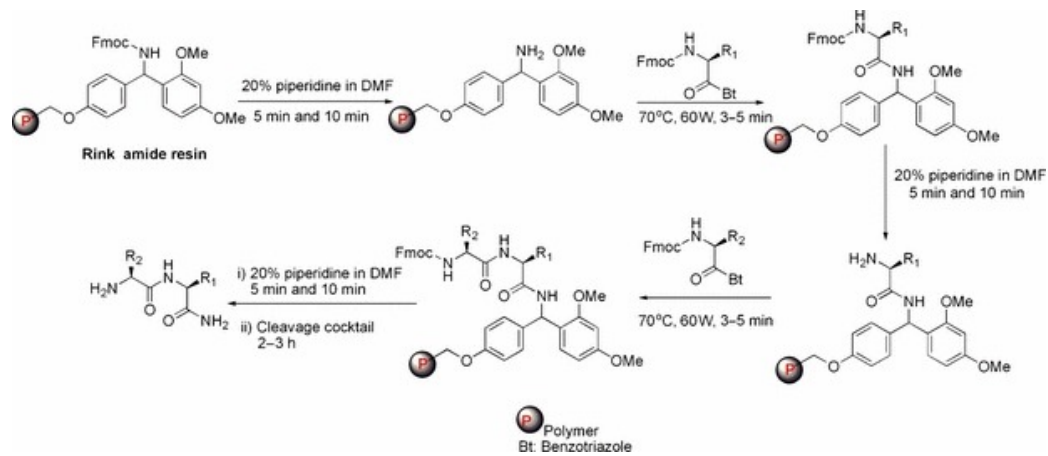


(You must answer each question on a separate sheet of paper. Please type narrative answers. Show your work on quantitative answers.)

- Peptides can be made in the laboratory using a technique called “solid phase synthesis” in which amino acid monomers are successively added to immobilized beads. In order to prevent solution-phase amino acids from reacting amongst themselves, the amino groups are typically protected using a 9-fluorenylmethyloxycarbonyl, or “Fmoc”, group (see figure below). During a peptide synthesis, you accidentally mix Fmoc-Ala and Fmoc-His. Propose how to separate the two reagents.



- Calculate the isoelectric point of the following peptides:
  - MILLARD
  - WHITNEY
  - FEKETE
- If you were given a tetrapeptide containing only non-polar aliphatic amino acids and had to guess it's sequence, what are the odds you'd get it correct on the first guess?
- If you had a 50.0 mL solution of 200. mM lysine, buffered at pH 10.2, how many moles of HBr are required to decrease the pH to 2.5? (*you may assume constant volume*)