ACTIVE TRANSPORT OF ALKALI METAL CATIONS USING CROWN ETHERS HAVING AN AMINO GROUP

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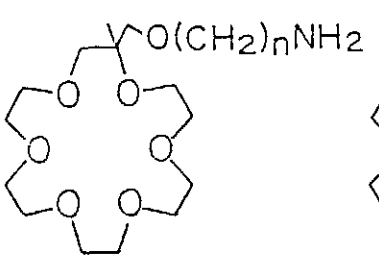
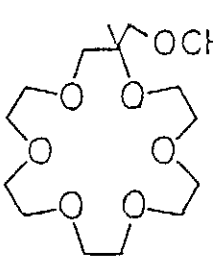
The development of carboxylic synthetic ionophores has been noticed in relation to mimicking the function of monensin-type antibiotics, which selectively transport alkali metal cations against the concentration gradient.[1] In this case, intramolecular complexation is skillfully used in the uptake process of the cation. We now report a new ion transport system having a device in the release process by using crown ethers having an amino group as ionophore.



1: n=5
2: n=2



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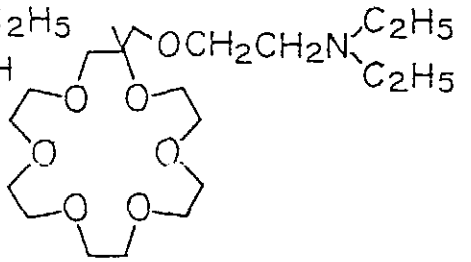

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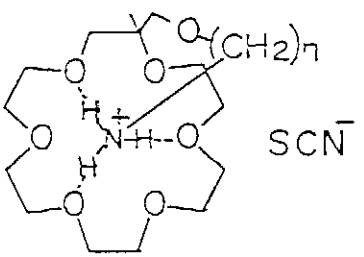
Ionophores 1 and 2 having a primary amino group displayed much better transport ability toward K^+ than ionophore 3 having a secondary one or ionophore 4 having a tertiary one. It is well known that 18-crown-6 derivatives can complex with primary amines much more effectively than secondary or tertiary ones.[2] So, the good ability of ionophores 1 and 2 may be ascribed to the presence of intramolecular complexation between 18-crown-6 ring and primary ammonium ion (1a and 2a) formed in the acidic region.

In addition, ionophores 1 and 2 revealed an excellent K^+/Na^+ selectivity.



Intramolecular Complex

1a: n=5 ; 2a: n=2

References

1) E.M.Choy et al., J.Am.Chem.Soc., 96, 7084(1974).

2) R.M.Izatt et al., J.Am.Chem.Soc., 101, 6273(1979).