of the product: 99% [by GC and HPLC]

9. Cost of production Rs.170/- per kg

10. Suggested terms fore release of process:

Lumpsum premium (Rs. 5.0 Lakhs) or recurring royalty(5% on sales)

11. Contact Address:

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Experimental details

Electrochemical Oxidation

Anode	:	DSA/O_2 electrode
Cathode	:	Stainless Steel Electrode
Electrolyte	:	Cerous methanesulphonate
Cell type	:	undivided cell
Current density	:	10 amp / dm^2
Temperature	:	35 - 40 ^{0}C
Cell voltage	:	4.5 - 5.5. V
Current efficiency	:	95 %

Chemical oxidation of naphthalene

Reactant	: Naphthalene	
	Cerium(IV)methanesulphonate:	
Solvent employed	:	Dichloroethane
Temperature	:	65 - 70 ^{0}C
Duration	:	90 mins
Yield (Naphthoquinone)	:	90%