MONTECATINI
Società Generale per l'Industria Mineraria e Chimica

AMMINISTRATORE DELEGATO

Data 7 aprile 1959

PROMEMORIA

C/ra

per il Signor BREY
SEPS
SEID
→ Prof. NATTA

e, p.c. VERE

Cortelle
I. C. I

La I.C.I. ha praticamente firmato il contratto per la cessione della licenza del polipropilene.

La I.C.I. desidera avere, subito dopo la firma del contratto, i seguenti quantitativi di Moplen, secondo specifica che allego alla presente per il SEID :

a) subito dopo la firma 150 tonn. di materiale Melt Index 6

b) 50 tonn/mese per il resto del 1959 della stessa qualità

c) 100/150 tonn./mese nel 1960

SEID esaminerà insieme con VERE e senza ritardo la possibilità di far fronte, anche parzialmente a queste esigenze tenendo conto delle necessità del mercato interno e di quelle prevedibili per gli altri licenziatari.

Per Vostra norma l'I.C.I. afferma essere possibile acquistare polipropilene anche all'estero e da tale fonte essa si approvvigionerebbe qualora non fossimo in grado di fornire le quantità predette.

Cordiali saluti.

per SEID : un allegato

Imperial Chemical Industries Limited

PLASTICS DIVISION

Bessemer Road, Welwyn Garden City, Herts

Telephone: WELWYN GARDEN 23400 *Telex:* 22613 ICIPLAST, WELWYN

Professor G. Natta,
Istituto di Chimica Industriale
del Politecnico,
Piazza Leonardo da Vinci, 32,
Milano.

Your ref:

Our ref: ATJ/JAB/RES.

4th November 1963

Dear Professor Natta,

Since I wrote to you on the 23rd October about our paper on the β and ϒ-forms of polypropylene for publication in "Die Makromoleculare Chemie", we have carried out some preliminary calculations to see whether small movements of the helices from their positions in Figure 10 c will be sufficient to give approximately the right relative intensities for the principal equatorial reflections but have not been entirely successful so far. An exhaustive examination has not been made and unfortunately owing to the pressure of other work I cannot now undertake further calculations on this topic. I still feel the packing of Figure 10c might be basically correct, but it will be best to delete this suggested packing from the paper since it is open to the criticism you have made.

We have accordingly made the appropriate alterations and have sent them direct to the Editor of "Die Makromoleculare Chemie" and are enclosing herewith copies of the altered text and diagram which I hope now meet the point you raised, and also a copy of my letter to Professor Kern.

Yours sincerely,

A. Turner-Jones

A. Turner-Jones
Research Department

Prof. Dr. W. Kern,
Mainz,
Organ. Chem. Institut der Universität,
Johann-Joachim-Becher-Weg 18-20
Germany.

AJ/JAB/RM.

4th November 1963

Dear Sir,

I was glad to receive your acknowledgement dated 22nd October 1963 of our paper "Crystalline Forms of Isotactic Polypropylene" forwarded to you by Professor Natta.

I understand that Professor Natta informed you that we would be making some small corrections to the galley proofs. In fact, to meet the point he raised we have made rather more extensive alterations to Page 19 and to Figure 10 than can conveniently be corrected at the galley proof stage. As we have rearranged the text somewhat to fit these alterations, it has seemed simplest to retype pages 17, 18, 19 and 22 and we are accordingly enclosing replacements for these pages and for Figure 10. We would also ask if you would kindly delete Reference 18 and the item marked 10e at the bottom of the page entitled "Captions to Figures".

I hope we have been able to make these alterations sufficiently quickly, so that you are not put to too much inconvenience.

I have sent a copy of this letter to Professor Natta and have explained to him the alterations we have made.

Yours faithfully,

A. J.

A. Turner-Jones
Research Department

We tentatively put forward the suggestion that an association of triplets of helices of the same hand might occur in the melt over a limited length of chain, and thus predispose the polymer to crystallise in the hexagonal form. Provided then the temperature of the polymer melt can be quickly reduced to below 100-130°C while no appreciable nucleation into the α-form takes place, nucleation and further growth in the hexagonal form is likely to occur predominantly. It has already been shown that for this particular polymer B the nucleation and growth rates of the α-form appear to be retarded for reasons which are not yet known. Alternatively, some extraneous substance may be present in the polymer which increases the nucleation rate into the hexagonal form.

As already mentioned Padden and Keith showed that the rate of growth of β-form spherulites was greater than that of α-form spherulites when both were growing simultaneously. Since the addition of segments of polymer chain to the existing side-by-side packed chains of the existing crystallite would then occur by accretion of triplets, an inherently faster growth rate of β-crystallites compared with α-crystallites is not unreasonable. However, it is appreciated that such ideas, based on such slight structural evidence, must be purely speculative.

6. UNIT CELL AND CHAIN PACKING - γ-FORM

The strong reflections at d = 6.37 Å and 5.29 Å are certainly hk0 reflections from planes parallel to the c-axis, but in considering possible unit cells it was borne in mind that reflections at 4.415, 4.19 and 4.05 Å might each be either a hk0 or a hk1 reflection. An equatorial cell network with $\underline{a}_o$ = 6.47 A, $\underline{b}_o$ = 10.71 A, γ_o = 99.07° was readily found which accurately fitted the d-spacings of the first five reflections (see Table 1) which then have indices 100, $1\bar{1}0$, 020, 110, $1\bar{2}0$. This cell is closely related to the α-form equatorial network by halving the b-axis and slightly deforming the halved cell from the orthogonal (see Fig. 10a, b). Indications that the

reflection at 4.415 Å was likely to be an hk0 reflection have been obtained in photographs of α-form fibres containing a small amount of the γ-form. Moreover, the positions of the first three strong reflections on X-ray photographs of pressed films in the γ-form showing preferred orientation were consistent with this equatorial cell network. If the chain repeat is assumed to be 6.49 Å, as already found in the α and β forms, both of which also have ternary helices, the density of any unit cell containing two chains per cell based on this equatorial network is 0.94 g/cc. The observed densities and per cent crystallinities given in Table 2 for samples B and D enable the approximate crystal density of the γ-form to be calculated (see Table 2); these values lie higher than that of the α-form. A crystalline density higher than that of the α-form, the preferred form in highly isotactic specimens is inherently unlikely, and probably arises because the crystallinity figures are not absolute and likely to be low.

Fig. 10.

Nevertheless, it appears that the γ-form crystal density must lie close to that of the α-form, which is consistent with the value based on the above equatorial network and assumed c dimension. It was considered justified to assume a fibre repeat of 6.49 - 6.60 Å and a crystal density not less than 0.93 g./cc. In considering possible equatorial net orks, the value of γ_o is then limited by the values of $a^* = 0.242$ $b^* = 0.1458$ and this minimum density; γ_o must lie between 90° and 103° to give a density greater than 0.93 g./cc.

The observed spacings did not fit a monoclinic cell based on the above equatorial cell network and range of c dimensions. Other equatorial cell networks based on the first 7 reflections were also considered but no orthorhombic or monoclinic cell could be found to fit the observed spacings and density. The cell is therefore triclinic.

The derivation of a triclinic cell from X-ray photographs of unoriented polymer specimens is not a very practical proposition. More than one cell was found based on the above equatorial network which fitted the observed spacings. γ generally lay close to 90° and β between 90° and 100°. Good packing could be achieved, with no methyl-methyl contacts less than 4 Å, with left and right handed helices packed side by side in approximately the positions shown in Fig. 10b allowing small lateral movement of the helical axes and twists around these axes. With the helices in these positions in c-projection, preliminary structure factor calculations showed that approximately the right intensity distribution is obtained for the principal equatorial reflections.

It is, quite possible that the unit cell may be doubled in the a or b directions. Nevertheless, the axes of the helices must occupy positions close to those of Fig. 10b if the calculated intensities of the three strong equatorial reflections, with spacings of 6.37, 5.29 and 4.415 Å (and these equatorial reflections only) are to remain sufficiently strong.

of the A and B blocks. It is likely that in any blocked chain the length of the blocks may vary widely. Nevertheless the fractionation will presumably have separated the chains into groups of a somewhat similar block structure and the length of the folds could be related to the shorter block lengths. The preference for the Y-structure over the α is still unresolved but this picture of the Y-structure is consistent with the observation that on drawing fibres, only oriented α-type crystallinity is formed, since, on drawing, the molecules are pulled out of their folded structure with regularly arranged discontinuities; these discontinuities would now be irregularly placed in the extended chains with consequent disruption of crystallinity. Here again cooling from the melt would be necessary to enable the blocks to take up the same helical configuration along the length of the chain if the folds occur in the $\underline{gg}$ plane (Fig. 10b), or right and left helices alternately if folding occurs parallel to the $\underline{bg}$ or $1\bar{2}0$ planes.

The authors wish to thank Dr. C.W. Bunn for many useful discussions.

Corbelle
ICI

Imperial Chemical Industries Limited

PLASTICS DIVISION

Bessemer Road, Welwyn Garden City, Herts

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Professor G. Natta,
Istituto di Chimica Industriale
del Politecnico,
Piazza Leonardo da Vinci, 32,
Milano.

Your ref: 899/lv & 918/lv

Our ref: ATJ/JAB/RES.

936
28 OTT 1963

23rd October 1963

Dear Professor Natta,

Thank you for your letter of October 10th, from which I was glad to learn that you are recommending the publication of our paper on the β and ϒ-forms of polypropylene in "Die Makromoleculare Chemie", and for your further letter of October 18th advising me that you have forwarded the paper for publication without waiting for any alterations arising from your comments on the alternative packing for the ϒ-form given in Fig. 10c.

This is certainly a valid criticism. I added in this second packing at the last minute after the paper was otherwise complete because the packing is in itself a good one and it was clear that the three reflections 200,020 and $2\bar{2}0$ at spacings of 6.37 A, 5.29 Å and 4.42 Å respectively,(100, 020 and $1\bar{2}0$ on the smaller cell with a halved)would have large calculated intensities as required. I have not paid sufficient attention to the intensities of the weaker reflections $2\bar{1}0$ and 210 ($1\bar{1}0$ and 110 on the smaller cell). As shown in Fig. 10c this packing is effectively face centred on the C-face and therefore $2\bar{1}0$ and 210 will be absent, or of very small intensity, depending on the precise arrangement of the helices (Right-up Right-down etc.).

The suggested arrangements of the helices in Figs. 10b and 10 c were diagrammatic only and not meant to be their final positions. Small lateral movement of the helices and rotation around their axes are not precluded provided the interatomic distances remain reasonable. The main factor we considered was that the axes of the helices must have co-ordinates close to

$a = 0$, $b = \frac{1}{4}$; $a = 0$, $b = \frac{3}{4}$ in Fig. 10b

or $a = 0$, $b = \frac{1}{4}$; $a = 0$, $b = \frac{3}{4}$; $a = \frac{1}{2}$, $b = \frac{1}{4}$; $a = \frac{1}{2}$, $b = \frac{3}{4}$ in Fig. 10 c.

if the three observed strong reflections, and no other equatorial reflections, are to have a sufficiently high calculated intensity.

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Your ref:

Our ref:

We are considering whether small movements of the helices are possible which will be sufficient to destroy the effective face-centering and give approximately the right relative intensities for the principal equatorial reflections. It is not worth considering reflections of spacings less than ~4 Å because it is not known with sufficient certainty whether they are equatorial reflections or not.

If we are successful we will redraw the diagram of Fig. 10 and make any necessary alterations to the text. If not, then it will be best to cut out the diagram of Fig. 10 c and all reference to this packing. We would hope to be able to do this before the galley proof stage.

With kind regards.

Yours sincerely,

Annette Turner-Jones

A. Turner-Jones
Research Department

Oct.18, 1963

Miss A.Turner-Jones,
I.C.I. Ltd.,
Plastics Division,
Bessemer Road,
Welwyn Garden City, Herts

our ref.918/lv

Dear Miss Turner-Jones,

Further to my letter of Oct.10, 1963, reporting my remarks on your paper: "Crystalline Forms of Isotactic Polypropylene", I wish to inform you that to-day I have forwarded your text to Makromolekulare Chemie, otherwise its publication would be postponed too much.

I have also informed the editorial office of this journal that the author will make small corrections to it when checking the galley proofs.

With my best regards,

Giulio Natta

Carbetta
I C I

Oct.10, 1963

Miss A.Turner-Jones,
I.C.I. Ltd.
Plastics Division,
Bessemer Road,
Welwyn Garden City, Herts

our ref.899/lv

Dear Miss Turner-Jones,

I have received the manuscript of the paper "Crystalline Forms of Isotactic Polypropylene" you sent to me for publication in "Die Makromolekulare Chemie".

I consider this paper very interesting and accurate; therefore I shall be glad to recommend its publication.

The results you obtained, concerning the obtainment of the γ modification, agree with our results, which have not been published yet.

However, a topic should be clarified: it should be pointed out in more detail on page 19 that the packings described in Figs. 10b and 10c are not equal, not even from an equatorialapoint of view; therefore, it cannot be stated "a priori" that the good agreement obtained on the equatorial reflections calculated on the basis of Fig.10b might anyway support the structure of Fig.10c. Therefore I would advise you to calculate the equatorial reflections again, also for this last structure, which you consider at least equally plausible. Only in this way, the last sentence on page 19 should be justified.

Before sending your manuscript for publication to Makromolekulare Chemie, I would like to learn your specifications on this respect.

With my kindest regards,

G.Natta

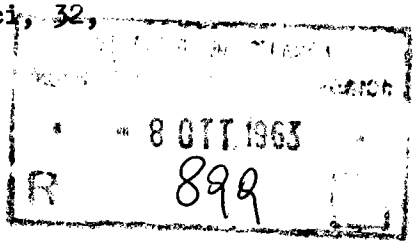
Imperial Chemical Industries Limited

PLASTICS DIVISION

Bessemer Road, Welwyn Garden City, Herts

Telephone: WELWYN GARDEN 23400 *Telex:* 22613 ICIPLAST, WELWYN

Professor G. Natta,
Istituto di Chimica Industriale del Polilecnico,
Piazza Leonardo da Vinci, 32,
Milano,
Italy.



Your ref:

Our ref: ATJ/JW

1st October, 1963.

Dear Professor Natta,

Last May Dr. C. W. Bunn sent you a paper of mine entitled "Crystallinity in Isotactic Polyolefine with Unbranched Side-chains", which you were kind enough to forward to "Die Makromoleculare Chemie" for publication.

I am sending with this letter a paper on "Crystalline Forms of Isotactic Polypropylene" which I and two of my colleagues would like to publish in "Die Makromoleculare Chemie".

Polypropylene is a subject on which you and your colleagues have already published a great deal, more particularly on the principal α-form and it seems appropriate to publish this paper in the journal where many of your own papers on stereoregular polymers have appeared.

This paper is concerned with the production and structures of the β (pseudohexagonal) and α (triclinic) forms of polypropylene. We did not succeed in obtaining oriented fibres in these crystal forms and the deductions as to the structure of these two forms are necessarily tentative, since they are based on the rather limited data obtainable from X-ray photographs of unoriented polymers.

Dr. Bunn, as you perhaps know, has now left us and has just started work in Sir Lawrence Bragg's group at the Royal Institution.

I was very pleased to have the opportunity of meeting Professor Bassi and others of your colleagues at the recent Crystallography Conference in Rome and to hear of something of the work on which you are now engaged.

Yours sincerely,

A. Turner-Jones

A. Turner-Jones (Miss)

Imperial Chemical Industries Limited

PLASTICS DIVISION

Bessemer Road, Welwyn Garden City, Herts.

Telephone: WELWYN GARDEN 23400 *Telegrams:* ICIPLAST, WELWYN GARDEN CITY, TELEX

Telex: 2-2613 ICIPLAST, WELWYN

Your ref:
Our ref: CWB/JP/RES

Professor G. Natta,
Istituto di Chimica Industriale del Politecnico,
Piazza Leonardo da Vinci, 32,
Milano,
Italy.

25th June 1963

Dear Professor Natta,

Thank you for your letter of June 6th. I am pleased to learn that you have forwarded the paper by Miss Turner-Jones to Makromolekulare Chemie, recommending its publication. (I have been away on holiday for two weeks; this is the reason for delay in answering your letter).

In answer to your remarks about polyhexene-1, we agree that the calculated density 0.73 for one of the possible unit cells is so low that this cell is unlikely to be correct; the other cell, with calculated density 0.91, is more likely to be correct. These two cells are alternative interpretations of the same X-ray pattern, that of the only crystalline form of polyhexene-1 which we have encountered. We cannot measure the density experimentally; it would be difficult to determine the density of a stretched specimen, and the crystallinity is so low that the result would be inconclusive.

We have encountered the two crystalline forms of polypentene-1, and Miss Turner-Jones has sent a short communication on the subject to the Journal of Polymer Science; this was written before seeing the papers by Danusso, but some alteration was made to refer to Danusso's work. We would like to refer to this work also in the paper sent to Makromolekulare Chemie; there will no doubt be an opportunity of doing this when the proofs are corrected.

Many thanks for your interest in the work.

Yours sincerely,

C.W. Bunn

C.W. Bunn

Carbide ICI

June 6, 1963

Dr.C.W.Bunn,
Imperial Chemical Industries Ltd.
Plastics Division,
Bessemer Road,
Welwyn Garden City, Herts.

our ref.582/lv

Dear Doctor Bunn:

Thank you for your letter of May 30, and for the paper by Miss A.Turner-Jones, which interested me very much. I have forwarded it to Makromolekulare Chemie, recommending its publication.

I have noticed the low density (0.73) of polyhexene-1 modification II (page 3). Since this is an exceptionally low value, I would suggest you to have the experimental density determined, both of the product having that type of crystallinity, and of the same product at a temperature higher than melting temperature.

I share your opinion that a density in the crystalline state, lower than that of the amorphous polymer, does not permit to obtain a stable crystalline phase. We expressed this concept in previous papers of ours, in order to explain the non-crystallizability of isotactic, non-crystallizable polymers, (such as poly-p-chlorostyrene, poly-2-methoxy-styrene).
In the case of vinyl-cyclopropane, a crystalline phase was found at low temperature, having a density lower than that of the amorphous product. In the case of poly-4-methyl-pentene-1, it has been observed a calculated density of 0.812, corresponding to an experimental density of a little crystalline product of 0.831. This is the lowest density observed by us for ~~linear~~ poly-alpha-olefins.
However, the existence of a crystalline phase of a polyhydrocarbon having a density of 0.73 seems unusual to me.

In your Fig.10, the reported melting temperature of polypentene is 80°C. According to research works done at this Institute, this temperature corresponds to that of melting of modification, stable at low temperature, while a modification of isotactic polypentene-1 exists, which is stable at high temperature and which melts above 120°C

June 6, 1963

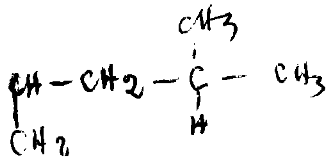
(see papers: F.Danusso, Polymer 3, 423 (1962); and F.Danusso and G.Gianotti, Makromol.Chemie, 61, 164 (1963))

Please, forward my compliments to Miss Turner-Jones. With my kindest regards.

Giulio Natta

Poli 4 metil pentene 1

F. C. Frank, A. Keller, and A. O'Connor.
Philosophical Magazine 4, n (38) pag. 200 febbraio 1959.



P.M. = 7(72 + 12) = 84.7 = 588

Tetragonale a = 18.66 c = 13.80 Z = 4

- Volume = 4805 Å^3

- $d_x = \frac{3904}{4805} = 0.812$ — densità calcolata cristallino

d sper. = { Keller 0.847 ; Nostro 0.831 } ← densità sperimentale cristallino + amorfo

Atti Acc. Naz. Lincei 19, 397 (1955)

- Keller osserva che la densità ~~sp~~ sperimentale è più alta di quella calcolata ~~e di una non spiegue~~ e dice che il fatto è "unacceptable at present".

Lavoro più dettagliato sulla det. della densità sperimentale (0.838 densità amorfo). Griffith J.H and Rånby B.G.
J. Polymer Sci. 44, 369 (1960).

notano la diversità che attribuiscono ~~in~~ in parte ad una ~~sbagl~~ inesattezze nella costante della cella (trovano una cella più piccola però non ha più pubblicato niente)

Imperial Chemical Industries Limited

PLASTICS DIVISION

Bessemer Road, Welwyn Garden City, Herts.

Telephone: WELWYN GARDEN 23400 *Telegrams:* ICIPLAST, WELWYN GARDEN CITY, TELEX

Telex: 2-2613 ICIPLAST, WELWYN

Professor G. Natta,
Istituto di Chimica Industriale del Politecnico,
Piazza Leonardo da Vinci, 32,
Milano,
Italy.

Your ref:
Our ref: CWB/JP/RES

Ricevuto dal Professore consegnato il 3/6/63

30th May 1963

Dear Professor Natta,

I am sending with this letter a paper by my colleague Miss A. Turner-Jones, which we wish to submit for publication in "Die Makromolekulare Chemie". This paper, "Crystallinity in Isotactic Polyolefines with Unbranched Side-chains", is an account of an X-ray diffraction study of a series of isotactic polyolefines having unbranched side-chains of different lengths up to 16 carbon atoms. The results are very interesting, and I think it would be appropriate to publish them in "Die Makromolekulare Chemie", where many of your own papers on the crystal structures of stereoregular polymers have appeared.

We had the pleasure of welcoming your former colleague Professor Corradini to our laboratory recently; and both he and Professor Pino attended the conference of our "High Polymer Research Group" at Moretonhampstead, where we had very interesting discussions. Shall we have the pleasure of seeing you in this country in July, at the I.U.P.A.C. Congress?

I send you my best wishes,

Yours sincerely,

C. W. Bunn

C.W. Bunn

Courtelle
ICI

April 19, 1962

Mr. E. Nield,
Plastics Division,
Imperial Chemical Industries Ltd.
Black Fan Road,
Welwyn Garden City,
Hertfordshire (Inghilterra)

our ref.184/lv

Dear Mr. Nield,

Thank you for your letter of March 5. Since I shall probably participate in the Moretonhampstead Conference, I shall be pleased to meet you and to attend your lecture.

With my kindest regards.

G.Natta

BY AIR MAIL

IMPERIAL CHEMICAL INDUSTRIES LIMITED

PLASTICS DIVISION

Telephone: WELWYN GARDEN 3400
Cables: ICIPLAST, TELEX, LONDON

BLACK FAN ROAD
WELWYN GARDEN CITY
HERTFORDSHIRE
ENGLAND

Our ref. EN/JEB/RES Letter No.

Your ref.

5th March, 1962.

Professor G. Natta,
Institute of Industrial Chemistry,
Milan Polytechnic,
Milan.

184

Dear Professor Natta,

We have recently received a copy of your letter to the editor of "Chemistry and Industry" in connection with our "communication" on copolymers of dimethyl ketene. We are pleased to note that our results are in agreement with yours and regret that no reference was made to the paper on this subject which you presented at the I.U.P.A.C. symposium in Montreal. However, the text of this paper was not available to us when our "communication" was written, although I agree that we ought to have noticed the abstracts.

The polymerisation and copolymerisation of ketenes has interested workers in our laboratories for several years and in fact as early as 1958 we found that alternating copolymers could be obtained from ketene and acetone. We were led to extend our work to dimethyl ketene partly as a result of the publication of your earlier papers. I hope to present a paper on our work on ketenes to a conference of "The High Polymer Research Group" at Moretonhampstead, 14-18th May 1962. I understand that you will be present at this conference and I look forward with pleasure to meeting you there.

Yours sincerely,

E. Nield

E. Nield

Carbella
ICI

March 28, 1962

Mr.C.Child,
I.C.I.
Piazzale Giulio Cesare 9
Milano

our ref.256/lv

personal and confidential

Dear Mr.Child,

Thank you for your kind letter of March 21, concerning the visit of Mr.Bradford to Milan during the period 17th to 22nd May 1962.

I regret to inform you that just in that period, my state of health permitting, I should have to participate in various conferences in Paris and in England, having accepted their invitation a long time ago.

If I give up participating in these conferences, I will be very glad to meet you and Mr.Bradford. On the other hand, if I am absent, Mr.Bradford will be able to talk with some co-workers of mine, who will show him my Institute, if he wishes to. Please, let me know the topics Mr.Bradford is interested in, to enable me to arrange his meeting with my co-workers qualified in those fields.

Accept my kindest regards.

Sincerely yours,

G.Natta

IMPERIAL CHEMICAL INDUSTRIES LIMITED

LIAISON OFFICE FOR ITALY

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TELEGRAMS: IMPKEMIX-MILAN
C.C.I.A. MILANO N.510874

ADDRESS:
PIAZZALE GIULIO CESARE, 9
MILAN

PERSONAL & CONFIDENTIAL

Prof. G. Natta,
Istituto di Chimica Industriale
del Politecnico di Milano,
Piazza Leonardo da Vinci, 32
Milano

CC/AB

21st March, 1962.

VISIT TO MILAN OF DR. B.W. BRADFORD, RESEARCH DIRECTOR OF IMPERIAL CHEMICAL INDUSTRIES LTD., BILLINGHAM DIVISION, BILLINGHAM, Co. DURHAM, DURING THE THE PERIOD 17TH TO 22ND MAY 1962.

Dear Prof. Natta,

I have just received a letter from Dr. Bradford, the Research Director of the I.C.I. Billingham Division, informing me that he will be attending a meeting of the committee of the European Chemical Engineering Conference in Milan during the period Thursday/Saturday 17/19th May 1962 but that as he will not be leaving Milan until Tuesday morning 22nd May he would very much appreciate an opportunity to meet you personally on Monday 21st May and, if at all possible, to be shown around your laboratories at the Politecnico.

Please will you advise me whether or not you can accept a visit from Dr. Bradford on Monday 21st May and should, by any chance, such a visit prove to be embarrassing to you in any way, please do not hesitate to say so immediately.

I am afraid that I have been out of contact with you for quite a long time, since which I heard from our mutual friend Dr. G.L. Palandri, Director of the Pirelli Cables Research Laboratory, that you have been seriously ill.

I hope sincerely, however, that you are now quite well again and, in the event of your finding it possible to accept a visit from Dr. Bradford on the date specified, I would hope to accompany him and thus take opportunity of renewing our acquaintanceship.

With my best wishes,

Sincerely yours,

C.CHILD
Liaison Officer in Italy for
IMPERIAL CHEMICAL INDUSTRIES LTD.,
London.

Castello

IMPERIAL CHEMICAL INDUSTRIES LIMITED

LIAISON OFFICE FOR ITALY

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PERSONAL & CONFIDENTIAL

Prof. G. Natta,
Istituto di Chimica Industriale
del Politecnico di Milano,
Piazza Leonardo da Vinci 32,
Milano.

CC/AB

3rd April, 1962.

VISIT TO MILAN OF DR. B.W. BRADFORD, RESEARCH DIRECTOR OF IMPERIAL CHEMICAL INDUSTRIES LTD., BILLINGHAM DIVISION, BILLINGHAM, Co. DURHAM, DURING THE PERIOD 17TH TO 22ND MAY 1962.

Dear Prof. Natta,

I have just received this morning your kind letter of 28th March 1962 regarding the above matter and in reply to mine of 21st March on this subject.

I note that it is unlikely that you will be available during the period of Dr.Bradford's visit, but that you will arrange for him to meet some of your co-workers and to be shown round your Institute.

Therefore, I have written today to Dr. Bradford requesting him to advise me of the topics which he would like to discuss during his visit to the Politecnico, and as soon as he replies I will write to you again.

I hope that your state of health continues to improve, and again I would like to thank you very much indeed for your kindness in dealing with my request in such a helpful manner.

With my best wishes,

Yours sincerely,

C.CHILD
Liaison Officer in Italy for
IMPERIAL CHEMICAL INDUSTRIES LTD.,
London.

IMPERIAL CHEMICAL INDUSTRIES LIMITED

LIAISON OFFICE FOR ITALY

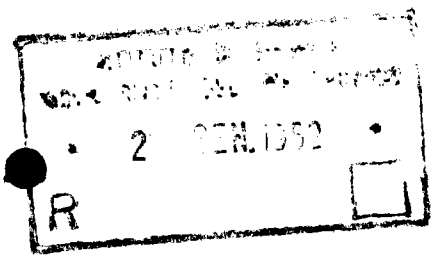
TELEPHONE: 4693322-4693324
TELEGRAMS: IMPKEMIX-MILAN
C.C.I.A. MILANO N.510874

ADDRESS:
PIAZZALE GIULIO CESARE, 9
MILAN

RE/LB

21st December, 1961.

Prof. G. Natta,
Istituto di Chimica Industriale
del Politecnico di Milano,
Piazza L. da Vinci, 32,
Milan.



I.C.I. PRESTIGE "INSTITUTIONAL" ADVERTISING CAMPAIGN IN THE ITALIAN DAILY NEWSPAPERS "CORRIERE DELLA SERA", "24 ORE", "LA STAMPA","L'OSSERVATORE ROMANO"-DURING THE YEAR 61

Dear Prof.Natta,

Undoubtedly you will have seen some of the above advertisements in the above-mentioned newspapers during the course of 1961, but in case you may be interested in having sight of a complete set of these, I have today sent 1 such set to you under separate cover by printed matter post.

Yours sincerely,

C. CHILD
Liaison Officer in Italy for
IMPERIAL CHEMICAL INDUSTRIES LTD.,
London.

January 22, 1962

Dr.C.Child
Imperial Chemical Industries
Piazzale Giulio Cesare, 9
Milano

Dear Mr.Child,

Thank you very much for kindly sending me the complete set of advertisements published in 1961.

With my kindest regards.

G.NATTA

BY AIR MAIL

Imperial Chemical Industries Limited

PLASTICS DIVISION

Black Fan Road, Welwyn Garden City, Hertfordshire, England

Telephone: WELWYN GARDEN 3400 *Cables:* ICIPLAST, WELWYN GARDEN CITY, TELEX

Letter No:
Your ref:
Our ref: CWB/DMG

28th November 1960

Professor G.Natta,
Istituto di Chimica Industriale del Politecnico,
Piazza Leonardo da Vinci 32,
Milano,
Italy

Dear Professor Natta,

I am exceedingly sorry to learn that you recently had a rather serious operation. However, it appears from your letter that you are at work again, and this must mean that you are well on the road to recovery. I very much hope that you have completely recovered.

We very much appreciate your kindness in having fresh samples of 1,2 butadiene polymers prepared for us. We will look forward to receiving them in due course.

Yours sincerely,

C.W.Bunn

C.W.Bunn

Nov. 23, 1960

Mr. C. W. Bunn,
Imperial Chemical Industries Ltd.
Plastics Division,
Black Fan Road,
Welwyn Garden City,
Hertfordshire (Inghilterra)

your ref. CWB/DMG
our ref. 1026/lv

Dear Mr. Bunn,

Please, excuse my delay in answering your letter of November 15, due to the fact that I under= went a rather serious operation a few weeks ago.

Since I do not have fresh samples of 1,2 butadiene polymers, I will have them prepared just for you; I think they will be sent to you next week.

With my best regards.

G. Natta

BY AIR MAIL

Imperial Chemical Industries Limited

PLASTICS DIVISION

1026

Black Fan Road, Welwyn Garden City, Hertfordshire, England

Telephone: WELWYN GARDEN 3400 *Cables:* ICIPLAST, WELWYN GARDEN CITY, TELEX

Letter No:
Your ref:
Our ref: CWB/DMG

Professor G.Natta,
Istituto Chimica Industriale del Politecnico Milano,
Milano,
Italy,

15th November 1960

Dear Professor Natta,

In this laboratory we have recently studied the dynamic mechanical properties of 1,4 butadiene polymers. To assist in the interpretation of the results, we should very much like to make similar studies of 1,2 butadiene polymers, partly because our samples of 1,4 polymers contain small proportions of 1,2 units which may be responsible for particular features in our results, and partly because we should like to add the 1,2 polymers to our study for the sake of completeness.

We do not possess specimens of the 1,2 polymers, however, and I therefore wish to ask whether you could let us have small quantities. We do not know what differences there may be between the isotactic and syndiotactic 1,2 polymers; but if you could send us a small quantity of each, we would be very grateful. However, either of these polymers would be interesting. For our experiments, 0.5 gram of material would be sufficient.

I should be most grateful if you are able to help us in this way.

With greetings and best wishes,

Yours sincerely,

C.W.Bunn

C.W.Bunn

BY AIR MAIL

Imperial Chemical Industries Limited

PLASTICS DIVISION

Black Fan Road, Welwyn Garden City, Hertfordshire, England

Telephone: WELWYN GARDEN 3400 *Cables:* ICIPLAST, WELWYN GARDEN CITY, TELEX

1228

Letter No:
Your ref: AHW/VLD
Our ref:

17th November, 1958.

Professor G. Natta,
Istituto di Chimica Industriale
del Politecnico,
Piazza Leonardo da Vinci, 32
MILAN.

Dear Professor Natta,

Many thanks for your letter of the 20th October. I have been abroad for sometime and only just found it on my return here. I am intrigued by the suggestion in your letter that the dynamic mechanical properties of polyolefines depend on the exact steric arrangement of the molecules. Apart from effects attributable directly to the presence of crystalline regions I should have thought that such a dependence would not be expected. If the dependence were found it would I suppose imply that the mobilities of these polymer chains in their amorphous states depend on their steric configuration. I should be very interested to hear the result of Professor Baccaredda's work when it becomes available; I gather from what you say that it is not yet actually published in any journal.

The behaviour of the sample of polyhexene-1 is certainly very remarkable. I appreciate your offer of other samples of this polymer if and when they can be made.

Yours sincerely,

A.H. Willbourn

October 20, 1958

A.H. Willbourn
Imperial Chemical Ind.Ltd.,
Black Fan Road
Welwyn Garden City
Hertfordshire
England

1099/mb

Dear Mr. Willbourn,

Thank you for your letter of October 15 and of the data on some dynamic mechanical measurements carried out on samples of polyhexene-1 and other poly-α-olefins you have so kindly sent to us.

Your data on polypropylene and polybutene may agree with the data determined by Prof. Baccaredda's Laboratorium in Pisa, only if one suppose that your samples are not sterically pure but are mixtures of isotactic stereoblock and atactic polymers.

The presence of two maximum in the dynamic losses for polyhexene may be related, the lower one, to the excitation of the branched chain, the higher one, to the main chain.

In effect, the polyhexene does not show, like the polypropylene, polybutene and polypentene, a transition at higher temperatures. It is also possible that the sample of polyhexene contain a mixture of macromolecules having different sterical structure (isotactic, stereoblock and eventually atactic molecules).

At this moment, I do not dispose of other samples of polyhexene-1, but I shall do my best to have them prepared shortly and, as soon as available, I will ~~certainly~~ send you a sample in a sealed container, with the attempt to avoid the employ of a stabilizer and to hinder the autoxydation.

With personal regards,

Sincerely,

(G. Natta)

BY AIR MAIL

IMPERIAL CHEMICAL INDUSTRIES LIMITED

PLASTICS DIVISION

Telephone: WELWYN GARDEN 3400
Cables: ICIPLAST, TELEX, LONDON

BLACK FAN ROAD
WELWYN GARDEN CITY
HERTFORDSHIRE
ENGLAND

Our ref. AHW/VLD Letter No. 1099

Your ref.

15th October, 1958.

Professor G. Natta,
Istituto di Chimicha Industriale del Politecnico,
Piazza Leonardo da Vinci 32,
MILAN.

Dear Professor Natta,

Some months ago you sent us a small sample of polyhexene-1 on which we proposed to carry out some dynamic mechanical measurements. This work has proceeded rather slowly but we did discuss it to some extent with Dr. Danusso when he visited us after the Nottingham Conference.

We now have comparative measurements on polypropylene, polybutene-1, polypentene-1, and the sample of polyhexene-1 which you sent to us. I am enclosing herewith a copy of the dynamic mechanical loss curves of these polymers. They show an interesting gradation of behaviour.

The maximum in the dynamic losses at about -130°C is to be expected for polypentene and polyhexene and it is I think understandable for polybutene. However, before we publish these results we would like to repeat the work on polyhexene because, as you will see, the shape of the loss curves is asymmetrical and altogether rather peculiar. When you sent the sample you told us that it was not stabilised and might be impure but that a purer sample could be prepared. We would certainly appreciate having such a sample. I also mentioned to Dr. Danusso when he was here that it would be most interesting to extend the series to α-olefin polymers with longer side chains such as polyoctene and/or polydodecene.

If you or your colleagues have any observations on these results, or any comparable data, we would certainly be very interested in them.

Yours sincerely,

A.H. Willbourn

BY AIR MAIL

Imperial Chemical Industries Limited

PLASTICS DIVISION

Black Fan Road, Welwyn Garden City, Hertfordshire, England

Telephone: WELWYN GARDEN 3400 *Cables:* ICIPLAST, WELWYN GARDEN CITY, TELEX

Letter No:
Your ref:
Our ref:

Professor Giulio Natta,
Istituto di chimica industriale del Politecnico 990
Piazra Leonardo da Vinci, 32,
MILAN,
Italy

4th November, 1960

Dear Professor Natta,

On my return journey to Yugoslavia I hope to visit your Institute as previously arranged. I shall be in Milan on Thursday 17th November and look forward to meeting you or your co-workers.

With my best regards,

Sincerely yours,

Dragutin Fleš

27th July, 1960

Dr.E.K.Pierpoint
Imperial Chemical Industries
Nobel Division
Research and Development Dpt.
STEVENSTON, Ayrshire
(England)

Your Ref.EKP/ABW/R16.3
Our Ref.723/rl

Silicon-Containing Polymers

Dear Mr.Pierpoint,

with reference to your letter of July 6, I am sorry not to be able to send you the requested samples of polyallyltrimethylsilane, as the old samples have been already used in several tests and, at present, we are working in other fields.

As to the poyallyltrimethylsilane stability, it results higher than that of polymers containing hydrogen bound to the silicon, as the allyldimethylsilane.

There is to bear in mind that the stability of polyhydrocarbons and polyallylsilanes, depends on their "hystory" and in particular on the formation of hydroperoxides that, in any case, are formed if the polymer is not stabilized. The hydroperoxides are formed spontaneously and slowly in the air, at room temperature, and more fast at higher temperatures.

Best regards.

Very truly yours,

(Giulio Natta)

IMPERIAL CHEMICAL INDUSTRIES LIMITED

NOBEL DIVISION

RESEARCH & DEVELOPMENT DEPT.

~~RESEARCH DEPARTMENT~~

STEVENSTON

AYRSHIRE

Telephone: Ardrossan-Saltcoats 621

Telegrams: Impkemix, Stevenston

Our ref. EKP/NG/R16.3

Your ref. 723/Th

Cont. ICI

12th August, 1960.

Professor G. Natta,
Instituto di Chemica Industriale del Politecnico,
Milano,
Italy.

Dear Professor Natta,

I would like to thank you for the information given in your reply to our letter of the 6th July on the oxidative stability of polyallyltrimethylsilane and related polyhydrocarbons.

Yours sincerely,

E K Kempster

MONTECATINI

Società Generale per l'Industria Mineraria e Chimica

AMMINISTRATORE DELEGATO

Carlette
I C I

Data, 23 aprile 1960

PROMEMORIA

G/bg

per il Signor SEPS
BREV
PROF. NATTA

Il giorno 10 maggio, alle ore 16, saranno da me i Signori Swanson, Swallow e Bisson.

Cordiali saluti.

I.C.I.

ricordarsi

Ze

Imperial Chemical Industries Limited

NOBEL DIVISION

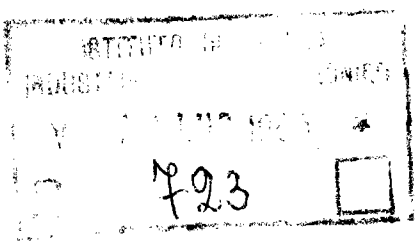
Research and Development Department

Stevenston, Ayrshire

Telephone: ARDROSSAN-SALTCOATS 621 *Telegrams:* IMPKEMIX, STEVENSTON

Your ref:

Professor G. Natta,
Instituto di Chemica Industriale
del Politecnico,
Milano,
ITALY.



Our ref: EKP/ABW/R16.3

6th July, 1960.

Dear Sir,

Silicon-Containing Polymers

We are currently interested in polymers with hydrocarbon backbones containing pendant silicon atoms, and we have prepared a small sample of polymer from allyltrimethylsilane by the method described by you in the Journal of Polymer Science, 31, (No.122), 181, (1958).

A statement in the Australian patent application, 44408 (18.12.58) of Montecatini to the effect that these polymers have a high thermal stability in air led us to expect the polyallyltrimethylsilane to show a considerable improvement in oxidative stability over polypropylene. However, we found our sample to behave very similar to commercial polypropylene when heated in air on a thermal balance. Both polymers showed a sudden rapid loss in weight at 220 - 230°C., the temperature being raised at 5° per minute.

We regard the oxidative stability of the silane polymers to be of great importance and we would be very interested in any data which you may be able to give on the comparative stability of the allylsilane polymer and polypropylene. Failing such information, we would be very obliged if it were possible for you to let us have a small sample (200 mg.) of authentic isotactic polyallyltrimethylsilane for direct comparison with our own material.

Yours faithfully,
for IMPERIAL CHEMICAL INDUSTRIES LIMITED
NOBEL DIVISION

(E.K.Pierpoint)
for RESEARCH AND DEVELOPMENT MANAGER

The new isotactic polymers provided by the invention are of remarkable practical interest since they have a very high melting point, considerable stability at high temperatures and a degree of inflammability lower than that of polymers obtained from equivalent hydrocarbon monomers.

The polymers containing silicon have a particularly high thermal stability, even in the presence of sir, and this permits their use under severe conditions of temperatures which few thermoplastic crystalline polymers can resist.

questo è ciò che è scritto nel nostro brevetto Ausiliario

DOTT. ING ANTONIO GIACHIN

TELEGRAPHIC & TELEX: 23289 GABBROENG. LON.

CABLE ADDRESS: GABBROENG. LONDON.

TELEPHONE: GROSVENOR 5188 (2 LINES)

10 UPPER GROSVENOR STREET,

LONDON, W.1. 31 Marzo, 19 60.

Cordelle
ICI

Preg.mo Signor
ing.G.De Varda,
BREV,
Sede.

Egregio Ingegnere,

in allegato, Le trasmetto fotocopia della lettera in data di ieri del Dr.Batten della Plastics Division della I.C.I., al quale non sò proprio più cosa dire.

Mi creda, con ogni migliore saluto,

-4. APR. 1960

A. Giachin

Bradley prego credere d'urgenza
dando ~~una lista prescritta~~
un allegato. elenco
diritti brevettuali, e controllate
se dobbiamo dare anche liste passi in cui non emerge data Lamp.
Urge risposta tempestiva !!

Imperial Chemical Industries Limited

PLASTICS DIVISION

Black Fan Road, Welwyn Garden City, Herts.

Telephone: WELWYN GARDEN 3400 Telegram: ICIPLAST, WELWYN GARDEN CITY, TELEX

Telex: 2 2613 ICIPLAST, WELWYN

Your ref:
Our ref: **WEB/DJE**

30th March, 1960.

Dr. A. Giachin,
Montecatini S.p.A.,
10, Upper Grosvenor Street,
London, W.1.

Dear Dr. Giachin,

May I please refer again to my letter to you of 27th May, 1959. Amongst other things, I then asked (item 2 (a)) for the full list of countries in which Montecatini were seeking patent protection. By your reply of 1st June, I understood that a constructive reply would come from Milan in due course.

So far as I can ascertain, no such reply has yet been received in Plastics Division and I feel that I must, therefore, ask you to remind Milan to let us have their answer. You will appreciate that we are now actively formulating our commercial plans and, within these plans, it is necessary for us to know the extent of our freedom overseas. We can, of course, rely upon the reports of our various overseas advisors, but such advice is not likely to extend beyond granted patents, whereas your own information would doubtless include all countries where relevant applications are being pursued.

At the same time, if further licences have been granted over and above those mentioned in your letter of 24th June, we would like to be informed of the countries concerned.

Yours sincerely,

W. E. Batten.

DOTT. ING ANTONIO GIACHIN

TELEGRAPHIC & TELEX: 23229 GABBROENG. LDN.

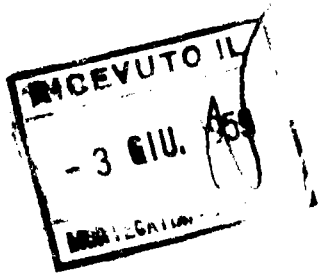
CABLE ADDRESS: GABBROENG. LONDON.

TELEPHONE: GROSVENOR 5159 (2 LINES)

10 UPPER GROSVENOR STREET,

LONDON, W.1.

1° Giugno, 1959.



Spettabile
Brevetti e Documentazione Tecnica,
Sede.

Mi pregio inviarVi in allegato fotocopia di lettera WEB/DJE del 27 Maggio u.s. del Dr. Batten della I.C.I., Plastics Division.

Come noterete, le questioni sollevate sono piuttosto sottili e sembrano fare parte di un piano prestabilito di espansione nell'attività nel campo del polipropilene e al di fuori di quelle che sono le chiare limitazioni dell'accordo.

Vi sarei pertanto grato se voleste fornirmi gli elementi per la risposta e in tale attesa, Vi prego di gradire i miei migliori saluti.

Allegato: 1

A. Giachin

Imperial Chemical Industries Limited

PLASTICS DIVISION

Black Fan Road, Welwyn Garden City, Herts.

Telephone: WELWYN GARDEN 3400 *Telegrams:* ICIPLAST, WELWYN GARDEN CITY, TELEX

Telex: 2 2613 ICIPLAST, WELWYN

Dr. A. Giachin,
Montecatini S.p.A.,
10, Upper Grosvenor Street,
London, W.1.

Your ref:
Our ref: WEB/DJE

27th May, 1959.

Dear Dr. Giachin,

Now that ICI is getting down to its polypropylene planning, there are inevitably one or two possible situations which cannot be fully resolved by mere reference to the letter of the Agreement. I think it is in accordance with the friendly spirit ruling between our companies for me simply to set down the various problems as we see them to-day, and to invite Montecatini's comments. On that basis then, the problems are as follows:-

1. Montecatini Patent Specifications

There was, of course, a schedule of UK numbers attached to the Agreement. In view of Montecatini's undertaking (Supp. Agreement Art.V) to provide copies of patent specifications within 30 days of filing, it would seem proper that ICI should now receive all the 'back-numbers' listed in Schedule A, together with any further filings since its compilation.

2. Montecatini Foreign Filings and Licensees

ICI is free to export Defined Polymers:-

(a) where Montecatini has no patents;

(b) where Montecatini has patents, but no licensee.

We would like to know therefore:-

the full list of countries where Montecatini have applied for protection both with regard to polymer production and substantial uses, our current concern being for isotactic polypropylene;

and the full list of countries where manufacturing licences have been granted.

3. Elastomers

ICI is, of course, not licensed in the elastomer field. We intend, however, to develop a composition which is based upon a mixture of polypropylene with a substance which is itself doubtfully elastomeric. The composition so produced is definitely not an elastomer. We believe that, whatever the

TO: Dr. A. Giachin. DATE: 27th May, 1959.

literal meaning of the definitions may be, Montecatini did not intend ICI's development of the legitimate plastics field to be hampered by a restriction upon the incorporation of minor proportions of modifiers. We believe that it is in the interests of both ICI and Montecatini that ICI should develop these compositions; we also believe that it is no incursion upon Shell's position in the field of true elastomers.

4. Fibres

ICI is, of course, not licensed in the fibres field as yet, and ICI is free to sell polymer for fibre making only to firms who are licensed by Montecatini to make fibres.

We are finding serious commercial interest in polypropylene monofils and we wish to exploit this interest. ICI could manufacture such monofils itself, but we believe it to be preferable that one or two of our customers should do so.

The fibres definition calls for a length at least 100 times the diameter and ...."can be spun into a yarn, or made into a fabric ...." We think there is a definite "textile flavour" about this definition but would prefer to settle our problems by common-sense rather than by an appeal to the definition.

The position is that the monofils we have in mind probably could be converted into a "fabric" of some kind, but not a true textile fabric. In any event, the likely uses are for brushes, panscrubbers and numerous small applications e.g. bead-stringing and interlinings, and we think that the production of monofils for these purposes would not fit in with the normal operations of the textile fibre industry. Certainly it has gone that way with nylon. It is desirable that this part of the polypropylene field should be exploited and we would like to take it up, subject to our paying proper respect to the true fibre field. We would suggest that perhaps a diameter criterion might be adopted - e.g. fibres have a diameter not greater than some specified figure (e.g. in the "Terylene" Agreement, the figure is 2 mm.).

5. "Fabricated Articles"

Just for good order, I would recall that Dr. de Varda was not too happy about the present phraseology (or intent) of the 'fabricated article' clauses. We ourselves have had no clarifying thoughts on this point but, if Montecatini have suggestions to bring forward (and I appreciate that the views of your other licensees are relevant), we would be pleased to consider them at the same time as we deal with the other points.

I am sorry that this is such a lengthy essay. Even so, it is probably not fully self-explanatory and, if you would like some discussion of the points, please let me know. I trust that I am not trespassing upon your good offices in raising all this through you.

Yours sincerely,

W. W. Batten.

W. W. Batten.

Bertello
I e I

1.3.1960

Mr.C.CHILD
Imperial Chemical Industries
Via Santa Maria Fulcorina 6
M i l a n o

184 /rl

Egregio Signor Child;

desidero ringraziarLa vivamente per la Sua gentilezza nell'inviarmi le copie dell' "ICI Magazine" che avevo richiesto.

La prego di gradire i miei migliori saluti.

G.Natta

22nd February 1960

Imperial Chemical Ind. Ltd.,
Mr.John Alater
Fibres Division
Research Department
Hookstone Road,
Harrogate, Yorkshire
(Inghilterra)

Dear Sir,

According to your request of the following reprint: "Conformation of Linear Chains & their Mode of Packing in the Crystal State", J.Polymer Sci.39, 29 (1959), we are sorry to inform you that we have no available copies

With best regards.

Secretary to Prof.G.Natta

IMPERIAL CHEMICAL INDUSTRIES LIMITED

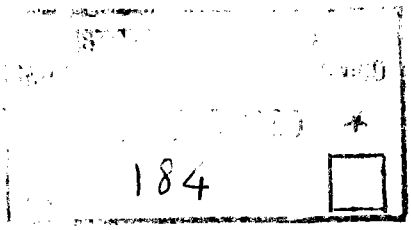
LIAISON OFFICE FOR ITALY

TELEPHONE: 873.044
TELEGRAMS: IMPKEMIX-MILAN
C.C.I.A. MILANO N.510874

ADDRESS:
VIA SANTA MARIA FULCORINA,6
MILAN

25 Febbraio 1960

Preg.mo Prof. G. Natta,
Istituto di Chimica Industriale
del Politecnico di Milano,
Piazza L. da Vinci, 32
MILANO



Preg.mo Prof. Natta,

Con riferimento al colloquio telefonico di ieri fra la Signorina Lamm ed il Signor Ely, mio assistente, ho il piacere d'informarLa che sono riuscito a raccogliere 3 copie del numero di Febbraio 1960 dell' "I.C.I. MAGAZINE", che accludo alla presente come da Sua richiesta.

Colgo l'occasione per porgerLe i miei migliori saluti.

C. CHILD.
Agente di Collegamento per l'Italia
della IMPERIAL CHEMICAL INDUSTRIES LTD.,
di Londra.

MONTECATINI

SOC. GEN. PER L'INDUSTRIA MINERARIA E CHIMICA
ANONIMA - CAPITALE VERSATO L. 100.000.000.000
MILANO

SETTORE PROGETTI E STUDI

MILANO 22 Febbr. 1960.
VIA F. TURATI, 18
TELEGRAMMI GABBROPROGETTI
TELEFONI 6333 - 6334

Preg.mo Signore
Prof. Giulio Natta
Istituto di Chimica Industriale
Politecnico di
M i l a n o.

Egregio Professore,

Sua 24 Febbraio.

Restituisco l'ICI Magazine con 5 copie dell'articolo; altre tre copie ho spedito a Toulmin.

Cordialità :

Bartolomeo Orsoni

All.
* Or/sl.

Information Notes

A NEW AND PROMISING PLASTIC

By T. Ward (Plastics Division)

Latest arrival in the group of plastics known as polyolefines, of which polythene was the first, is polypropylene—potentially the most important polymer discovered in the last 25 years. The announcement that Plastics Division is to make this new plastic at Wilton prompts the questions: what is polypropylene, who discovered it, what will it do?

POLYPROPYLENE is the lightest of all plastics—about 2% lighter, volume for volume, than the lightest polythene. It does not quite have polythene's flexibility and toughness. But it does have three properties that promise a bright future and a special niche in the plastic world. First, it is rigid like the special high density polythenes, but is easier to process. Secondly, it has a much higher softening point than polythene and so can be sterilised and used at high temperatures without distortion. Thirdly, it stands up to oil, grease and acids exceedingly well and does not have the tendency of the higher density polythenes to stress-cracking in contact with certain chemicals.

These, briefly, are polypropylene's physical properties. But behind this rather prosaic catalogue lies a fascinating story—or rather, a fascinating new chapter in the story that began with I.C.I.'s discovery of polythene some 25 years ago. It involves, among other people, two distinguished academic chemists, one working in Germany, the other in Italy.

The German chemist Professor Karl Ziegler had held important teaching posts in the Universities of Frankfurt, Heidelberg and Halle before being appointed head of the Max Planck Institute for Coal Research at Mülheim in the Ruhr valley. The activities of this institute are much wider than you might suppose from its title, and in the course of their work Ziegler and his associates made an extremely important discovery.

Investigating the catalytic action of metal compounds on olefines, they discovered by chance that a certain combination of metal compounds dispersed in a hydrocarbon had the effect of polymerising ethylene rapidly. More important, this linking of the ethylene molecules into long chains took place at atmospheric or relatively low pressures (whereas the I.C.I. polythene process required extremely high pressures).

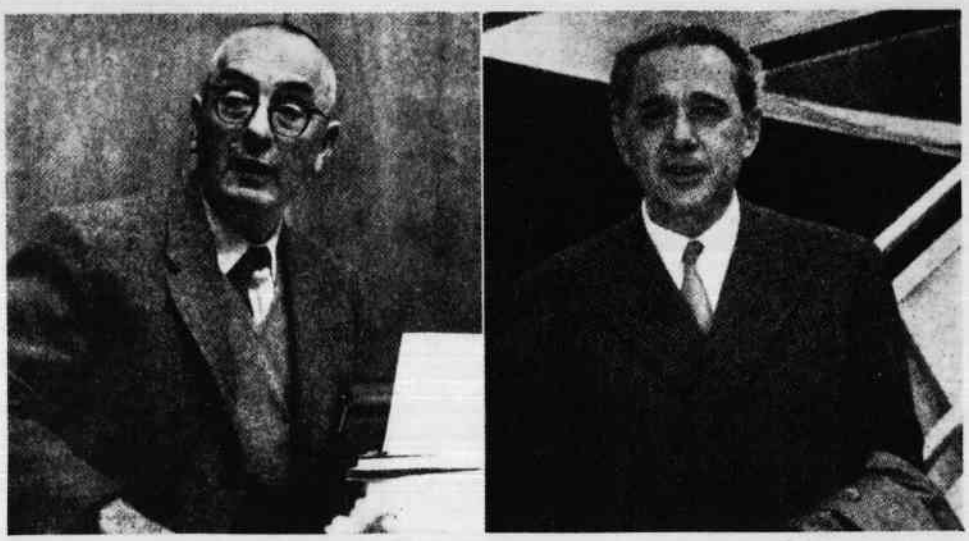
Ziegler's process could be controlled to give a wide range of polymers with varying qualities; and the best of them was a polythene with a higher density, stiffness and softening point than that made by the I.C.I. process. These qualities were due to the fact that in Ziegler's polythene the molecules were arranged with almost perfect precision, while in conventional polythene there were a great many "branches" or side chains of molecules from the main structure. Ziegler discovered his catalyst in 1953, and it was almost immediately put to use in the commercial production of low-pressure polythene—the second (high-pressure polythene being the first) in the group of plastics known as polyolefines.

I.C.I.'s original discovery of polythene had, of course, suggested to many people that other olefines could be made to yield useful plastics by polymerisation. One of the most likely objectives seemed to be the polymerisation of propylene, but repeated attempts to achieve this were disappointing. Neither the I.C.I. high-pressure process nor conventional techniques could be made to yield anything but liquids or waxes of little value. Which takes us to Italy and the next part of the story.

Professor G. Natta was Professor of Industrial Chemistry at the Polytechnic Institute of Milan, and in 1954 in the course of some work with Ziegler-type catalysts he and his associates succeeded where everyone else had failed: they polymerised propylene to solid high polymers. They also discovered that a fraction of this polypropylene had a higher melting point, higher density and lower solubility than the rest, because its molecules were arranged with perfect regularity, all the external carbon atoms being on one side of the polymer chain. More important still, they found that a particular Ziegler-type catalyst gave a high proportion of this type of polypropylene, which Natta termed "isotatic"—a new word, coined

from the Greek *isos* (equal) and *tatto* (to set up), to describe polymers with exceptionally regular structure.

Natta was a consultant to the Italian chemical firm of Montecatini, which had been one of the first firms to be licensed by Ziegler to use his catalysts. Shortly after Natta's discovery, an agreement was made between Montecatini and Ziegler which gave Montecatini exclusive rights to polypropylene in Italy and Ziegler similar rights in West Germany. Outside these two countries, Montecatini's and Ziegler's polypropylene rights are licensed by Montecatini, taking Ziegler's wishes into consideration.



Professor Karl Ziegler (left) of Germany and Professor G. Natta of Italy, the two chemists to whom the development of polypropylene is chiefly indebted

It was from Montecatini, therefore, that I.C.I. obtained its licence to manufacture and sell polypropylene in the United Kingdom, and to export to any country except Italy, West Germany and countries where Montecatini may grant manufacturing licences.

The arrival of polypropylene on the scene has been the signal for intense activity in the plastics industry. Another prospective producer in the United Kingdom is Shell Chemicals, who secured rights to the Ziegler catalyst through their purchase of Petrochemicals in 1955 and who recently announced their intention to build a 30,000 tons/year polythene and polypropylene plant at Carrington, Manchester. In Europe, apart from Montecatini themselves, Farbwerke Hoechst in Germany have started production, and Shell in Holland have a pilot plant. In the U.S.A., Hercules Powder Company and Avisun are in production. Other companies in America and Europe have plans to make polypropylene, and future world capacity, as far as one can see at the moment, will be more than 250,000 tons a year, bringing the world capacity for the polyolefines group of plastics (polypropylene and high- and low-pressure polythene) to two million tons a year within the next few years.

I.C.I.'s polypropylene, to be sold under the registered trade mark 'Propathene,' will be made at Wilton in a plant with a capacity of 10,000 tons a year or more, bringing the Company's total capacity for polyolefines to 100,000 tons a year. The process will involve passing propylene (drawn from the Wilton olefines plants) into a suspension of catalyst in a hydrocarbon solvent. The resulting polymer is in the form of fine particles which are separated from the solvent, the latter being re-used in the process. All traces of catalyst are then removed from the polypropylene, which is worked up into suitable granular form.

What will polypropylene be used for? Its properties make it particularly promising for very large mouldings with thin walls, as well as for all kinds of small mouldings. You will probably meet it in the form of moulded domestic ware, refrigerator linings, washing-machine parts, hospital sanitary ware, toilet seats, picnic ware, shoe heels, car and electrical accessories, toys, cutlery handles, bottles and containers. To some extent it will compete with conventional polythene, but it is chiefly expected to make inroads into the market of the higher density polythenes made by low-pressure processes.

Then there are also a number of specialised uses which may be developed. There is, for example, a promising future for polypropylene as a packaging film. It is not only clearer and glossier than polythene film, but can be produced in a stretched form with high clarity, sparkle and crisp handle. Polypropylene also has good electrical properties, and is of considerable interest for wire covering. In the form of extruded pipe and sheet it should find markets in the chemical and other industries for the fabrication of plant. Finally, it has interesting possibilities as a monofilament and fibre, because of its potentially low cost, light weight, high tensile strength and chemical resistance. The main fibre applications suggested at present are ropes, cordage, brushware, filter fabrics, car seat covers and outdoor furniture webbing.

Between them, propylene and the two types of polythene thus have a wide range of uses. But the work of Ziegler and Natta has led to a greater understanding of how to "build" plastics to order, and it is quite possible that new polymers with different sets of properties will in time be added to the polyolefines group.

MONTECATINI

Società Generale per l'Industria Mineraria e Chimica

AMMINISTRATORE DELEGATO

PROMEMORIA

ISTITUTO DI [illegible]
INDUSTRIALE DEL [illegible]
5 OTT. 1959
R 1066

Data, 3 ottobre 1959

G/ra

per il Signor BREV
SEPS
SERE
Prof. NATTA

Cartella

I Signori Swallow e Sissen dell'I.C.I. verranno da me venerdì, 9 ottobre, alle ore 15.

TeneteVi a disposizione per le conversazioni che si seguiranno nell'ordine :

a) contratto polipropilene ed accessori
b) (eventualmente) conversazioni per monomero metacrilato.

Cordiali saluti.

non c'è

avvisato per telefono lunedì 5/10 - ore 12

dy/ma

Cartella ICI

24/4/59

Alcune informazioni importanti prima riunione licenza esclusiva

fibre polipropilene alla I.C.I. in U.K. (concerne esclusivamente brevetti e campioni)

Milano, 24 Aprile, 1959 - Ore 11:00.

Presenti: Ing. Giustiniani, Mr. Careen, Kamm, Ing. Orsoni, Prof.Natta, Ing. Larcher, Ing. de Varda.

Fase introduttiva

Inizialmente, in attesa dell'arrivo dell'Ing. Giustiniani, era stato discusso brevemente la situazione brevettuale USA e Canadà del polipropilene polimero.

dV. **(Accenna brevemente ai brevetti ICI sul terilene che continuano a venirci offerti in licenza in base alla opzione prevista nel contratto Montecatini-ICI sul terilène).**

Vedo che ICI continua attivamente le sue ricerche nel campo del terilene almeno a giudicare dal numero dei brevetti italiani ICI che ci vengono sottoposti per una eventuale opzione. Questi brevetti vengono da me passati direttamente agli interessati.

Ho però notato una certa tendenza dei nostri Settori e Consociate a differire nel tempo la valutazione economica di questi trovati ogni qual volta veniva esercitata l'opzione.

Da parte mia ormai non mi occupo che molto superficialmente del terilene sia perchè i contratti a suo tempo conclusi mi sembra operino senza il minimo inconveniente, sia perchè sono completamente assorbito dalla brevettazione e dai contratti nel campo dei trovati Natta.

Careen **Quali sono i partners nella interference americana?**

dV. **Solo Standard of Indiana, Phillips, du Pont e Hercules.**

Careen **Quali sono, secondo lei, le chances degli altri?**

dV. **Mi sembra che Hercules ne abbia veramente poche.**

Careen **Credo che questa sua opinione sia condivisa dalla st/ Hercules. Ma gli altri?**

dV **Mi esimo da uno statement, anche perchè il sotto/ è per natura ottimista. Ciò premesso, ritengo / vittoriosi nel farci riconoscere i nostri dir/ li anche negli U.S.A.**

In tutto il resto del mondo il problema non esiste essendo noi arrivati per primi.

Comunque anche negli U.S.A. dove, come le è noto, vige la complicazione dello swear back, ci è già stato concesso poco tempo fa un primo brevetto sulla polimerizzazione del propilene sia pure di secondaria importanza.

Caresa Un brevetto USA sul processo Natta alla Montecatini? Non lo sapevo. E quando prevede usciranno gli altri?

dV. Non è facile fare previsioni in questo campo.

Caresa Fra due anni?

dV. Forse anche prima delle previsioni che si fanno correntemente in America.

Caresa E' il Canadà, che ci interessa parecchio ?

dV. Nel Canadà occorrerà avere pazienza. Del resto mi richiamo all'esperienza da voi fatta per il brevetto base sul terilene. Per il trovato base del terilene non c'era tanta concorrenza come nel caso nostro.

Caresa In Canadà il brevetto del terilene è rimasto allo stato di domanda per ben 8 anni, essendo stato concesso solo nel 1954.

dV. Cosicchè il vostro brevetto in Canadà scadrà nel 1971. E negli U.S.A. quando scade?

Kamm Negli U.S.A. il brevetto base terilene venne a suo tempo concesso nel giro di un anno (sussistevano però anche delle ragioni militari). Ho ben presente tale data giacchè ICI entrerà in produzione sul mercato americano nel 1961 assieme alla Celanese. (40.000 tonn/anno?)

dV. Quale è la potenzialità attuale di produzione del Dacron negli U.S.A.?

Kamm 25.000 tonn/anno, che entro il 1959 diventeranno 50.000 tonn/anno.

Nel successivo corso della conversazione è poi risultato che la potenzialità attuale degli impianti ICI nell'U.K. arriva a 30 milioni di libbre (circa 13.800 tonn/anno) e verrà aumentata entro l'anno venturo a 50 milioni di libbre (cioè 23.000 tonn/anno) di terilene.

Prima fase

Carena Desidererei sapere dall'Ing. de Varda se egli ritiene che in base ai brevetti base possa essere impedita a chiunque nel U.K. di produrre e vendere delle fibre polipropileniche di valore commerciale, come quelle viste ieri e oggi alla Fiera e nell'Ufficio dell'Ing. Lercher.

Chiedo questo perchè non abbiamo ancora le idee sufficientemente chiare per quanto riguarda i requisiti richiesti dal punto di vista costituzione storica per dette fibre.

dV. Ritengo in base ai brevetti base già pubblicati per opposizione,o ancora da pubblicare, che nessuno possa produrre e vendere fibre polipropileniche commerciali nell'U.K. senza licenza Montecatini.

Carena Ciò mi fa piacere anche se avevo anticipato questa risposta. Per noi non era del tutto chiaro se i claims di prodotto del brevetto già pubblicato coprivano effettivamente tutte le fibre utili.

dV. Si, in quanto dette fibre sono costituite essenzialmente da polipropilene isotattico.

Seconda Fase

Giust. Noi abbiamo però una serie di trovati importanti che bisogna attuare per poter arrivare a delle fibre commerciali. Mi riferisco particolarmente alla filiera e al modo di filare.

Carena Sono già stati pubblicati questi vostri trovati all'estero, per esempio in Belgio?

dV. (Controllando l'elenco dei nostri brevetti sulla filatura preparato, e consegnato, nel febbraio scorso alla Hoech
No, non ancora.
Trattasi di un trovato relativamente recente (M.D.
brevetto è stato depositato in Italia solo nel no
Però abbiamo altri trovati, nel campo della fil
pubblicati e decisamente interessanti.

Giust. Per esempio la tintura in massa, ecc.

Enem Desidererei sapere dall'Ing. de Varda
brevetti ICI sul terilene se la vostr
ricada, almeno in parte, sotto qual

dV. A parte il fatto che sono passati molti anni da quando feci l'esame sistematico dei brevetti Calico e ICI sul terilene, per cui non posso certamente ricordare in dettaglio tutti i brevetti nel campo della filatura della ICI (e di tutte le altre numerosissime ditte che svolgono attività di ricerca in questo vastissimo campo),

ritengo che il nostro procedimento di filatura non ricada sotto nessuna delle rivendicazioni dei suddetti brevetti ICI.

(N.d.R. Questa affermazione non è purtroppo ancora basata sui risultati di una ricerca della proprietà ingegno industriale nel campo della filatura e delle fibre ~~x~~ del polipropilene.
Detta ricerca è stata affidata a Ripri ma richiederebbe che venisse fornita a Brev una descrizione sufficientemente dettagliata del procedimento di filatura oggi seguito a Terni, per decidere se e quali fasi operative sono eventualmente dominate da brevetti di terzi).

Altrettanto dicasi per il trovato della polimerizzazione in presenza di idrogeno che permette di arrivare a polimeri aventi peso molecolare relativamente basso atti a essere filati.

Potrebbe anche darsi che per quanto riguarda questo trovato fossimo anticipati da una o più delle seguenti ditte: National Distillers Co., Bayer, Hercules, du Pont, oltreché ICI.)

Terza fase

Gli inglesi insistono per avere dei campioni, richiesta alla quale l'Ing. Giustiniani continua a opporre un cortese rifiuto.

Caruso Sarebbe per noi utile poter ricevere un campione di polimero atto a essere filato.

Giust. Non credo di poterla accontentare. Sarebbe come comunicar una parte del ns. know-how. Sentiamo de Varda.

dV. (reticente) Disporre del ns. polimero non sarebbe sufficiente per riuscire a filarlo in modo soddisfa Comunque sarebbe sempre un comunicarvi parte del know-how.

Giust. Potremo invece vedere di darvi dei campioni ?

Caruso Quando?

Giust. Per esempio in ottobre di quest'anno quando cominceremo a entrare in produzione industriale e a vendere sul mercato italiano.

Caress Abbiamo fatto anche noi dei polimeri a scopo filatura, ma abbiamo constatato che per filarli occorreva un apposito estrusore e delle temperature molto vicine a quelle usate per il terilene.

Natta Ciò dipende probabilmente dal fatto che avete usato un polimero a peso molecolare molto elevato.

dV. Di recente dei tecnici che avevano tentato di filare campioni di polipropilene per usi plastici forniti dalla Montecatini si sono lagnati di non aver ottenuto dei risultati soddisfacenti.

Orsoni .... i giapponesi.

Giust. "The fiber obtained was not very good".

dV. Il polimero per essere filato deve avere particolari requisiti (rivolgendosi all'ing. Larcher) Quanti anni lei ha lavorato dietro il polimero?

Larcher Quattro anni.

Quarta fase

Gli inglesi non si sanno rendere conto perchè la nostra fibra non presenti i soliti difetti di pilling e di accumulo di elettricità statica.

Orsoni e Larcher Il fatto che non si sia elettricità statica è probabilmente dovuto alla presenza di gruppi peressidici.

Kamm e il pilling?

Larcher Il polipropilene presenta un coefficiente di attrito molto basso.

Kamm E allora come fate per i filati di fiocco?

Larcher Aiuta molto il creep (ondulazione) delle fibrille tag'

(S.dV.

MONTECATINI
Società Generale per l'Industria Mineraria e Chimica

AMMINISTRATORE DELEGATO

Data 18 aprile 1959

PROMEMORIA

G/k

per il Signor **V E E S**
BREV
SEPS
SEID
VERE
→ **PROF. NATTA**

Mi riferisco alla mia nota del 7 aprile.

Nel colloquio che ho avuto con il Signor Swallow dell' I.C.I. per quanto riflette le richieste di Moplen per l' anno 1959, è stato stabilito quanto segue :

1) **L' I.C.I. importerà dagli Stati Uniti, e precisamente dalla Hercules Powder, le 110 tonn. richieste immediatamente e che noi non possiamo fornire,** in luogo delle 150 tonn. da me menzionate nella nota 7/4. **E' inteso che l' I.C.I. pagherà a noi regolare royalty per questo quantitativo.**
E' anche inteso che I.C.I. ci invierà campioni del prodotto Hercule per una valutazione da parte nostra.

2) **Per il resto del 1959 io ho affermato che noi potremmo fornire, a partire dal 1° luglio p.v., da 20 a 25 tonn/mensili a prezzo e condizioni da concordare e per modalità da stabilire.**

3) **Per il 1960 ho dichiarato che entro la fine dell' anno ci saremmo messi di nuovo in rapporto per fissare quantità e prezzo per le eventuali maggiore forniture.**

A seguito di ciò è opportuno che VEES, in contatto con l' ing. Giachin, che è al corrente di quanto precede, e in rapporto con BREV e con SEID, rediga una lettera di conferma a quanto precede per la regolazione del rapporto.

Cordiali saluti.

IMPERIAL CHEMICAL INDUSTRIES LIMITED

LIAISON OFFICE FOR ITALY

TELEPHONE: 873.044
TELEGRAMS: IMPKEMIX-MILAN
C.C.I.A. MILANO N.510874

ADDRESS:
VIA SANTA MARIA FULCORINA,6
MILAN

Corletto I.C.I.

Milano, 10 Febbraio 1959

Egr. Prof.
Giulio Natta,
Istituto di Chimica Industriale
del Politecnico di Milano,
Piazza Leonardo da Vinci, 32
MILANO.

NUOVO CATALOGO DI PELLICOLE I.C.I.
PER L'ANNO 1959.

Egregio Prof. Natta,

Mi pregio inviarLe in allegato per Suo interesse, una copia del catalogo in oggetto, che ritengo sia un documento utile di riferimento da tenersi nei Suoi archivi.

Qualora Ella volesse avere in prestito ed utilizzare qualsiasi pellicola contro segnata nel catalogo in questione, sarà mia premura, dietro Sua richiesta, provvedere in merito.

Con l'occasione, le porgo i miei più cordiali saluti.

C. CHILD
Agente di Collegamento per l'Italia
della IMPERIAL CHEMICAL INDUSTRIES LTD.
di Londra.

I all.

IMPERIAL CHEMICAL INDUSTRIES LIMITED

LEGAL DEPARTMENT

Solicitor JWRIDSDALE

Telephone VICTORIA 4444 EXT

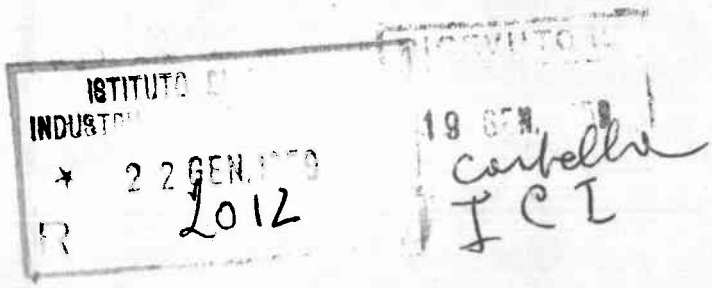
Telegrams IMPKEMIX, TELEX, LONDON

IMPERIAL CHEMICAL HOUSE
MILLBANK
LONDON, S.W.1

Our ref JWR/AMM

Your ref VB/gl

16th January, 1959



Montecatini, S.A.,
BREVETTI,
Via Turati 18,
MILANO

Dear Sirs,

Polypropylene Plastics Licence Agreement

I am very much obliged to you for your letter of the 8th January. We would be very pleased to avail ourselves of your suggestion if it did not involve advancing the date upon which the payment is due under Article IV.1(a). This does not, however, appear to be the case, and in such event we must regretfully decline your proposal. It would naturally be of assistance to us to have a sight of the patent specification as accepted prior to March 11th, 1959 if this did not involve the Agreement coming into force at an earlier date.

If you would agree to our having a copy of the patent specification in advance, we would naturally undertake to keep its contents confidential until the date on which they will become open to public inspection, namely, March 11th.

Perhaps you would let me know if you would be willing to accept this counter proposal.

Yours very truly,

Jridsdale

N

MONTECATINI

SETTORE PROGETTI E STUDI

Milano, 3 Ottobre 1958.

Preg.mo Signore
Ing. Piero Giustiniani,
S e d e.

I.C.I. ha formato una Società con Celanese Corp. per produrre negli Stati Uniti 40 milioni di libbre/anno di fibra Terylene, che in America sarà chiamata "Teren".

Lto: Orsoni

Or/al.

IMPERIAL CHEMICAL INDUSTRIES LIMITED

PLASTICS DIVISION

Telephone: Welwyn Garden 3400
Telegrams: Iciplast, Telex, Welwyn Garden City
Cables: Iciplast, Telex, London

BLACK FAN ROAD
WELWYN GARDEN CITY
HERTS

Our ref. HCR/B
Your ref.

29th May, 1958

Professor Giulio Natta,
Istituto di Chimica Industriale del Politecnico
Piazza Leonardo da Vinci 32,
Milan. Italy.

Dear Professor Natta,

It has occurred to us that you in view of your interest in olefine polymers might like to see an advance copy of a paper by our Dr Willbourn which is to be presented at the International High Polymer Conference in Nottingham in July. This paper brings together data which have been obtained in quite a wide range of chemical investigations, and does we think add something to the knowledge of the fine structure of polymers of ethylene. If you have any comments or suggestions to make we would naturally be very keen to hear them, but in any case we hope that we shall have the opportunity of seeing you in England before very long.

With kind regards,

Yours sincerely,

H. C. Raine.

H. C. Raine.

Enclosure

July 22, 1958

H.C. Raine
Imperial Chem. Industries Ltd.,
Black Fan Road
Welwyn Garden City
Herts (England)

Our.ref;: 668/mb

Dear Mr. Raine,

Prof. Natta, who has left Milan a few days ago to attending the Nottingham Meeting, had charged us to thank you for the sending to us of the paper which Dr. Willbourn will present at the above Conference.

Best regards,

Yours very truly,

Secretariat to Prof. Natta

IMPERIAL CHEMICAL INDUSTRIES LIMITED

NOBEL DIVISION

Tel: Ardrossan-Saltcoats 621

Grams: Nobel, Stevenston

RESEARCH DEPARTMENT

STEVENSTON

AYRSHIRE

Our ref. DT/EAW.

Your ref.

13th June, 1958.

Dear Professor Natta,

It was a very great pleasure to meet you at the Conference in Turin. The Conference was a great success and we were entertained in a most royal fashion. It would be a great pleasure to me to attempt to return some of your kindness and hospitality during your visit to Britain this year.

In course of conversation with Signora Natta and yourself, you said you would like to visit Scotland at the time of your visit to the High Polymer Conference in Nottingham. It was suggested that you might spend approximately five days on a Scottish tour. I have great pleasure in sending you two possible tours lasting about five days. I also send a route from Nottingham to Ardrossan. Ardrossan is 30 miles south of Glasgow. I hope that in the course of your journey you can spend an hour or two in Ardrossan to see something of our laboratories and our work here.

July and August are busy holiday months in Scotland and it would be advisable to book hotels. When you have had time to consider the suggested itineraries, and of course you may wish to modify them, either by extending or curtailing, please give me some idea of your time table and I shall be glad to arrange hotel accommodation for you. In the case of Ardrossan we have a nice Guest House and would be very happy to have you there as our guests in the course of your journey.

I look forward very much to seeing you and would again express my pleasure and thanks for the kindness we members of the Society of Chemical Industry received in Italy.

Yours sincerely,

David Traill

(DAVID TRAILL)
NOBEL DIVISION RESEARCH DIRECTOR

Professor J. Natta,
Chemistry Department,
The University,
MILAN,
Italy.

July 1, 1958

Mr. David TRAILL, Director
NOBEL DIVISION Research
Imperial Chemical Industries, Ltd.
STEVENSON, Ayrshire (England)

Ref.n.756/el

Dear Mr. Traill,

I wish to thank you very deeply for your very kind and appreciated letter of June 13, and for your kindness in sending to me some suggestion on our trip to Scotland. Unfortunately I foresee not to be able to make the trip through Scotland, as I must come back to Italy on July 27, and I have not the necessary time.

My wife and I are very sorry, because we do not know Scotland and we would like very much to visit it.
I do hope to be able to come to Scotland in occasion of an another travel to England.

Thanking you again, I send you my best regards.

Sincerely yours,

G.Natta

20 Maggio 1958

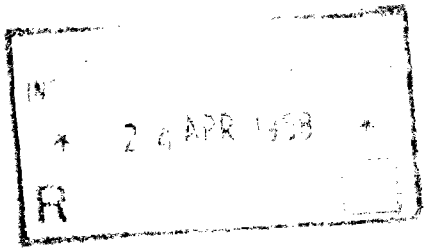
Mr. Cyril CHILD
Imperial Chemical Industries Ltd.
Via Santa Maria Fulcorina 6
M I L A N O

Egregio Signor Child,

La ringrazio dell'invio delle due pubblicazioni "Annual Report" and "Review for 1957", che gentilmente mi ha fatto pervenire.

La prego di gradire i migliori saluti.

(Prof. G. Natta)



Imperial Chemical Industries, Ltd.
Plastic Division
Black Fan Road
Welwyn Garden City
Hertfordshire

April 23, 1958

Attention of Mr. J. C. Swallow.

Dear Sirs,

We are in receipt of your letter dated April 15, 1958 regarding the draft agreement for poly-olefines licenses.

We too think it advisable to resume the talks about the various points of the draft and therefore suggest you to arrange a meeting of your collaborators with ours in Milan on the 7th and 8th of May next.

While we are awaiting your kind reply, we remain,

sincerely yours,

"M O N T E C A T I N I"

(firmato: Ing. P. Giustiniani)

DA TRADURRE

Giulio Natta

Mr. A.H. WILLBOURN
IMPERIAL CHEMICAL INDUSTRIES Ltd. Plastics Division
WELWYN GARDEN CITY - HERTS
Black fan Road
(England)

30/10/1957

Dear Mr. Willbourn,

La prego di scusarmi se non ho scritto prima d'ora per ringraziarla della Sua gentile lettera del 29 agosto e per l'articolo "The Glass Transition in Polymers with the (CH_2) Group" .

Ho letto il suo interessante lavoro e le sarò molto grato se vorrà inviarmi copia delle sue successive comunicazioni sull'argomento, quando dovesse pubblicarle.

Noi abbiamo in corso delle ricerche analoghe nel campo dei polimeri delle olefine e da parte mia Le invierò copia dei nostri lavori quando saranno pronti per la pubblicazione.

La ringrazio e le invio i migliori saluti.

MONTECATINI

SOC. GEN. PER L'INDUSTRIA MINERARIA E CHIMICA
ANONIMA - CAPITALE VERSATO L. 84.000.000.000
MILANO

Corbetta
ICI

Brevetti e Documentazione Tecnica

MILANO (134) 7.10.1957
Via F. Turati, 18

BREVLEG: FER/Mor.

ISTITUTO DI CHIMICA
INDUSTRIALE
8 OTT 1957
R 1696

Signor
prof. Giulio Natta
Direttore Istituto Chimica
Industriale del Politecnico di
M i l a n o.

Egregio Professore,

Le inviamo in allegato fotocopia della lettera RHS/JPH del 30 settembre u.s. della Imperial Chemical Industries Limited, che abbiamo provveduto a trasmettere in originale al Settore Idrocarburi per la risposta di competenza.

Cordiali saluti.

"M O N T E C A T I N I"

All.: 1 fotocopia.

Telefoni 6335 - 6334 - Telefoni interurbani chiedere GABBRO-MILANO
Telegrammi-Télégrammes-Telegramme-Cables: GABBROBREV-MILANO

MOD. BREV 59 (A5) - 1000 - 4.55

IMPERIAL CHEMICAL INDUSTRIES LIMITED

LEGAL DEPARTMENT

Solicitor: J.W. RIDSDALE
Patent Agent: A.O. BALL

Telephone: VICTORIA 4444
Telegrams: IMPKEMIX, TELEX, LONDON

IMPERIAL CHEMICAL HOUSE
MILLBANK
LONDON, S.W.1

Our ref. RHS/JPH

Your ref.

30th September 1957.

Societa Montecatini,
Ufficio Brevetti,
Via F. Turati 18,
Milan,
Italy.

Attention: Dr. G. deVarda.

Dear Sirs,

ICI/Montecatini Agreement of 26th April 1956
ICI's Request for Technical Information.

We refer to your letter of the 31st July 1957, in which you sent us copies of the British Specification (Application number not known) corresponding to Montecatini Case No. T.174.

In accordance with the Provisions of Article XII - Clause 4, we shall be pleased if you will please send us further technical information on this invention e.g. we would be interested to know whether you feel able to make any comments on the practical merits of the compositions of this Specification. We should also be interested to hear whether the compositions are in use and whether fatty alcohol/ethylene oxide condensates other than lauryl/alcohol/ethylene oxide condensates have been examined and whether they have been found effective.

It would be a great convenience to us if you could send us three copies of the technical information.

Yours faithfully,

(R.H. Spiller)

November 6, 1957

Mr. A. H. WILLBOURN
Imperial Chemical Industries Ltd.
Plastics Division
Black Fan Road
WELWYN GARDEN CITY - Herts (England

Rif. N. 1500/rl

Dear Mr. Willbourn,

Please escuse my long delay in answering your kind letter of August 29, 1957 for thank you for your sending to me your paper "The Glass Transition in Polymers with the (CH_2) Group".

I have read your interesting paper and I shall be very grateful to you if you will send to me your next communications on this argument, when published.

We are carrying out researches in the field of olefin polymers and I shall send to you, as soon as available, all our papers concerning this argument.

With many thanks and best wishes, I am

Sincerely yours,

G. Natta

BY AIR MAIL

IMPERIAL CHEMICAL INDUSTRIES LIMITED

PLASTICS DIVISION

Telephone: WELWYN GARDEN 3400
Cables: ICIPLAST, TELEX, LONDON

BLACK FAN ROAD
WELWYN GARDEN CITY
HERTFORDSHIRE
ENGLAND

Our ref. AHW/VLD Letter No.

Your ref.

2nd October, 1957.

Professor Giulio Natta,
Istituto di Chimica Industriale
del Politecnico,
Piazza Leonardo da Vinci 32,
Milan.

Dear Professor Natta,

Many thanks for your letter of the 13th September enclosing the sample of polyhexene-1. We will examine this with interest and determine its dynamic mechanical loss spectrum and let you know our results. I note that the sample may be slightly oxidised, but I hope that this will not interfere with the measurements.

I am sorry that Dr. Corradini's paper is not available yet but we shall be interested to see it when it is published.

Yours sincerely,

A.H. Willbourn

September 13, 1957

Mr. A. H. Willbourn
Assistant Research Manager

Imperial Chemical Industries
Plastics Division

Black Fan Road
Welwyn Garden City - Herts.
(England)

Dear Mr. Willbourn,

Please excuse my long delay in answering your kind letter of August 12, but I am just now come back to Milan from my summer vacation.

I am sending you, enclosed, a few grams sample of poly-hexene-1. This sample has been prepared some months ago and it is not stabilized, therefore it may be slighly oxidised. If you wish to have sample of ~~different size~~ more recent preparation, we may prepare them expressely.

In regard to the paper on the subject developed by Dr. Corradini, I am sorry but I have till now no copies available; as soon as it is published I will send you a copy.

Please convey to Mr. H. C. Raine and Dr. J. W. C. Crawford my best thanks. With best regards,

Sincerely yours,

Giulio Natta

Encl/poly-hexene-1 sample

August 26th, 1957

Mr.A.H.WILLBOURN
Imperial Chem.Industries,Ltd.
Black fan Road
Welwyn Garden City,
HERTFORDSHIRE, England

Dear Mr. Willbourn,

your letter of 12th August came during Prof.Natta's summer vacation. Prof.Natta will be here again at the beginning of September, and you should be so kind to wait for an answer after his return.

With best wishes,

L.Einaudi (secretary to Prof. Natta)

Mr.A.H.WILLBOURN
I.C.I.

Dear Mr. Willbourn,

La prego di volermi scusare se rispondo ora alla Sua lettera del 12.8, ma sono appena rientrato a Milano dopo il periodo di vacanze.

Le invio unito alla presente un campione di alcuni grammi di poly(pentene-1). Si tratta di un prodotto preparato circa due mesi fa e non stabilizzato; può quindi essere leggermente ossidato. Nel caso che desideri campioni di preparazione più recente, potremo prepararne altri appositamente. (°)

Gradisca i migliori saluti.

(°) Per quanto riguarda il lavoro sull'argomento svolto da Corradini, sono spiacente di non disporre di qualche manoscritto; ne invierò una copia appena sarà pubblicato.

Ringrazi da parte mia Mr. H.C.Raine and Dr. J.W.C.Crawford per i gentili saluti, che ricambio.

2 Agosto 1957

Mr. C. CHILD

Imperial Chemical Industries Ltd.
Via Santa Maria Fulcorina 6

M I L A N O

Egregio Signor Child,

Ricevo la Sua gentile lettera del 30 Luglio, di cui La ringrazio vivamente.

Mrs. Natta non è attualmente a Milano ma tra qualche giorno sarà di ritorno, prima di recarsi in montagna. Sarà molto lieta di ricevere il bellissimo ed interessantissimo libro inviatole gentilmente dal Dr. d'Leny.

La prego, se Lei ha occasione di scrivere a Mr. d'Leny, di porgergli già sin d'ora i miei più vivi ringraziamenti. Mrs. Natta gli scriverà direttamente appena tornerà.

I migliori saluti.

Giulio Natta

IMPERIAL CHEMICAL INDUSTRIES LIMITED

PLASTICS DIVISION

Telephone: Welwyn Garden 3400
Telegrams: Iciplast, Telex, Welwyn Garden City
Cables: Iciplast, Telex, London

BLACK FAN ROAD
WELWYN GARDEN CITY
HERTS

Our ref. JWCC/B
Your ref.

22nd May, 1957

Professor G. Natta,
Istituto di Chimica Industriale,
Politecnico di Milano,
MILAN. Italy.

Dear Professor Natta,

I have learned from Dr A.W. Taylor of Billingham Division that you would be writing a preprint of your lecture to the Congress of the International Union of Pure and Applied Chemistry in Paris on July 18th, and I should be very much obliged if you could let me have a copy. I hope to attend the Congress but am not sure that I will be able to be there in time for the opening session.

Yours sincerely,

J. W. C. Crawford.

J. W. C. Crawford.

IMPERIAL CHEMICAL INDUSTRIES LIMITED

LIAISON OFFICE FOR ITALY

TELEPHONE: 873.044
TELEGRAMS: IMPKEMIX-MILAN

ADDRESS:
VIA SANTA MARIA FULCORINA,6
MILAN

6 Agosto 1957.

Egr.Prof.
Giulio Natta,
Istituto di Chimica Industriale
del Politecnico,
Piazza Leonardo da Vinci 32,
MILANO.

Egregio Professore Natta,

Ricevo la Sua gentile lettera del 2 Agosto indirizzata a Mr.Child, il quale è attualmente in ferie, e mi sono premurato di trasmettere a Dr. D'Leny i Suoi ringraziamenti.

Mi è gradita l'occasione per porgerLa, assieme alla Sua gentile Signora, i migliori saluti.

(G.J.Ely)

Lgura Natta

IMPERIAL CHEMICAL INDUSTRIES LIMITED

LIAISON OFFICE FOR ITALY

TELEPHONE: 873.044
TELEGRAMS: IMPKEMIX-MILAN

ADDRESS:
VIA SANTA MARIA FULCORINA, 6
MILAN

30th July, 1957

Prof. G. Natta,
Istituto di Chimica Industriale
del Politecnico,
Piazza Leonardo da Vinci 32,
M I L A N O

Dear Professor Natta,

On the 19th June, 1957, Dr. W. d'Leny, Research Director of the I.C.I. Billingham Division posted to me a parcel containing a copy of Izaak Walton's well-known book "The Compleat Angler", together with a covering letter addressed to Mrs. Natta, so that I could reforward them to you.

This parcel has only just arrived and, rather than reforward it through the post, I am now sending you herewith attached both the book and the relative covering letter which I would ask you please to pass on to Mrs. Natta.

With kindest regards to Mrs. Natta and yourself,

Yours sincerely,

C. Child

C. CHILD
Liaison Officer in Italy
for IMPERIAL CHEMICAL INDUSTRIES LTD.,
London.

Dear Mr. Child

[illegible] Mrs. Natta [illegible]

[illegible] Mr. d'Leny [illegible]

[illegible]

BY AIR MAIL

IMPERIAL CHEMICAL INDUSTRIES LIMITED

PLASTICS DIVISION

Telephone: WELWYN GARDEN 3400
Cables: ICIPLAST, TELEX, LONDON

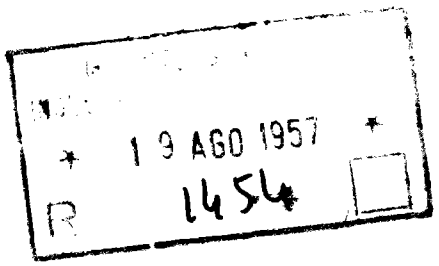
BLACK FAN ROAD
WELWYN GARDEN CITY
HERTFORDSHIRE
ENGLAND

Our ref. AHW/DMG/RES Letter No.

Your ref.

12th August, 1957.

Professor G. Natta,
Istituto di Chimica Industriale
del Politecnico,
Piazza Leonardo da Vinci, 32
Milano,
Italy.



Dear Professor Natta,

I had the pleasure at the Polymer Symposium held in Paris at the end of last month of hearing several papers by you and your colleagues, and in particular of having a brief discussion with Dr. Danusso.

I have just sent to Dr. Danusso a copy of the text of the paper which I presented dealing with the correlation of transitions in hydrocarbon polymers with their structures. Unfortunately, we are short of sets of figures to accompany this paper, but these will be available in the near future, and I will send to you a complete copy of the paper.

Our own dynamic mechanical experiments have extended to the examination of poly (pentene-1). I was interested to hear from Dr. Danusso that you have carried out dilatometric measurements on the higher linear olefine polymers, and find evidence of a minimum in the temperature of the apparent glass transition. It would be instructive to see how the dynamic mechanical loss spectra of these vary with chain length. For our part, we would be glad to do these measurements, and to send copies of the spectra to you should you see your way to providing samples of poly(hexene-1) and the higher olefine polymers. For this dynamic mechanical work, samples of the order of 1 gm are quite adequate, and of course the test is non-destructive.

I was very interested also in the paper read by Professor Corradini, but unfortunately I was not able to have any discussion with him. I and my colleagues will be very grateful if you could let us have a copy of this paper when it is available.

My colleagues, Mr. H.C. Raine and Dr. J.W.C. Crawford, join in sending you our kind regards,

Yours sincerely,

A.H. Willbourn
Assistant Research Manager.

June 7, 1957

Mr. J. W. C. CRAWFORD
Imperial Chemical Industries Ltd.
Plastics Division
Black Fan Road
WELWYN GARDEN CITY - Herts - England

Rif.n.1096/rl

Dear Mr. Crawford,

I received your letter of May 22, 1957. I had in mind to publish the lecture that I will present to the Congres of International Union of Pure and Applied Chemistry, to be held in Paris on July 1957, so that I may distributed the preprints before this Congress, but the Congress Organisation wish to have the exclusiveness of this publication and so I cannot prepare the preprints.

I hope to be able to see you during the Congress, but I may assure you that I will send you the preprints if these become available in some way.

With my best regards.

Sincerely yours,

Giulio Natta

February 19, 1957

Mr. J. C. SWALLOW, Chairman of
the Plastics Division of the
Imperial Chemical Industries
Black Fan Road
WELWYN GARDEN CITY - HERTS (Engl.)

Dear Mr. Swallow,

I wish to thank you for the kindness that Mrs. Natta and myself received from you and the other fine people of Imperial Chemical Industries.

I enjoyed very much in visiting your interesting laboratories and I hope to be able to see you soon in another occasion. in Italy.

Mrs. Natta joins to me in sending you the kindest regards.

Sincerely yours,

Giulio Natta

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15 Febbraio 1957

Mr. C. CHILD
Imperial Chemical Industries, L
Liaison Office for Italy
Via Santa Maria Fulcorina, 6
M I L A N O

Egregio Signor Child,

di ritorno dal mio viaggio in Inghilterra, che è stato per me molto interessante, sono stato riassorbito dall'intenso lavoro del mio Istituto. La prego perciò di scusarmi se appena ora Le scrivo per ringraziarLa, con la preghiera di voler ringraziare per me i signori della I.C.I. per l'accoglienza veramente molto gentile che hanno fatto a mia moglie ed a me, sia a Manchester che a Londra. Sono lieto di aver conosciuto diverse persone della Sua Società, ed in particolare il Sig. Swallow, e di aver visitato gli interessanti laboratori di Welwyn Garden City.

La prego di gradire i miei vivi ringraziamenti, insieme ai migliori saluti.

(Giulio Natta)

IMPERIAL CHEMICAL INDUSTRIES LIMITED

LIAISON OFFICE FOR ITALY

TELEPHONE: 873.044
TELEGRAMS: IMPKEMIX-MILAN

ADDRESS:
VIA SANTA MARIA FULCORINA,6
MILAN

19 Febbraio, 1957

Egr. Prof.
Giulio Natta,
Istituto di Chimica Industriale
del Politecnico,
Piazza Leonardo da Vinci 32,
MILANO

Egregio Professor Natta,

sono molto lieto di apprendere, dalla Sua gentile lettera del 15 c.m., che il di Lei viaggio in Inghilterra, come pure i contatti con la I.C.I., si sono rivelati molto interessanti e spero altrettanto proficui.

Come da Lei richiesto, mi sono premurato ad estendere, ai miei colleghi in Inghilterra, i di Lei ringraziamenti per l'accoglienza riservata alla Sua Gentile Signora ed a Lei stesso.

Restando a Sua completa disposizione per quant'altro potesse occorrerLe in futuro, voglia gradire, Egregio Professore, i miei migliori saluti.

C. CHILD
Agente di Collegamento per l'Italia
dell'Imperial Chemical Industries Ltd.
di Londra.

IMPERIAL CHEMICAL INDUSTRIES LIMITED

LIAISON OFFICE FOR ITALY

TELEPHONE: 873.044
TELEGRAMS: IMPKEMIX-MILAN

ADDRESS:
VIA SANTA MARIA FULCORINA,6
MILAN

20 Maggio, 1957

Chiar.mo Prof.
Giulio Natta,
Direttore dell'Istituto di
Chimica Industriale,
Politecnico di Milano,
Piazza Leonardo da Vinci,
MILANO

Chiarissimo Prof. Natta,

vorrei innanzitutto pregarLa di scusarmi per non essere stato in grado, a causa di un impegno soppravenuto improvvisamente, di accompagnare personalmente il Dr. W. d'Leny ed il Dr. A.W.C. Taylor nel corso della visita che questi ultimi, assieme al mio assistente Sig. G.J. Ely, hanno avuto il piacere di renderLe, in data del 14 Maggio c.a.

Mentre Dr. d'Leny e Dr. Taylor avranno occasione di scriverLe direttamente, non appena saranno rientrati in Inghilterra, dopo il loro attuale viaggio in Svizzera, voglia gradire i più vivi ringraziamenti, estensibili alla Sua gentile Signora e Famiglia, per la cordiale accoglienza riservata agli stessi, come pure al Sig. Ely.

Mi auguro di avere ben presto il piacere di fare la Sua conoscenza, e ringraziandoLa nuovamente, mi è gradita l'occasione per porgerLe i più cordiali saluti.

C. CHILD
Agente di Collegamento per l'Italia
dell'IMPERIAL CHEMICAL INDUSTRIES LTD.,
di Londra.

IMPERIAL CHEMICAL INDUSTRIES LIMITED
LIAISON OFFICE FOR ITALY

TELEPHONE: 873.044
TELEGRAMS: IMPKEMIX-MILAN

ADDRESS:
VIA SANTA MARIA FULCORINA, 6
MILAN

10 Maggio 1957

Urgente!

Chiar.mo Prof.
Giulio Natta,
Direttore dell'Istituto di
Chimica Industriale,
Politecnico di Milano,
Piazza Leonardo da Vinci,
MILANO

VISITA DEI SIGG.
DR. W. D'LENY, CONSIGLIERE PER LE RICERCHE;
DR. A.W.C. TAYLOR, CO-DIRETTORE PER LE RICERCHE (RAMO PRODOTTI ORGANICI)
DEL SETTORE "BILLINGHAM", IMPERIAL CHEMICAL INDUSTRIES LTD.

Chiarissimo Prof. Natta,

ho il piacere di confermarLe quanto già predisposto telefonicamente in merito alla visità che avrò il piacere di farLe, in compagnia dei soprannominati dirigenti della Imperial Chemical Industries Ltd., il martedì 14 Maggio 1957, alle ore 10.

Come Le ho già menzionato, il Dr. W. d'Leny ed il Dr. A.W.C. Taylor si recano in Italia allo scopo di prendere contatti con le maggiori personalità del mondo scientifico in materia di ricerche sui prodotti organici, per uno scambio di vedute. Approfitteranno di questa occasione per prospettare le possibilità di reclutare, fra i laureati italiani nei rami di chimica organica e chimica fisica, personale tecnico per la Imperial Chemical Industries, le sue filiali e consociate.

Mi auguro che questo colloquio sia proficuo per ambo le parti, ed al piacere di incontrarLa, mi è gradita l'occasione per porgerLe i miei più cordiali saluti.

C. CHILD
Agente di Collegamento per l'Italia
della Imperial Chemical Industries Ltd.

Mr. Ely - segretario di

IMPERIAL CHEMICAL INDUSTRIES LIMITED

FIBRES DIVISION

Telephone: Harrogate 68021
Telegrams: Fibres, Harrogate.

HOOKSTONE ROAD
HARROGATE
YORKSHIRE

Our ref. RH/T.
Your ref.

13th February, 1957.

Professor Natta,
Istituto di Chemica Industriale
del Politecnico di Milano,
Milan,
Italy.

Dear Professor Natta,

I am writing to say how much we appreciated the opportunity of hearing you speak at the University in Manchester last week, and we all enjoyed very much the presence of Mrs.Natta and yourself at the small informal dinner party later that evening.

Just in case you do not have one, I am sending under separate cover a copy of "Fibres from Synthetic Polymers". The main reason for this is because of four excellent chapters by Bunn which will certainly interest you. Of course these are becoming a little out of date since isotactic polymers came to light.

I hope that one of these days it will be possible for Mrs.Hill and myself to take up Mrs.Natta's invitation to join you for a week-end in the summer months at your mountain chalet. It is just possible that we will be spending our vacation in Italy this year as we did last year.

Please give Mrs.Natta our kind regards.

Yours sincerely,

Rowland Hill

Fibres Division Research Director.

IMPERIAL CHEMICAL INDUSTRIES LIMITED

LIAISON OFFICE FOR ITALY

TELEPHONE: 873.044
TELEGRAMS: IMPKEMIX-MILAN

ADDRESS:
VIA SANTA MARIA FULCORINA,6
MILAN

30th January, 1957.

Prof. Natta,
Istituto di Chimica Industriale,
Politecnico di Milano,
Piazza L. da Vinci 32,
MILANO

PRIVATE AND CONFIDENTIAL

PROPOSAL THAT WHILST YOU ARE IN ENGLAND BETWEEN 2ND AND 8TH FEBRUARY 1957 YOU SHOULD VISIT THE BILLINGHAM DIVISION AND THE WILTON WORKS OF IMPERIAL CHEMICAL INDUSTRIES LTD.

Dear Professor Natta,

I would refer to my letters of the 24th and 29th January regarding the above subject, and would confirm our telephone conversation today when I advised you that, as several high-ranking persons in I.C.I. in UK would welcome the honour and opportunity of meeting you during your short visit to UK, the only practical proposition which I have been able to work out, in view of your already full programme, is that a meeting over dinner should be arranged in London on the evening of Thursday 7th February.

I was very pleased indeed to hear that this plan is agreeable to you; naturally, I have already advised the persons concerned in UK, by cable, of your kind acceptance, and am sure that they will be equally delighted.

Under the circumstances, I suggested to you that after your visit to Dunlop's in Birmingham on the morning of that day (Thursday 7th February), you proceed to London in the early afternoon, to a hotel (the name of which I will be passing on to you tomorrow) where I.C.I. Ltd. will be booking a room for you and where, of course, you will be staying for the night as a guest of I.C.I.

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Regarding your journey from Birmingham to London, you may find it preferable to travel by rail, which takes about two hours, rather than by car which would take much longer.

At 6.30 - 7.00 p.m. on Thursday February 7th, the following dignitaries of I.C.I. Ltd. - who will be coming to London especially for the occasion - will be calling on you at the hotel, and will later have the pleasure of entertaining you to dinner:

1) DR. W. d'LENY - Research Director of the Billingham Division of I.C.I. Ltd.

2) DR. H.C. RAINE - Research Director of the Plastics Division of I.C.I. Ltd.

3) DR. J.C. SWALLOW - CHAIRMAN of the Plastics Division of I.C.I. Ltd.

4) DR. J.W.C. CRAWFORD - (whom you already know) Assistant Manager of the Research Department of the Plastics Division of I.C.I. Ltd.

As stated above, I will be getting in touch with you again tomorrow to advise you of the name and address of the hotel where accommodation for the night of Thursday, February 7th is being booked for you, meanwhile, please do not hesitate to let me know in case you should require any further information regarding the above arrangements.

Yours sincerely,

C. CHILD

P.S. I would confirm our further telephone conversation this afternoon, advising you that the hotel where you have been booked by I.C.I. Ltd. for the night of Thursday February 7th is:

GROSVENOR HOUSE,
PARK LANE, LONDON.

May I take this opportunity of wishing you a successful and pleasant trip.

IMPERIAL CHEMICAL INDUSTRIES LIMITED

LIAISON OFFICE FOR ITALY

TELEPHONE: 873.044
TELEGRAMS: IMPKEMIX-MILAN

ADDRESS:
VIA SANTA MARIA FULCORINA,6
MILAN

29th January, 1957.

Prof. Natta,
Istituto di Chimica Industriale,
Politecnico di Milano,
Piazza L. da Vinci 32,
MILANO

PRIVATE AND CONFIDENTIAL

PROPOSAL THAT WHILST YOU ARE IN ENGLAND BETWEEN 2ND & 8TH FEBRUARY 1957 YOU SHOULD VISIT THE BILLINGHAM DIVISION AND THE WILTON WORKS OF IMPERIAL CHEMICAL INDUSTRIES LTD.

Dear Professor Natta,

Further to my letter of the 24th January, and with reference to our subsequent telephone conversations, I would advise you that I am trying to arrange for you to meet important I.C.I. officials, if this can be fitted into what appears to be a very full programme for your forthcoming UK visit. I will certainly advise you immediately I have made any definite arrangements.

Meanwhile, may I take this opportunity of enclosing herewith a pamphlet entitled "Britain in Brief - a Pocketful of Facts." This is not an I.C.I. publication but, by an arrangement with the authors, we find it very useful to distribute copies to friends of ours in overseas countries who intend to visit the UK, and you will almost certainly find the information contained therein to be very useful in providing a general background.

With kindest regards,

Yours sincerely,

C. Child

C. CHILD

IMPERIAL CHEMICAL INDUSTRIES LIMITED

LIAISON OFFICE FOR ITALY

TELEPHONE: 873.044
TELEGRAMS: IMPKEMIX-MILAN

ADDRESS:
VIA SANTA MARIA FULCORINA,6
MILAN

24th January, 1957.

Prof. Natta,
Istituto di Chimica Industriale,
Politecnico di Milano,
Piazza L. da Vinci 32,
MILANO

PRIVATE AND CONFIDENTIAL

PROPOSAL THAT WHILST YOU ARE IN ENGLAND BETWEEN 2ND & 8TH FEBRUARY 1957 YOU SHOULD VISIT THE BILLINGHAM DIVISION AND THE WILTON WORKS OF IMPERIAL CHEMICAL INDUSTRIES LTD.

Dear Professore Natta,

I would refer to my conversation with you this afternoon regarding the above from which I understand that you are leaving Milan for London on Saturday, 2nd February, that you will be giving a lecture in London on Monday, 4th February, that you will be giving a further lecture in Manchester on Wednesday, 6th February, and that you will be returning from London to Milan on Friday, 8th February.

I would also confirm the information which I passed to you, namely that Dr. W. d'Leny, the Research Director of the Billingham Division of Imperial Chemical Industries Ltd. would very much like you to visit this Division whilst you are in England if you can possibly spare the time to do so.

I would explain that the Billingham Division is at Billingham, Stockton-on-Tees, which is not very far from Newcastle, and which is some 3 hours by train from Manchester.

Furthermore, if you find it possible to accept Dr. d'Leny's invitation to visit the Billingham Division, it would, no doubt, also be possible

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for you to visit the new Wilton Works of Imperial Chemical Industries Ltd. which is just across the river from the Billingham Works.

The Billingham and Wilton factories would, in my opinion, be extremely interesting to you, as it is at these two particular points where synthetic organic chemicals are manufactured of the types in which I understand that you are specially interested.

So that you will be more conversant with the types of chemical manufacture undertaken at Billingham and Wilton, I take opportunity of sending to you herewith a new illustrated brochure which has just been published, describing the activities of the Wilton Works.

I also send you herewith a booklet entitled "This is our Concern", which describes in general terms the activities of all the Divisions of Imperial Chemical Industries Ltd.

Furthermore, I enclose an additional brochure detailing "I.C.I. Products for Export", together with a booklet entitled "Review of 1955" which will give you a general picture of Imperial Chemical Industries Ltd., both in the UK and Overseas.

Whilst you are in Manchester, you may also like to take opportunity of making contact with Dr. J.D. Rose, the Research Director of the Dyestuffs Division, as the Headquarters of this Division is at Blackley, some ten minutes by car from the centre of Manchester.

If the above suggestions meet with your approval, then perhaps you will advise me early next week, so that I can make the necessary arrangements with the various individuals concerned at the UK end.

With best wishes,

Yours sincerely,

C. CHILD

IMPERIAL CHEMICAL INDUSTRIES LIMITED

NOBEL DIVISION

Telephone: Ardrossan-Saltcoats 621
Telegrams: Impkemix, Stevenston

RESEARCH DEPARTMENT
STEVENSTON
AYRSHIRE

Our ref. DT/RHM.
Your ref.

16th January, 1957.

Dear Professor Natta,

It is with great pleasure that we learn that you are coming to our country to lecture. I note that you will be in London on the 4th February and in Manchester on the 6th. I wonder if you would care to visit our laboratories at Ardeer either before or after these meetings. We are easily reached by an overnight journey either from London or Manchester. In the event of your coming, we would be pleased to make arrangements for your travel. I think there are various activities in our laboratories which would interest you, and if you are willing to give a talk for an hour to a selected number of our staff, we would be glad to pay you a fee of 20 guineas, in addition to your travelling expenses. I hope that you will be able to extend your visit to include this trip to Scotland.

Kind regards,

Yours sincerely,

David Traill

(DAVID TRAILL)
NOBEL DIVISION RESEARCH DIRECTOR

Prof. Guilio Natta,
Politecnico di Milano.

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240

Our ref. AJP/MHC
Your ref.

9th September, 1955.

Professor G. Natta,
Istituto Chimica Industriale,
Politecnico,
Piazza Leonardo da Vinci 32,
MILAN. Italy.

Dear Professor Natta,

Thank you very much for your letter of the 30th August.

I am not sure yet when my visit to Italy will take place, but will give you good notice. I am hoping it will be before the end of the year but it might have to wait over to next February.

I am looking forward very much to the pleasure of meeting you.

Yours sincerely,

A.J.Prince.

February 19, 1957

Mr. Rowland HILL, Director
Fibres Division Research
Imperial Chemical Industries, Ltd
Hookstone Road
HARROGATE - Yorkshire (England)

Dear Mr. Hill,

I wish to thank you very much for the very kind reception in Manchester. I enjoyed very much in visiting your Company and in making the acquaintance of the fine people of the Imperial Chemical Industries.

I received also your kind letter of February 13, and I thank you for your kindness in sending to me a copy of "Fibres from Synthetic Polymers". I look forward to receiving it.

Mrs. Natta joins me in sending to Mrs. Hill and you the kindest regards.

Yours sincerely,

Giulio Natta

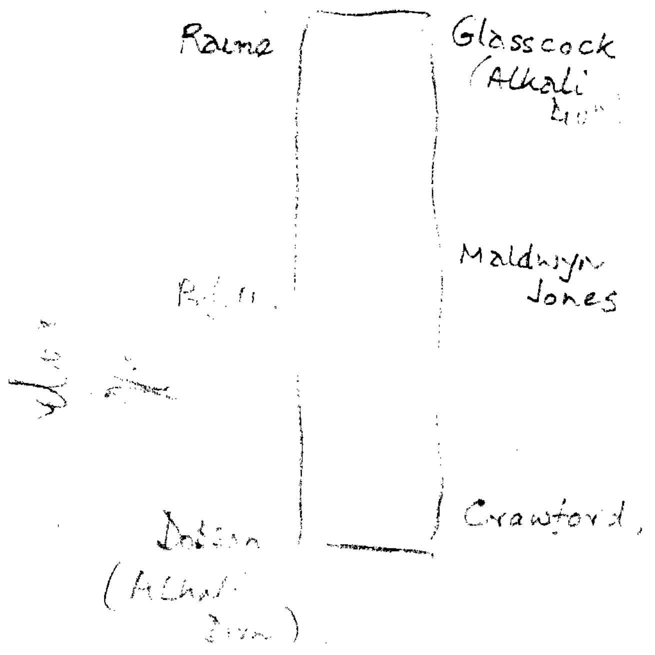
P.S. I received just now the very insteresting book you very kindly sent to me and I wish to thank you very much.

Imperial Chemical Ind.

5 febbraio 1957

Inghilterra

Colazione alla I.C.I.
Welwyn Garden City
Plastic Department



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BLACK FAN ROAD
WELWYN GARDEN CITY
HERTFORDSHIRE
ENGLAND.

Our ref. JWCC/B
Your ref.
Letter No.

253

29th January, 1957

Professor G. Natta,
Instituto di Chimica Industriale,
Politecnico di Milano,
Piazza L. da Vinci 32,
MILAN.

Dear Professor Natta,

We learn that you will be lecturing in London on Isotactic Polymers on 4th February, and would like to take the opportunity to invite you to visit the Plastics Division at Welwyn Garden City, should your arrangements permit. We are quite near London.

I have had the pleasure of hearing your discussions on Isotactic Polymers at Zurich and at Bad Nauheim, and of meeting you and Mrs Natta at last year's Gordon Conference. I am quite sure we should be very glad here to make your acquaintance and discuss a subject of much interest to us.

Dr Gourlay has just left for a visit to America, but has asked me to convey his regards to you.

Yours sincerely,

J.W.C. Crawford

J.W.C. Crawford.

I.C.I. 2443 I P W 4 8 53. W. & S. Ltd

January 25, 1957

Mr. David Traill, Director
Nobel Division Research
Imperial Chemical Industries, Ltd.
Research Department
STEVENSTON, Ayrshire, England

Dear Mr. Traill,

I received your kind letter of January 16, with your kind invitation to visit your laboratories at Ardeer and to give a talk. I wish to thank you very much for this appreciated invitation, but I am sorry I must come back to Milan on February 8, and I cannot, therefore, to delay my leaving from England. I do hope to be able to accept your kind invitation in another occasion I may have to come to England, as I am interested in visiting your laboratories and also in seeing your beautiful country that I have never seen.

With kindest regards,

Sincerely yours,

Giulio Natta

30 /8/1955

Dr. A. J. Prince
Imperial Chemical Industries
Limited
Billingham- Co- Durham

Dear Sir

I received from Prof. Bromley a kind letter introducing you to me.

I shall be very glad to meet you when you shall come to Italy.

Please let me know of your visit.

Yours sincerely.

Prof. G. Natta.