Condensation Polymerization of Nylon 6,6
The Nylon "Rope Trick"

References:

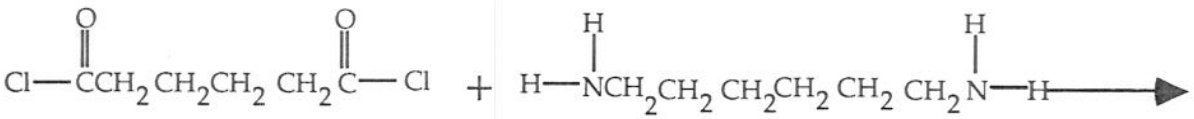
Pavia, Donald L., Lampman, Kriz, Engel. **Introduction to Organic Laboratory Techniques: A Microscale Approach; Saunders College Publishing,** Harcourt, Brace Jovanovich, Fort Worth, 1990; p. 393-394.

Shakhashiri, B.Z. and G. E. Dirreen, **Chemical Demonstrations; Vol. 1**, University of Wisconsin Press, 1983; p. 241.

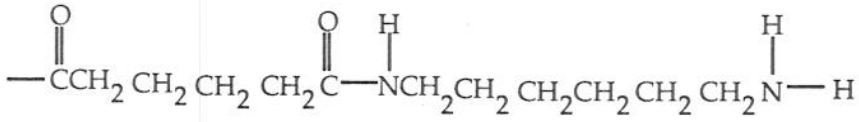
OVERVIEW

The word "nylon" is used to represent synthetic polyamiides. The various nylons are described by a numbering system that indicates the number of carbon atoms in the monomer chains. Nylons from diamines and dibasic acids are designated by two numbers, the first representing the diamine and the second the dibasic acid.

Reaction of a dicarboxylic acid, or one of its derivatives, with a diamine leads to a linear polyamide through a condensation reaction. Commercially, nylon 6-6 (so called because each monomer has six carbons) is made from adipic acid and hexamethlenediamine.



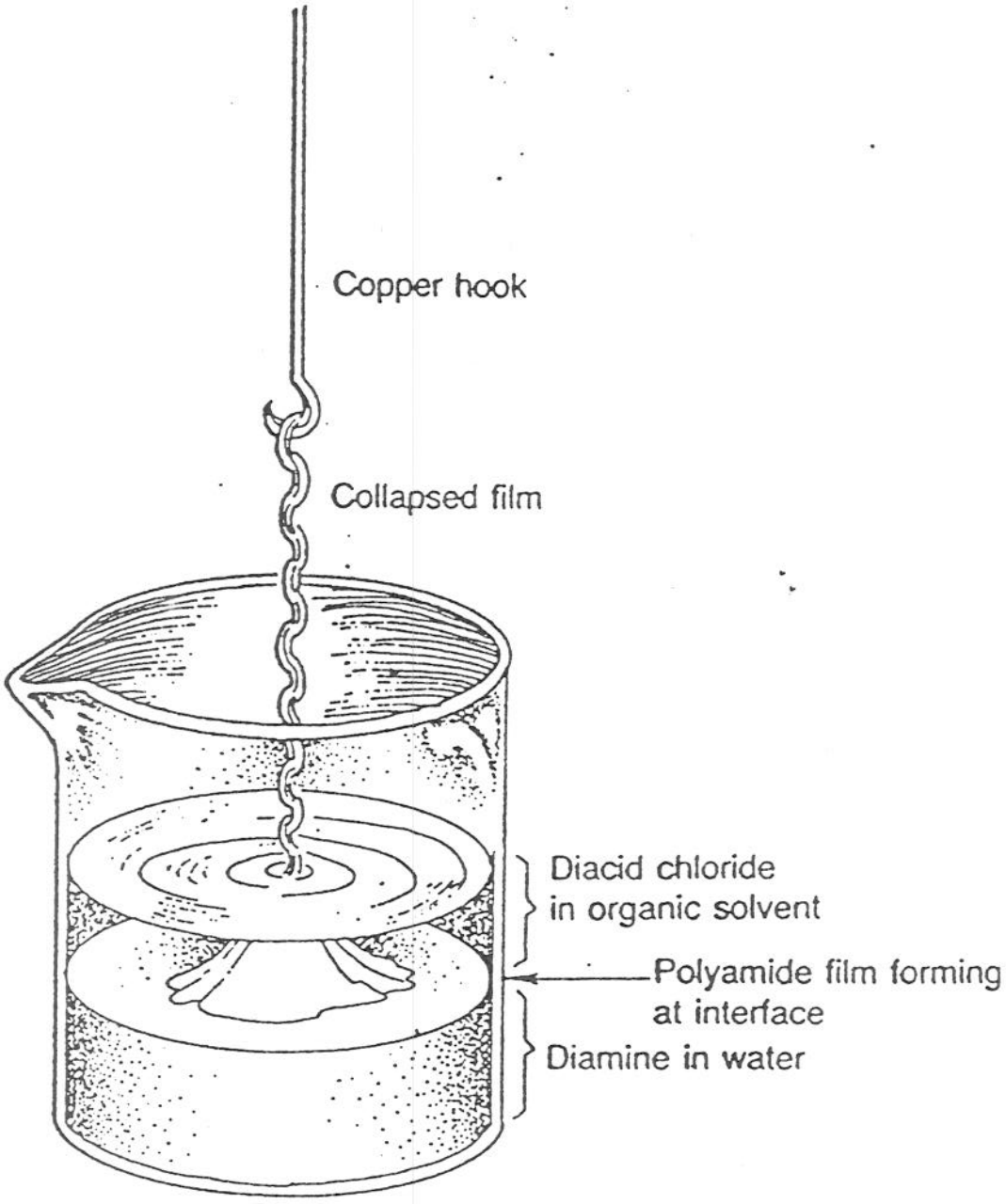
Adipoyl chloride + Hexamethylenediamine →



Nylon 6-6

In this experiment, you use the acid chloride instead of adipic acid. The acid chloride is dissolved in cyclohexane and this is added carefully to hexamethylenediamine dissolved in water. These liquids do not mix and two layers will form. The nylon can then be drawn out continuously to form a long strand. Imagine how many molecules have been linked in this long strand. It is a fantastic number!

The Nylon "Rope Trick"



Preparation of nylon