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ON THE LEVELS OF ^{192}Pt AND ^{192}Os

THE study of the energy levels of ^{192}Pt and ^{192}Os has attracted the attention of several investigators¹⁻⁶. Among all the earlier investigations¹⁻⁵ there has always been inconsistencies in the number of existing levels and the gamma transitions in both the ^{192}Pt and ^{192}Os . We have studied the decay of ^{192}Ir using a high resolution Ge (Li) gamma ray spectrometer in order to remove such inconsistencies, and the efforts have been made to look critically the weak gamma ray transitions which might have not been resolved in earlier investigations.

The ^{192}Ir radioactive source was used in the form of sodium chloro iridate in HCl solution, which was obtained from the BARC, Trombay (India). The lithium drifted germanium detector having a resolution of about 3 keV was used for the detection of gamma rays. The gamma ray spectra were recorded in the 4096 channel analyzer. ^{152}Eu was used as the calibration source for determining the energies of the gamma ray peaks.

The ^{192}Ir isotope decays through all the three beta processes and populates the levels of ^{192}Os through electron capture and β^+ -emission, and the levels of ^{192}Pt through β^- -emission. Twenty-eight gamma transitions have been observed in the decay of ^{192}Ir . Out of them, ten gamma rays depopulate the levels of ^{192}Os and the rest are observed to depopulate the levels of ^{192}Pt . The gamma rays of our interest in the gamma ray spectra obtained from 4096 channel analyzer are shown in Figs. 1 and 2. The energies of the prominent gamma rays obtained from our data fit well with the level scheme shown in Fig. 3.

In addition to the well-established gamma rays, four new weak but clear gamma ray peaks of energies 628.5, 785, 912.1 and 921 keV are also observed in our spectrum (Figs. 1 and 2),

We find a weak but clear evidence for the existence of 478 and 1090 keV gamma rays. These gamma rays fit well in the level scheme of ^{192}Pt by ascribing a level at 1090 keV. The 1090 keV gamma ray is a cross-over transition and the 478 keV gamma ray seems to exist between the 1090 and 612.5 keV states. So far, only Schellenberg², on the basis of his internal conversion studies, has reported the existence of these gamma rays by ascribing a level at 1090 keV in ^{192}Pt .

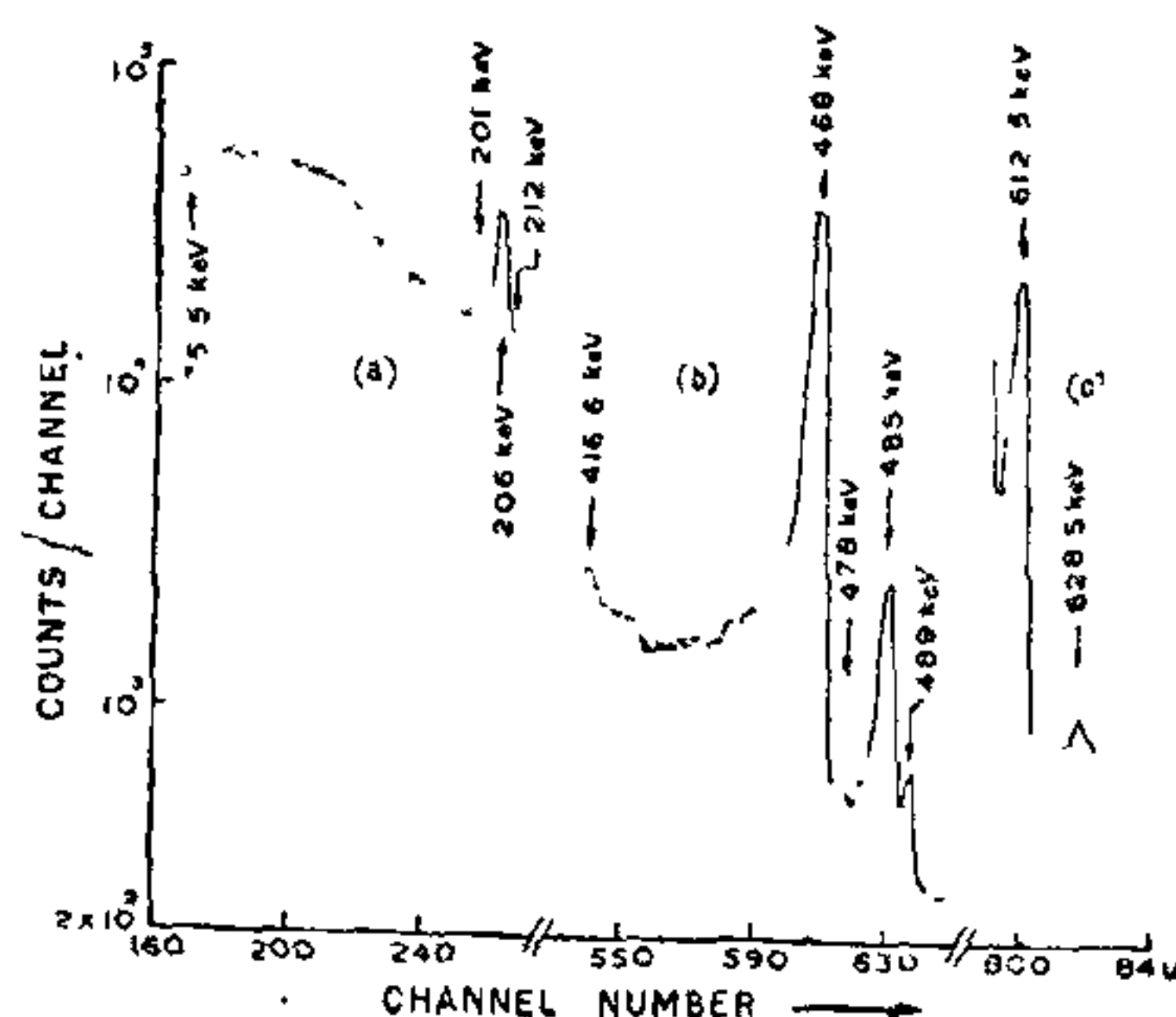


FIG. 1

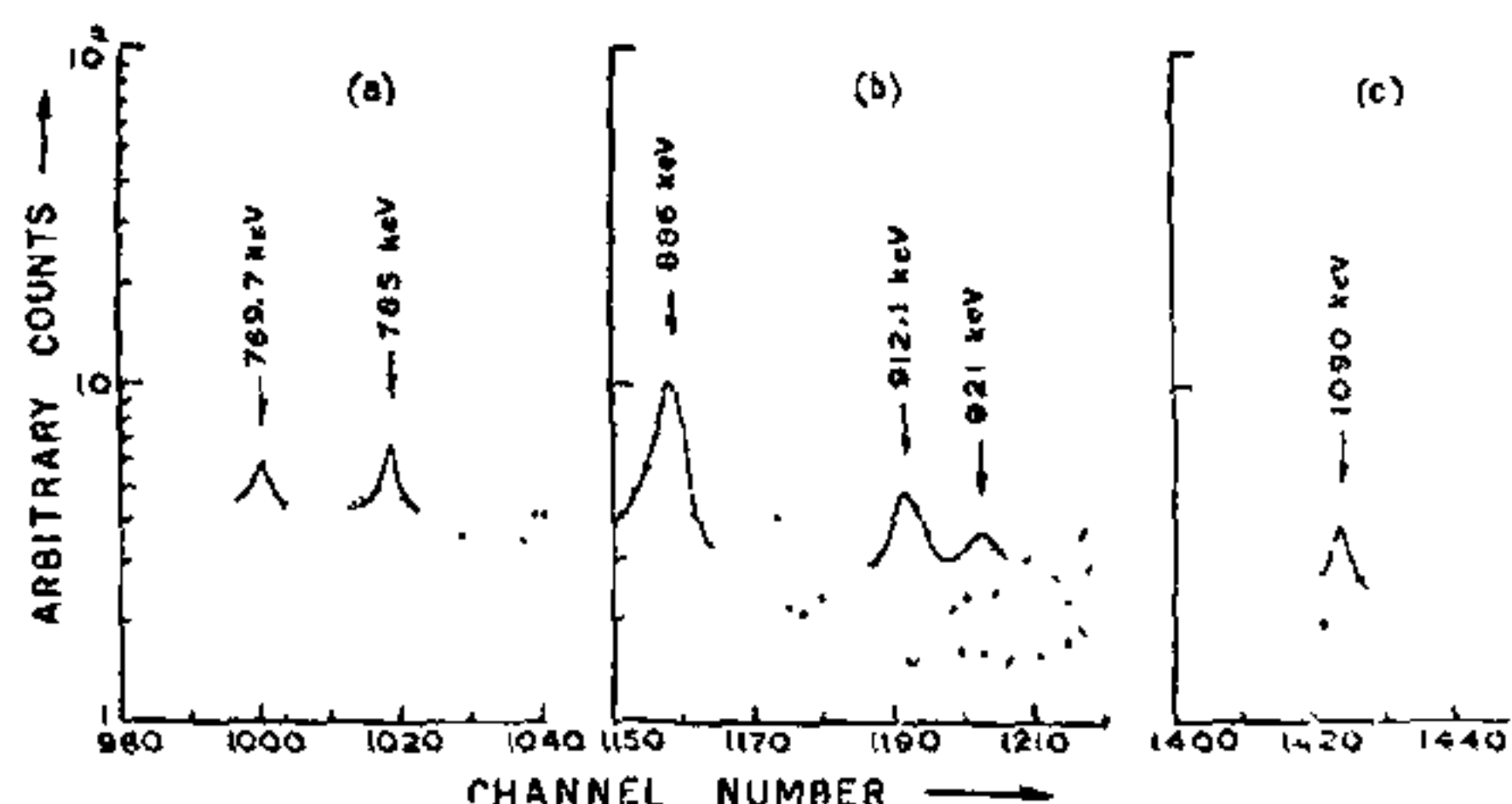
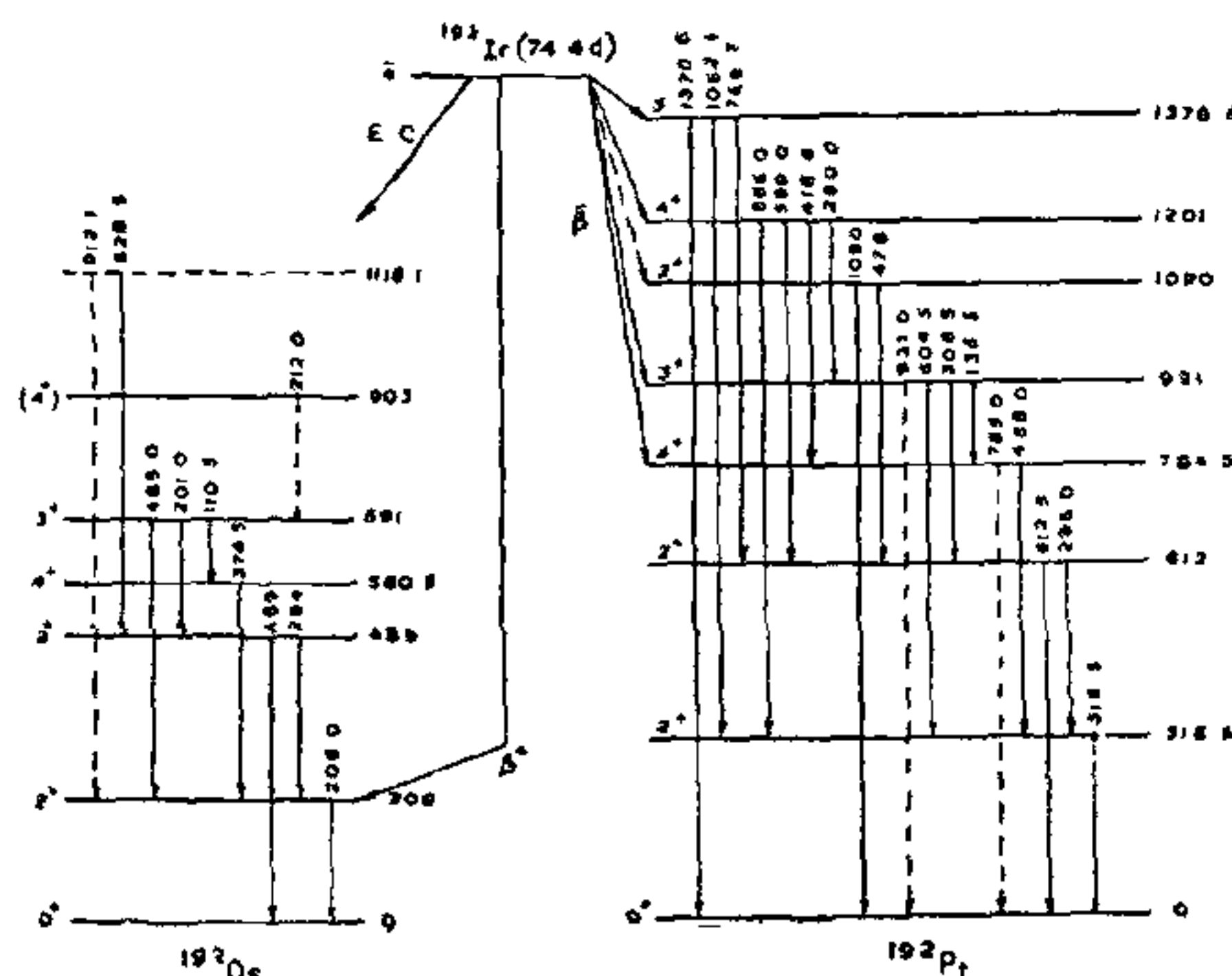


FIG. 2



As in earlier investigations we also have a weak indication for the presence of 769.7 keV gamma ray existing between the 1378.6 (²⁺) and 612.5 (²⁺) state. In our spectrum we also find and confirm the presence of 135.5 keV gamma ray (921—784.5), not reported in some earlier observations^{3,6}.

Schellenberg² observed 212 and 415 keV gamma rays and proposed a level at 905 keV in ¹⁹²Os, and fitted these gamma rays from 905 keV state to 690 and 489 keV states respectively. In Fig. 1, the 212 and 416.6 keV gamma rays have been observed. The 415 keV gamma ray depopulating the 905 keV state as proposed by Schellenberg² is not very certain. It may or may not be present here as a 416.6 keV gamma ray exists in ¹⁹²Pt between the 1200 and 784.5 keV states.

Further, a new level at 1118.1 keV in ¹⁹²Os has been tentatively proposed by us, in order to accommodate the 628.5 and 912.1 keV gamma rays observed in the decay of ¹⁹²Ir. These transitions populate the 489 and 206 keV states respectively.

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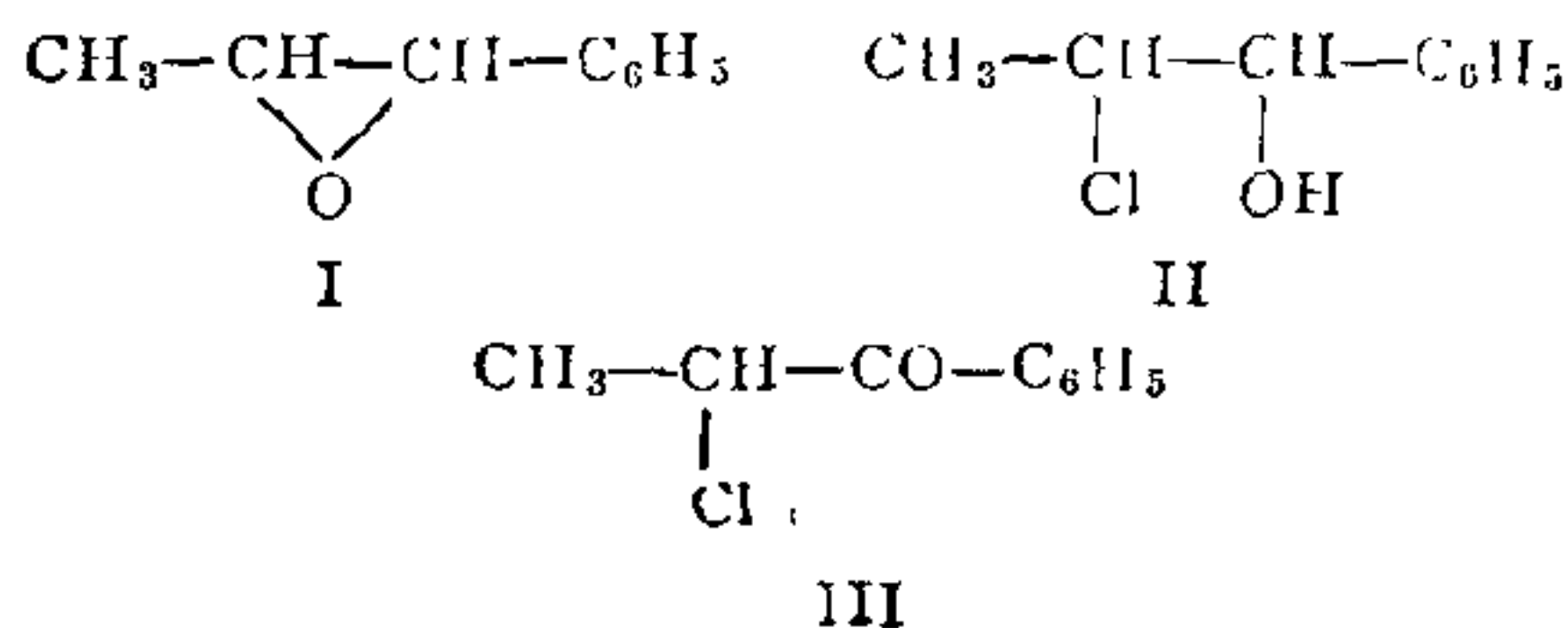
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STEREOSPECIFIC SYNTHESIS OF CIS- AND TRANS-1, 2-EPOXY- 1-PHENYLPROPANES

1,2-Epoxy-1-phenylpropane (I) is an attractive intermediate in the synthesis of ephedrine. Early attempts in this direction, *e.g.*, by Fournau and Benoit¹, involved the use of I obtained in an impure form from the corresponding olefin and resulted in a complicated mixture of ephedrine, *ψ*-ephedrine and iso-ephedrine. Lange, Belzecki and Buczkowski² have reported the synthesis of the *cis* isomer of I and its conversion into *ψ*-ephedrine in 50% yield by the action of methylamine. Their synthesis involves the epoxidation of *cis*-1-phenyl-1,2-propene

prepared by decarboxylation of *α*-methylcinnamic acid, with perphthalic acid.

We have investigated some reactions of *α*-chloro-carbonyl compounds with a view to synthesise *cis*- and *trans*-epoxides, and stereospecific syntheses of the *cis*- and *trans*-isomers of I, reported below, have been achieved through very facile routes.



Grignard reaction of 2-chloropropanal with phenylmagnesium bromide gave the chlorohydrin (II) in nearly 65% yield. As judged by the purity of the epoxide prepared from it and the i.r. spectrum of the epoxide, this was proved to contain 80–85% of the chlorohydrin corresponding to the *trans*-epoxide. Cornforth, Cornforth and Mathew³ have earlier shown that the addition of Grignard reagents to aliphatic *α*-carbonyl compounds is a stereoselective process. II could be converted almost quantitatively into the epoxide (predominantly *trans*) by the action of methanolic potash.

The chlorohydrin (II) was oxidised to the chloroketone (III) with chromic acid. III was also prepared in very high yields by the sulphuryl chloride chlorination of propiophenone. Reduction of III with sodium borohydride gave the chlorohydrin in high yields. This could be quantitatively converted into the epoxide which is judged to be 90% *cis*, thereby showing that reduction of III with sodium borohydride is highly stereoselective. The chlorohydrin could also be obtained in high yield by reduction of III with aluminium isopropoxide and an epoxide judged to be about 85% *cis* could also be prepared from this chlorohydrin. Thus the reduction of III with aluminium isopropoxide is only slightly less stereoselective than the borohydride reduction.

The *cis*- and *trans*-epoxides (I) were separately heated with alcoholic methylamine in a sealed tube. The *trans*-isomer gave iso-ephedrine, *ψ*-ephedrine and ephedrine in equal amounts besides non-basic material. The *cis*-isomer, on the other hand, gave 70–80% yield of *ψ*-ephedrine which could be readily crystallised out from the reaction mixture.

The identity and purity of the *cis*- and *trans*-epoxides were established by i.r. spectra. *ψ*-Ephedrine and ephedrine were separated and identified