

to make the chain and leave the other electron for possible interaction between chains to form a covalent bond between them. This is what is called crosslinking.

If a phthalic ester (heavy) is added when polymerization starts, then the free radicals of monomer induce an instability between the carboxylic group in the ester and the heavy chain attached to it; causing the ester to break also in free radicals precisely in this bond. The carboxylic group free radical has two oxygens with one free electron each, capable to react and form a covalent bond. So it can react with one monomer in one chain and at the same time, with another monomer in another chain, therefore widening the space between these two crosslinked chains. However, it can happen that only one oxygen has lost his heavy chain and just one electron is now available for reaction. If this happens then the ester will react with only one monomer in one chain, thus blocking that possibility for crosslinking and by this reduce and eventually stop the possibility for crosslinking. On the other side the heavy chain free radical can only interact as blocker.

The purpose of using benzoic esters instead of phthalic or terephthalic esters is that when breaking in free radicals, they can only have one electron for forming a covalent bond. Therefore they will only work stopping the crosslinking between chains. If the sensibility is the same as with the other esters, then phthalic esters work as blockers. If the sensibility decreases, then the phthalic esters work as openers. However if the sensibility increases, then we can not say anything about the work of the phthalic esters but a better dopant has been found.

3. Experimental. Five different preparations were made using the french monomer C.A.D. from the Société Française D'organo-synthèse. Each preparation was polymerized using as initiator 3% by weight of asoisobutironitryl (AIBN) from Dupont (peroxidicarbonates were not available in our country), and four of them were dopped with different esters according to TABLE 1. All five polymers were polymerized at the same time, in the same oven with a thirtytwo hour curing cycle [1],[2].

TABLE 1.- INITIATOR AND DOPANT USE IN EACH POLYMER.

PREPARATION N°	NAME	INITIATOR	INITIATOR CONC.	DOPANT	DOPANT CONC.
1	CR-39	AIBN	3%	—	—
2	CR-39(DOP)	AIBN	3%	DOP	3%
3	CR-39(MB)	AIBN	3%	MB	3%
4	CR-39(BB)	AIBN	3%	BB	3%
5	CR-39(SB)	AIBN	3%	SB	3%

AIBN= asoisobutironitryl; DOP= dioctyl phthalate; MB= methyl benzoate; BB= benzyl benzoate; SB= sodium benzoate.

After the curing cycle was completed, the plastics thus obtained were soft and flexible. We irradiated them, together with some samples of CR-39 (DOP) from Pershore Mouldings Ltd., with α -particles at different energies. We then etched them in a solution 25% NaOH at 70°C in three steps. A first step of two hours, a second one of two hours nineteen minutes and a third one of three hours .

4. Preliminary inference. At the time this confirming abstract was done, analysis of the irradiated plastics was in progress. The analysis will end with calibration curves describing the track velocity of attack as a function of the residual range, which would show the sensibility of each polymer compared to CR-39 (DOP) by Pershore.

Though analysis is not yet complete, some preliminary inferences can be made: From the size of the tracks in our five plastics compared to the size of the tracks in the CR-39 (DOP) from Pershore, we can infer that the sensibility of our plastics should be about the same as the CR-39 (DOP) from Pershore. Though, this should not be conclusive since calibration curves have not been obtained yet. If this inference results in becoming true, we would have proved then, that DOP works as a blocker and not as an opener that widens the space between crosslinked chains.

At the moment being, we have a conclusive result. This is that the tracks in the polymer doped with sodium benzoate are very hard to analyze since the polymer is quite turbid.

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References.

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* On leave for INAOE, Tonantzintla, A.P. 51, 72000-Puebla, Pue. México.