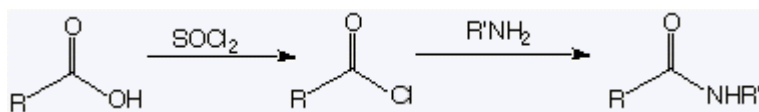


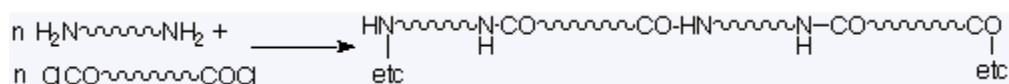
## NOTES ON EXPERIMENT 6

**Nylon** is a very important polymer, used for carpets and water-resistant clothing. It is based on amide linkages- rather like the polypeptides which form the polymer backbone of many proteins- but it also has hydrocarbon chains present also (unlike polypeptides).

Today's experiment consists of a two step reaction sequence. First, sebacoyl chloride (an acid chloride) is prepared from sebacic acid and  $\text{SOCl}_2$  (using DMF as catalyst), then the sebacoyl chloride is reacted with 1,6-hexanediamine to form nylon. In one view, this is a typical conversion of a carboxylic acid to the corresponding amide via the acid chloride:



In another view, it is the preparation of an amide polymer by linking up the ends of two difunctional molecules:



The polymer can be regarded (if  $n$  is large enough, as here) as a multiple of the polymer unit  $-(\text{NH-R-NH-CO-R}'\text{-CO})_n-$  (where  $R$  is a hydrocarbon chain) with the molecular weight being *equivalent* to the monomer shown when calculating a % yield.

**Tips on the procedure:**

- Get a hot water bath started (using hot water to begin with!) when you come in.
- Measure things out in the hood-  $\text{SOCl}_2$  is particularly smelly, and the reaction may begin (even without the DMF), so make sure your trap is in place before you start. Make sure your trap is damp but not dripping wet.
- Water and acetone will both interfere with the reaction, so make sure you clean your tube out ahead of time!
- You only need a **thin** coating of grease on your beaker.
- Get everything ready before you start to mix the acid chloride solution with the diamine solution. Lay out paper towels along the bench first, and put on gloves. Mix the two solutions, then immediately use a spatula or wire hook to start off a nylon strand, and then draw the beaker along the bench while making sure the strand comes out cleanly in a line (we will not be wrapping the strand around anything). Some strands can end up several metres long! If you can't draw a strand from your nylon, just try to recover a "blob" of nylon.
- Test the solubility of a little piece of your nylon in acetone, methanol, formic acid and hexane, report these observations.

**Assigned problems:** questions 2, 4 from chapter 69, also questions below.

- Also, explain how the % yield can be calculated using the molecular weight of the monomer, without knowing the true molecular weight of the polymer.
- Why is this experiment described as *interfacial* polymerization?