

**NON TECHNICAL NOTE**  
**Process on Electrochemical preparation of Calcium Gluconate**

**1. Name of the process** : Electrochemical preparation of Calcium Gluconate

**2. Product** : Calcium Gluconate

**3. Uses of the product** :

Calcium gluconate is extensively used in the treatment of calcium deficiency both for oral and parenteral administration. It is also used as an oral antidote for fluorine and oxalic acid poisoning, as a substitute for fruit acids in the manufacture of fruit jellies and baking powders and in the preparation of homogenous pastes like dentifrices and metal polishes. Ferrous gluconate, which can be readily made from calcium gluconate, is used the treatment of iron deficiency anemia's and in ionic composition. Aluminum gluconate has potential use as a tanning agent.

**4. Advantages:**

- i. The formation of calcium gluconate is in higher yield in comparison with chemical methods.
- ii. The conversion is high.
- iii. There is no by-product formation.
- iv. No spent reagent disposal.
- v. Process is eco-friendly.

**5. i. Present consumption pattern** : 3000 TPA  
ii. How is the demand being met : by import and indigenous  
iii. Estimated future demand : expected to increase  
iv. Present market price : Rs. 110 per kg

**6. Description of the process:**

Calcium gluconate is produced by the electrolytic oxidation of glucose dissolved in sodium bromide solution as electrolyte using graphite electrodes. Gluconic acid formed is neutralised by the calcium carbonate present in the electrolyte as a suspension. Calcium gluconate formed in the electrolyte is recovered by cooling and the mother liquid obtained after recovery of the product is continuously reused in further batches.

7. Suggested plant capacity : 60 TPA  
8. Consumer acceptability : I.P specification  
9. Laboratory work details  
    i. Scale of investigation : 20 kgs per day  
    ii. Can you supply samples : yes  
    iii. Demonstration scale : 1 kg of product per batch

**10. Total Capital Investment**

- a. Total Capital Investment : Rs. 48.00 lakhs  
b. Fixed capital investment : Rs. 39.00 lakhs  
c. Working capital investment : Rs. 9.00 lakhs  
d. Cost of production : Rs. 83.00 per kg  
e. Selling price : Rs.110.00 per kg  
f. Annual Turnover : Rs. 66.00 lakhs  
g. Gross profit : Rs. 16.00 lakhs  
h. Net profit : Rs. 12.00 lakhs  
i. Return on investment : 25%

**11. Suggested terms of release of the process:**

1. Lump sum premium: Rs. 5.0 lakhs  
2. Recurring royalty : 3% on sales.

**12. Address for correspondence:**

Director  
Central Electrochemical research Institute  
Karaikudi –630 006. Tamil Nadu.  
E-mail: director.cecric@gmail.com or vyejna@gmail.com

Website: www.cecric.res.in

## **Calcium Gluconate**

### **1. Process description:**

Calcium gluconate is produced by the electrolytic oxidation of glucose dissolved in sodium bromide solution as electrolyte using graphite electrodes. Gluconic acid formed is neutralised by the calcium carbonate present in the electrolyte as a suspension. Calcium gluconate formed in the electrolyte is recovered by cooling and the mother liquid obtained after recovery of the product is continuously reused in further batches.



### **2. Parameters:**

- i. Anode : Graphite
- ii. Cathode : Graphite
- iii. Electrolyte : NaBr
- iv. Concentration : 20 gpl
- v. Current density : 2 - 5 A/dm<sup>2</sup>
- vi. Temperature : 45 – 50 °C
- vii. Type of cell : undivided Cell
- viii. Cell voltage : 3.5 – 4.5 V
- ix. Yield : 90 %
- x. Current efficiency : 90%
- xi. Energy consumption: 1.8 Kwh/kg

**Electrolysis conditions [ 100 grams per batch scale]**

- i. Anode : Graphite [working area = 1 dm<sup>2</sup>]
- ii. Cathode : Graphite [working area = 1 dm<sup>2</sup>]
- iii. Electrolyte : NaBr = 30 g + CaCO<sub>3</sub> = 40 g
- iv. Concentration : 20 gpl
- v. Current density : 2 - 3 A/dm<sup>2</sup>
- vi. Temperature : 45 – 50 °C
- vii. Type of cell : undivided flow Cell [1500 ml capacity]
- viii. Cell voltage : 3.5 – 4.5 V
- ix. Yield : 90 %
- x. Conversion : 95 %
- xi. Current efficiency : 90 %
- xii. Energy consumption : 1.8 Kwh / kg
- xiii. Glucose taken : 145 grams
- xiv. Calcium gluconate formed : 155 grams