## *Synthetic Ion Exchange Resins from α-Pinene*

α-Pinene in the presence of an aldehyde yields a composition suitable as starting material for the preparation of cation exchange resins. In the present investigation, furfural was used as the aldehyde; earlier work had confirmed its efficacy for yielding ion exchange resins.[1] Isagulyants and Khomko[2] have reported condensing certain terpene hydrocarbons in the presence of a cation exchange resin, and the probable structure of the pinene formaldehyde condensate has been presented.

The product obtained by reacting α-pinene and furfural under controlled conditions[3] was treated with the following reagents to obtain three cation exchange resins with different ionogenic groups: (a) sulfuric acid 96% at 60°C, Sulfonic acid-type resin A; (b) phosphorous trichloride plus anhydrous aluminium chloride at 80°C, phosphonic acid-type resin B; (c) Acetylation with acetyl chloride and anhydrous aluminium chloride, then phosphorylation with phosphorous trichloride and hydrolysis with glacial acetic acid at 30°C, hydroxyphosphonic acid-type resin C.

Table I presents some of the properties determined for the three cation-exchange resins. Further properties studied have shown that the resins function efficiently as cation exchangers.

TABLE I

| Resin | % Moisture | Exchange capacity, meq/g (dry) | |
|---|---|---|---|
| | | Salt splitting | Total |
| A | 32.15 | 2.53 | 3.67 |
| B | 11.09 | 0.56 | 3.06 |
| C | 10.18 | 0.65 | 4.82 |

### References

1. B. D. Dasare and N. Krishnaswamy, *J. Appl. Polym. Sci.*, **9**, 2655 (1965).
2. V. I. Isagulyants and S. V. Khomko, *J. Appl. Chem. USSR*, **41**(3), 645 (1968).
3. B. J. Mehta, unpublished results.

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