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NOTE

Kinetic Study of Microporous Ion Exchange Resin Duolite A 102-D

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A 102-D is an anion exchange resin extensively used in mix bed system and also in demineralization of water. For the industrial processes kinetics plays an important role. Kinetic study of this resin is carried out using ^{82}Br as a tracer isotope. The study was carried out at different concentrations of electrolyte at various temperatures and at a fixed amount of resin. The rate of the reaction was then determined using conventional method.

Key Words: Kinetic, Ion exchange resin, Duolite A 102-D

The radioactive tracers[1] have been gradually introduced in process analysis as an analytical tool for diagnosis in industrial systems. Earlier, many radioactive isotopes have been used in many applications[2,3] in the field of agriculture, medicine, industries, etc. Using the valuable property of exchanging ions, an attempt is made to understand the kinetics of ion exchange process in strongly basic anion exchanger microporous resin Duolite A 102-D.

Duolite A 102-D is a strongly basic anion exchanger supplied in chloride form by Auctel Products (I) Pvt. Ltd., Mumbai. The chloride form was converted into bromide form using 10% KBr solution. After conditioning, the resin was air-dried and used for further studies. KBr solutions of different concentrations ranging from 0.005 to 0.1 M were prepared and labelled using ^{82}Br isotope which was obtained from Board of Radiation and Isotope Technology (BRIT), BARC, Mumbai. Activity was so adjusted that 1 mL of this solution might have known activity bvetween 15000 to 16000 cpm measured on gamma-ray spectrometer. To this solution of different concentrations of known initial activity, fixed amount of ion exchange resin (1.0 g) in bromide form was added under continuous stirring. The activity of 1.00 mL of solution was measured at an interval of every 2 min and continued for 1.5 h. The procedure was repeated for different temperatures.

It was observed that for a given temperature the rate of reaction is almost constant with increasing concentration of KBr solution as shown in Table-1. However, as the temperature of the KBr solution increases, a gradual increase in the rate of reaction has been observed (Table-2). This is because of the increase in the number of collisions between reacting molecules with increase in temperature.

TABLE -1
EFFECT OF CONCENTRATION ON REACTION RATE OF ION EXCHANGE REACTION

Temperature of KBr solution : 25°C
Amount of ion exchange resin : 1.00 g

Concentration of bromide ion solution (M)	Specific reaction rate (min^{-1})
0.05	0.082
0.01	0.084
0.02	0.083
0.04	0.084
0.10	0.083

TABLE -2
EFFECT OF TEMPERATURE ON REACTION RATE OF ION EXCHANGE REACTION

Concentration of KBr solution: 0.005 M
Amount of ion exchange resin: 1.00 g

Temperature (°C)	Specific reaction rate (min^{-1})
25	0.082
30	0.103
35	0.122
40	0.144
45	0.163

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