



## ACRYLIC ACID AND POLYMERIZATION OF ANODIC GEL

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### ABSTRACT

*Electro-initiated polymerization acrylic acid seed at room temperature was tested in aqueous medium using sodium nitrate as an auxiliary electrolyte. When an electric current is passed into a reaction mixture, the electrolytic cell undergoes a cross-linked water-insoluble gel formation, which we report briefly here.*

**KEYWORDS :** *Electro-initiated polymerization , electric current .*

### INTRODUCTION

It has been found from the literature that electrolysis of acrylamide in a solution of sodium nitrate in N, N-dimethylformide results in the simultaneous formation of polymers in anodic and cathodic compartments. The polymerization in the cathode compartment consists of an anionic mechanism similar to the alkaline lactam polymerization by amide ions formed by hydrogen transfer, according to Breslow et al. Al. Species formed due to salt decomposition at the anode initiated anodic polymerization. This work has been further enhanced in aqueous systems with vinyl monomers, rye acrylic acid seeds, in which gels are formed.

### PART OF EXPERIMENT:

#### Material:

Many times the water was removed. Rye acetic acid, sodium Nitrate and other chemicals were transferable and used without further purification.

#### Polymerization:

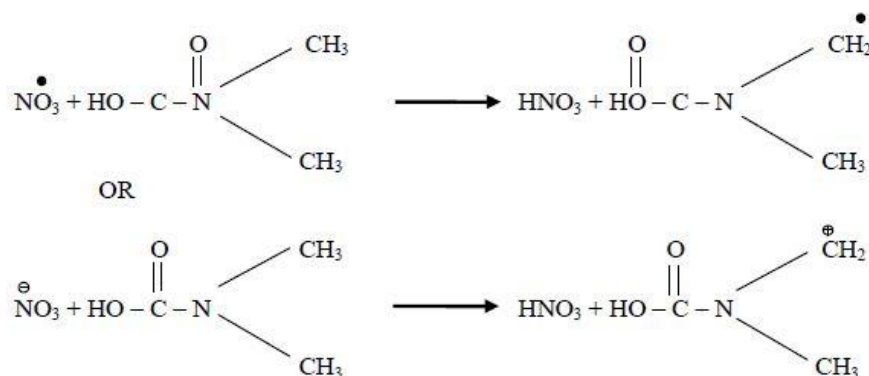
Polymerization was performed in a single electrolytic cell using electrodes under normal laboratory conditions e.g. Stainless Steel - Stainless steel of area 0.7 x 2.5 cm. Crylic acid in H<sub>2</sub>O with sodium nitrate helps the electrolyte to form a polymer in the electrolytic cell. No polymerization occurred if not subjected to electrolysis. This indicates the complete absence of adventurous beginners and an electric current was also required.



### RESULTS AND DISCUSSION:

Upon electrolysis, the electrolytic solution, after showing some induction period, becomes viscous and changes from a viscous mixture to a transparent elastic gel, which may not return. Polymer removal was usually a significant difficulty because it was trapped in the electrolytic cell as a solid insoluble

block. When drying, the rubber-like gel polymer becomes hard and brittle, it has a glassy appearance. Increased conversion thresholds beyond 40% usually resulted in the occurrence of gelation. This point can be achieved by increasing the current level of electrification or time. The formation of the gel was possible only for a concentrated monomer solution. An increase in the reaction temperature reduces the glass time due to the easy availability of glacial activation energy.



Salt decomposes at the anode and it gives rise to catalytic species that are stable in acidic solution. NO<sub>3</sub> radical abstract hydrogen atoms from the media as instructed by Ross3 et al. Al. Preparation of HNO<sub>3</sub> which makes the solution acidic during electrolysis and can also catalyze polymerization. Indeed, we have seen that HNO<sub>3</sub> is able to stimulate the polymerization of AA, which is similar to anodic polymerization. P-Benzoquicon A.A. Polymerization does not occur either anodically or with HNO<sub>3</sub> in the presence of which indicates the possibility of free radical polymerization. Nitrate radicals or nitric acid seeds can interact with AO to form monomeric free radicals which give rise to polyacrylic acid seeds with C-C chain.

The current function in the summary demonstrates that H<sub>2</sub>O acts as an initiator in the electro-reserved polymerization of NaNO<sub>3</sub>. Further work on quantitative aspects is in progress.

**Table 1.1 Polymerization of AA at altered current**

Current (mA)	Electrolysis time (Min)	Conversion %
10	240	Trace
20	240	8.00
40	240	10.00
60	240	12.00

**Condition:**

[AA] = 2.97 Mole/l  
 [NaNO<sub>3</sub>] = 1.180 x 10<sup>-3</sup> mole/l  
 Temperature, 40°C  
 Electrode, St.Steel – St.Steel

**Table 1.2 Polymerization of AA at Electrolysis time**

Electrolysis time (Min)	Conversion %
60	Trace
120	2.8
240	9.1
480	14.54

**Condition:**

[AA] = 2.97 Mole/l  
 [NaNO<sub>3</sub>] = 1.180 x 10<sup>-3</sup> mole/l  
 Current = 40mA  
 Electrode, St.Steel – St.Steel

Temperature, 40°C

**Table 1.3 Polymerization of AA at alternate concentration**

[AA] mole/l	Electrolysis time (Min)	Conversion %
0.765	240	5.00
1.480	240	11.00
2.950	240	7.00
4.500	240	1.40

**Condition:**

[AA] = 2.97 Mole/l

[NaNO<sub>3</sub>] = 1.180 x 10<sup>-3</sup> mole/l

Current = 40mA

Electrode, St.Steel – St.Steel

Temperature, 40°C

**Table 1.4 Anodic Gel Polymerization of AA at alternate concentration**

Temperature °C	Electrolysis time (Min)	Conversion %
30	240	30.00
45	240	15.00
65	240	9.00

**Condition:**

[AA] = 2.97 Mole/l

Current = 40mA

Electrode, St.Steel – St.Steel

[NaNO<sub>3</sub>] = 1.180 x 10<sup>-3</sup> mole/l

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