

Bulk polymerization of Styrene

Ingredients:

1. 4gm Styrene (l)
2. 35mg AIBN (s)
3. Toluene (l) (to dissolve the polystyrene) ~30ml
4. Propanol (l) (to precipitate the polystyrene) ~ 100ml
5. Hot plate and a water bath

Procedure:

1. Place water in the bath and heat to ~80°C (You need enough water in bath to submerge the contents of the test tube in hot water)
2. Add 4gm of styrene in a test tube.
3. Add 35 mg (excess) of AIBN to the beaker. Stir to dissolve the AIBN in styrene with a glass rod. AIBN is used to initiate the styrene on heating above 60 C. (The excess AIBN reacts with the stabilizer BHT which is a free radical scavenger present in styrene. You can also distill the styrene to remove BHT for a cleaner reaction.)
4. Place the test tube in the hot water bath for about 20-25 mins.
5. You will notice the solution getting thicker indicating the formation of polystyrene.
6. Remove the beaker from the bath and dip the beaker in cold water for a few minutes (to quench). It will be ideal to use ice for quenching, but cold water from tap works.
7. The quenching process will either solidify or really thicken the polystyrene.
8. Add toluene to the test tube and transfer to a beaker to add the remaining toluene to a total of 30 ml to dissolve the polystyrene. Stir well. Toluene is a good solvent for the monomer and polymer.
9. Once the polystyrene is dissolved, add excess propanol while stirring. Propanol is a non-solvent for styrene but has some miscibility with monomer and toluene. You will immediately notice the white precipitate of polystyrene. Continue stirring at this time.
10. After stirring let the contents in the beaker settle down for a couple of minutes and add more propanol. You will see the polystyrene (white chunk) form in the beaker. Decant the toluene/propanol solution and wash the polystyrene precipitate with toluene a few more times. The polystyrene can be removed and dried on filter paper.

Precautions:

1. Styrene vapors are potentially carcinogenic (still under debate, check Wiki page of [Styrene](#)). You may cover the beaker while heating to reduce the release of styrene vapors. For small amounts this procedure can be conducted with no hood as long as the room is relatively well ventilated.
2. AIBN should be handled with gloves and avoid contact with AIBN, dust or vapors.