

# Chemical Modification of Kevlar Fiber Surfaces

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To improve the interfacial interactions of Kevlar fiber with composite matrix polymers, amine functional groups have been incorporated into Kevlar fiber surfaces by bromination followed by ammonolysis and by nitration followed by reduction. Studies have been made on the effects of reaction conditions such as reaction time, temperature and concentration on the number of amine groups on the Kevlar fiber surface. To determine the number of amino groups, a technique used included adsorption and elution of acid dyes from the chemically modified Kevlar surfaces, with subsequent spectroscopic analysis of the eluted dye. The number of amino groups attached to the Kevlar fiber surface increased with increasing concentration reagents, reaction time and temperature.

Table Effect of reaction conditions on the number of amino groups(-NH<sub>2</sub>) incorporated to the Kevlar fiber surface.

Reaction conditions	Number of -NH <sub>2</sub> group(100 Å <sup>2</sup> )	Fixed reaction condition
NBS concentration in bromination		
40mM	14.0	EDA/temp./time
400mM	94.2	(0.5M/80~85°C/1hr)
EDA concentration in ammonolysis		
0.25M	1.9	NBS conc. : 40mM
0.50M	3.5	reaction temp. : 50°C
0.75M	5.9	reaction time : 20min
1.00M	6.2	
Temperature of ammonolysis		
50°C	3.8	NBS conc. : 40mM
80°C	12.1	EDA conc. : 0.5M
120°C	30.0	reaction time : 20min
Time of ammonolysis		
10min	11.6	NBS conc. : 40mM
20min	12.1	EDA conc. : 0.5M
40min	12.9	reaction temp. : 80°C
80min	14.1	