UN FUTURO SENZA IL PETROLIO:

IL RUOLO FONDAMENTALE DELLA CHIMICA

(ALCUN ESPERIENZE NEL CAMPO DEI NUOVI MATERIALI)

G. Chidichimo

World Petroleum Energy Crisis

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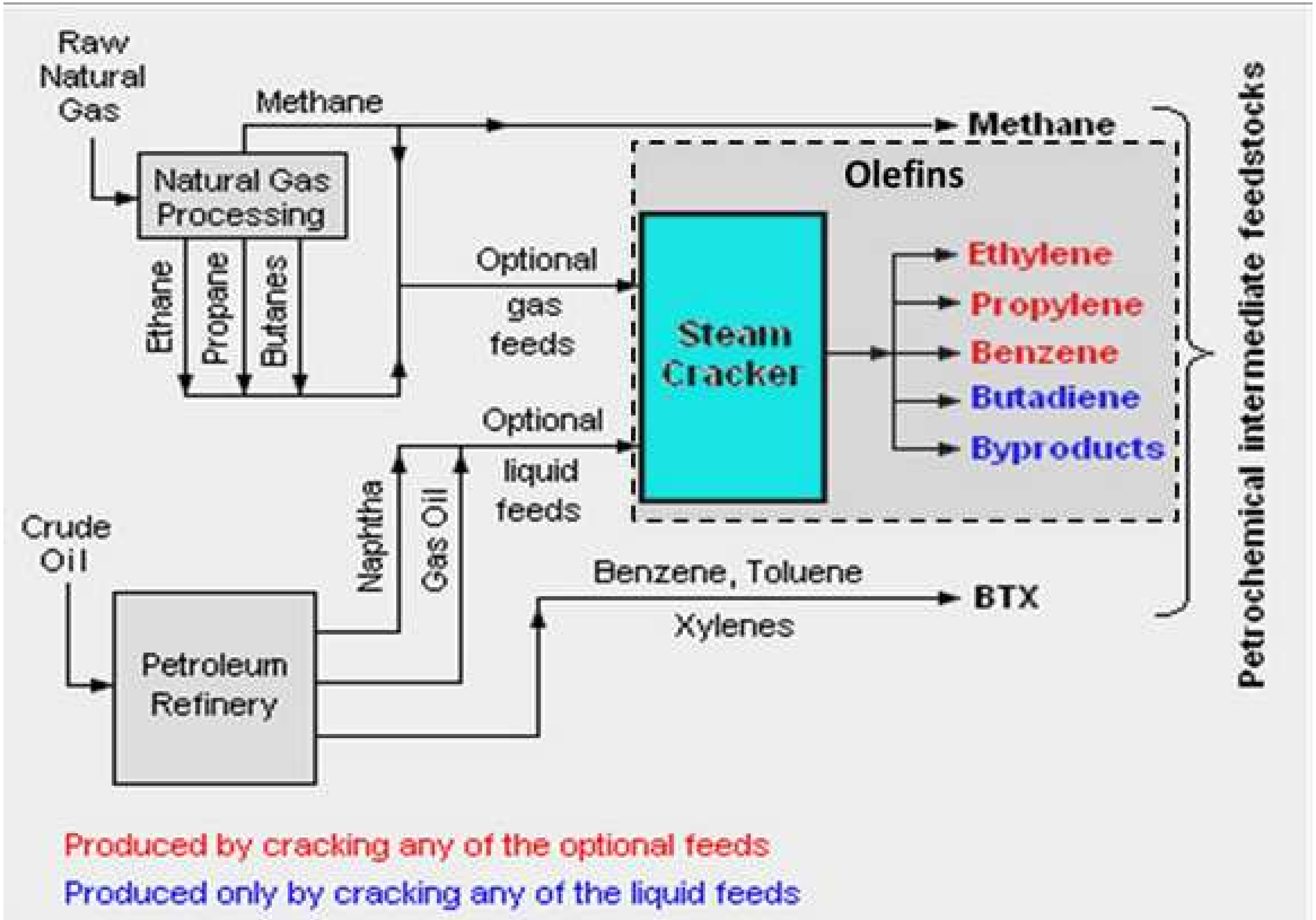
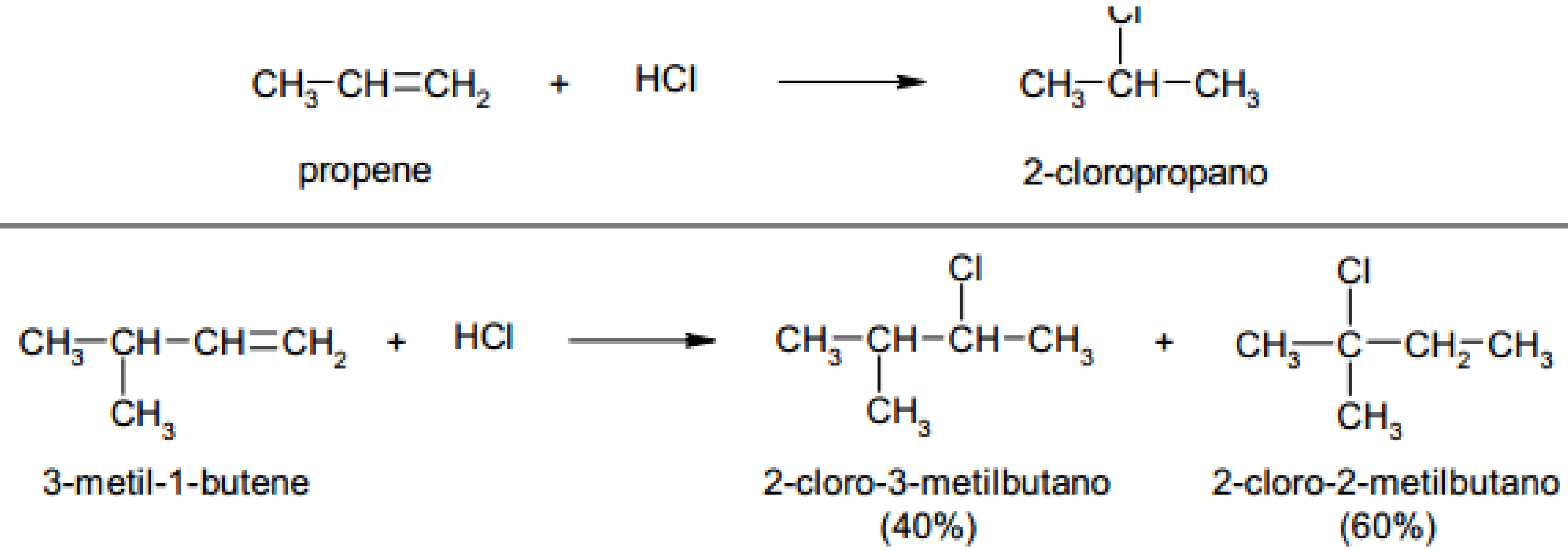
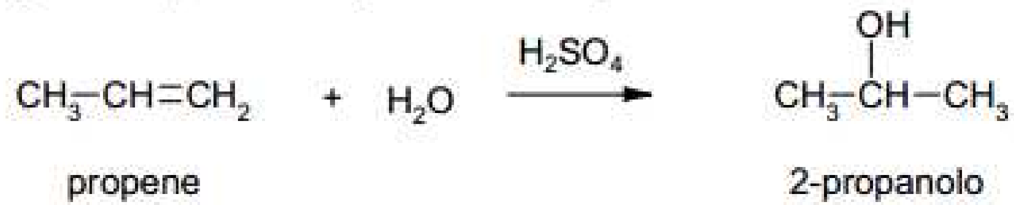
Only 1.08 trillion barrels of petroleum reserves are left on Earth (World Oil Journal 2005), and only one new barrel is found for every four used. With over 31.03 billion barrels consumed annually worldwide (2006) and rapidly increasing, there is less than 25.4 years left. Then it's all gone! Of the 48 petroleum-producing countries, only 15 can supply their own internal needs; the remaining 33 must supplement their internal needs with imports.

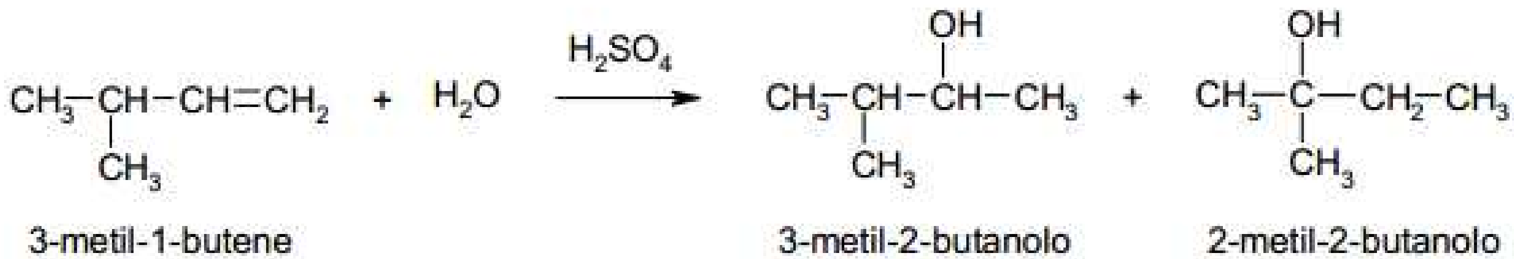


Raw Natural Gas
Natural Gas Processing
Methane
Ethane
Propane
Butanes
Optional gas feeds
Optional liquid feeds
Crude Oil
Petroleum Refinery
Naphtha
Gas Oil
Olefins
Steam Cracker
Methane
Ethylene
Propylene
Benzene
Butadiene
Byproducts
Benzene, Toluene
Xylenes
BTX
Petrochemical intermediate feedstocks
Produced by cracking any of the optional feeds
Produced only by cracking any of the liquid feeds

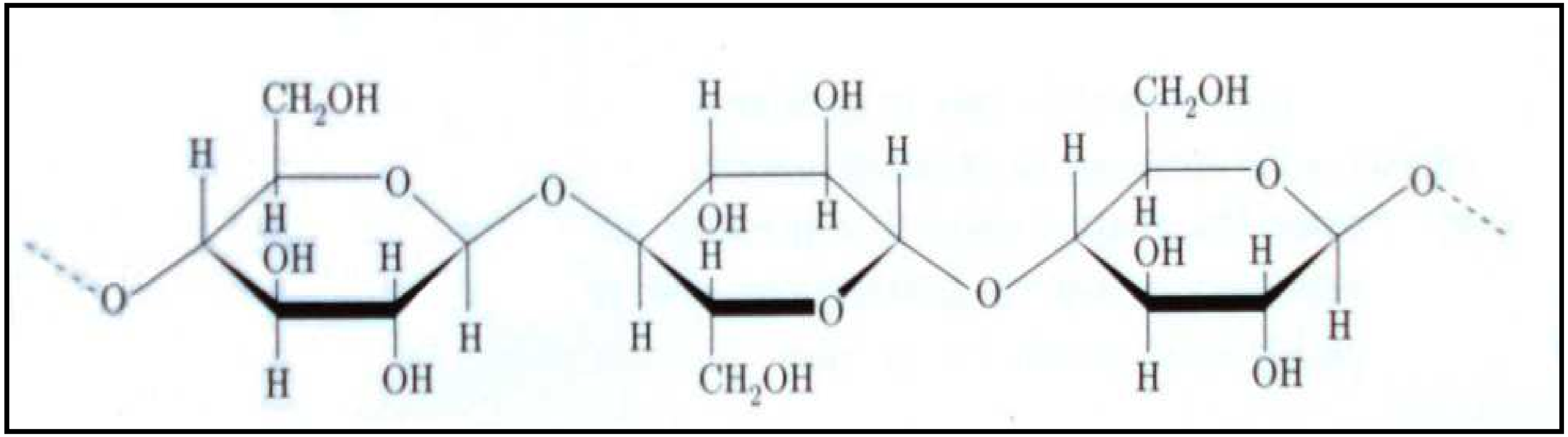
LA PRODUZIONE DI OLEFINE DAL PETROLIO E' L'INIZIO DELLA VARIEGATA CATENA DI PRODOTTI CHE DAL PETROLIO PRENDE ORIGINE.

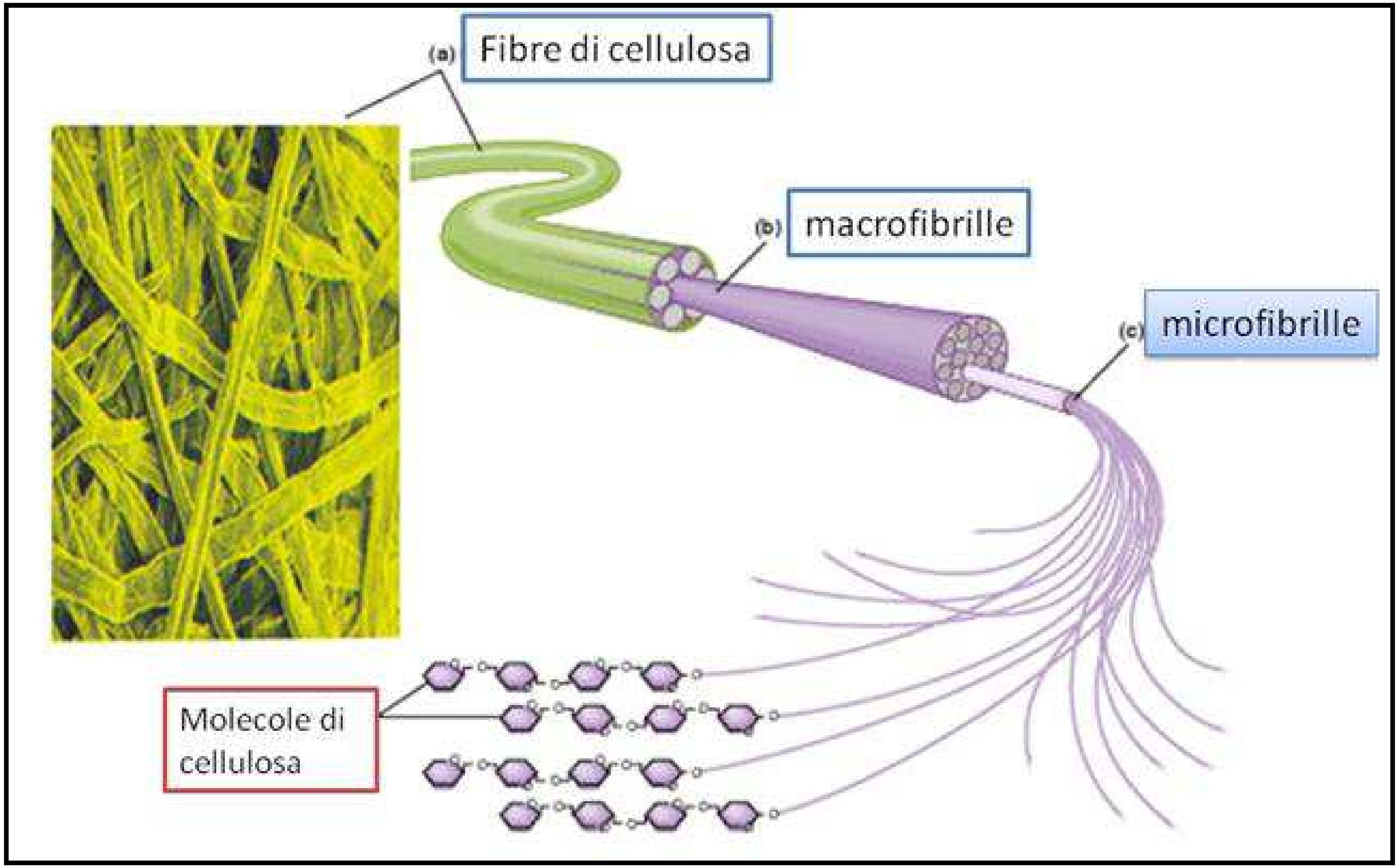



H2SO4
propene
2-propanolo


H2SO4
3-metil-1-butene
3-metil-2-butanolo
2-metil-2-butanolo

La cellulosa





Struttura delle fibre di cellulosa

La ginestra non è solo bella!

La canna è un’altra risorsa

FIBRA TESSILE MA E’ CELLULOSA!

Our Patents

Chidichimo G. , Alampi C. , Cerchiara T. , Gabriele B. , Salerno G. , Vetere M. , *Physical chemical process for production of vegetable fibers*. Depositario: Università della Calabria. *vedi documento originale World Patent*, **WO2007102184A2 2007**.

G. Chidichimo, A. Aloise, M. De Benedittis, A. De Rango, G. Esposito, V. Gallo, S. Manfredi, G. Pingitore , *Materiali compositi ottenuti da fibre estratte da due varieta' di ginestra*, **CS 2013°000027**

G. Chidichimo, A. Aloise, M. De Benedittis, A. De Rango, G. Esposito, S. Manfredi, G. Pingitore, *Materiali compositi ottenuti da matrici vegetali di ginestra e sostanze collanti di tipo organico ed inorganico; e processi per la loro realizzazione*, **In application**

G. Danieli, G. Chidichimo, P. F. Greco, P. Nudo, A. Aloise e A.De Rango,
Impianto automatizzato per l'estrazione di fibre vegetali da piante, **In application**

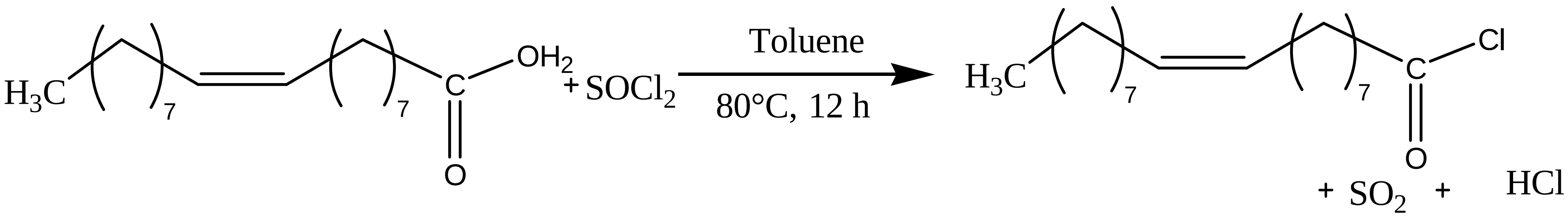
Microfibres for new plastics

Arundo Donax

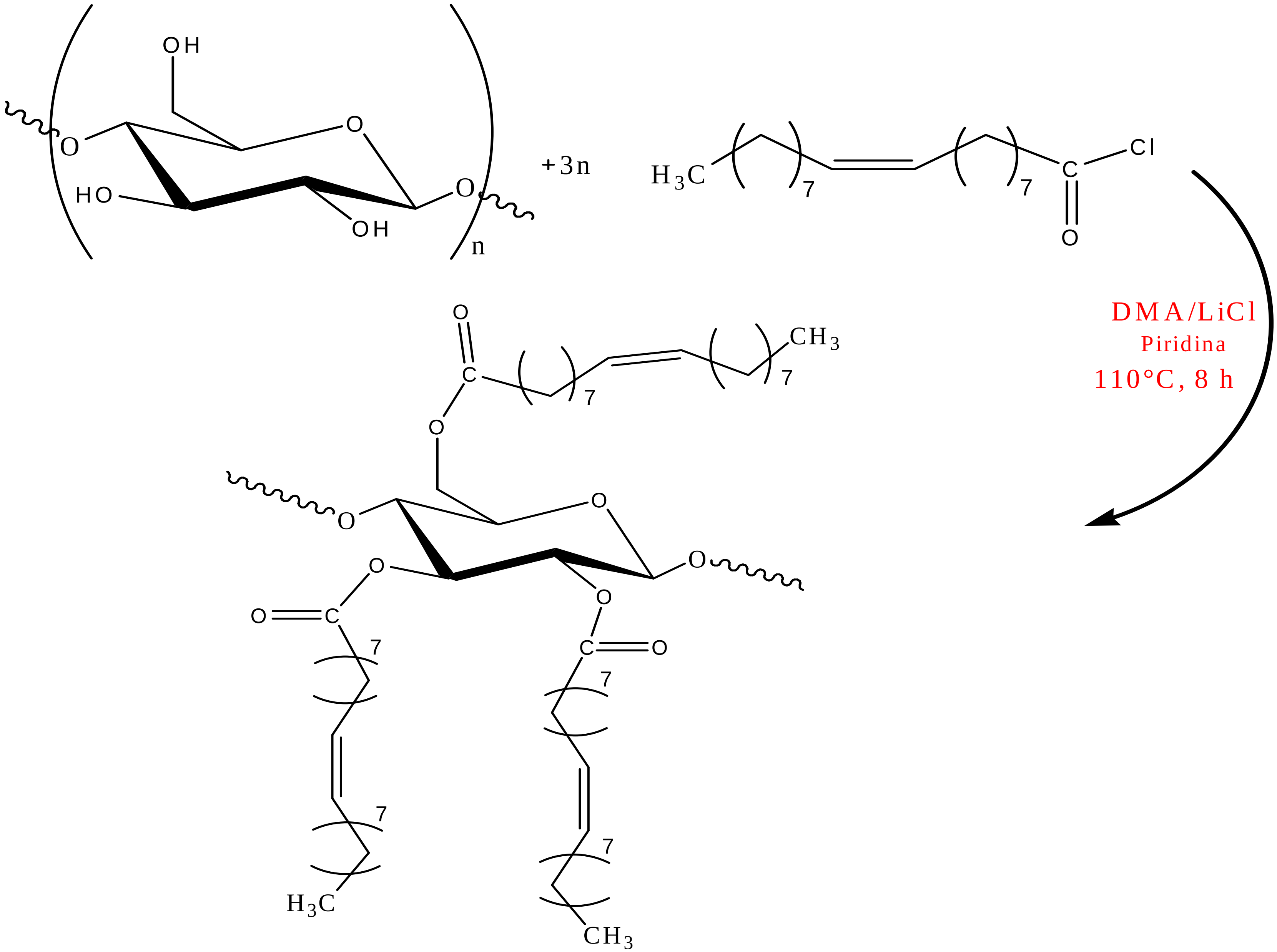
Spartium Juncem

Produzione di compositi di fibra cellulosica con PP e PE

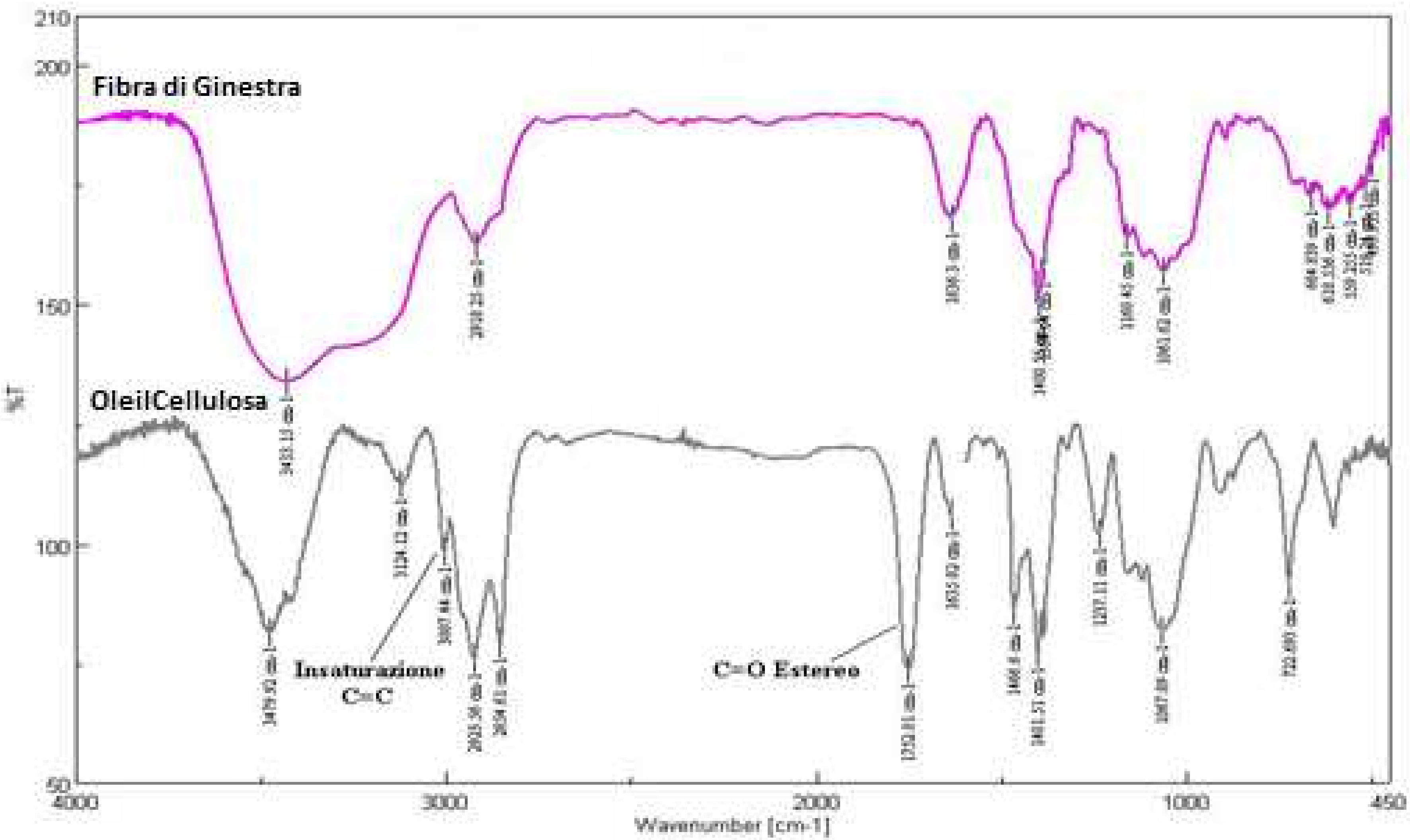
1) *Sintesi dell' oleil-cloruro :*



2) *Esterificazione della fibra:*

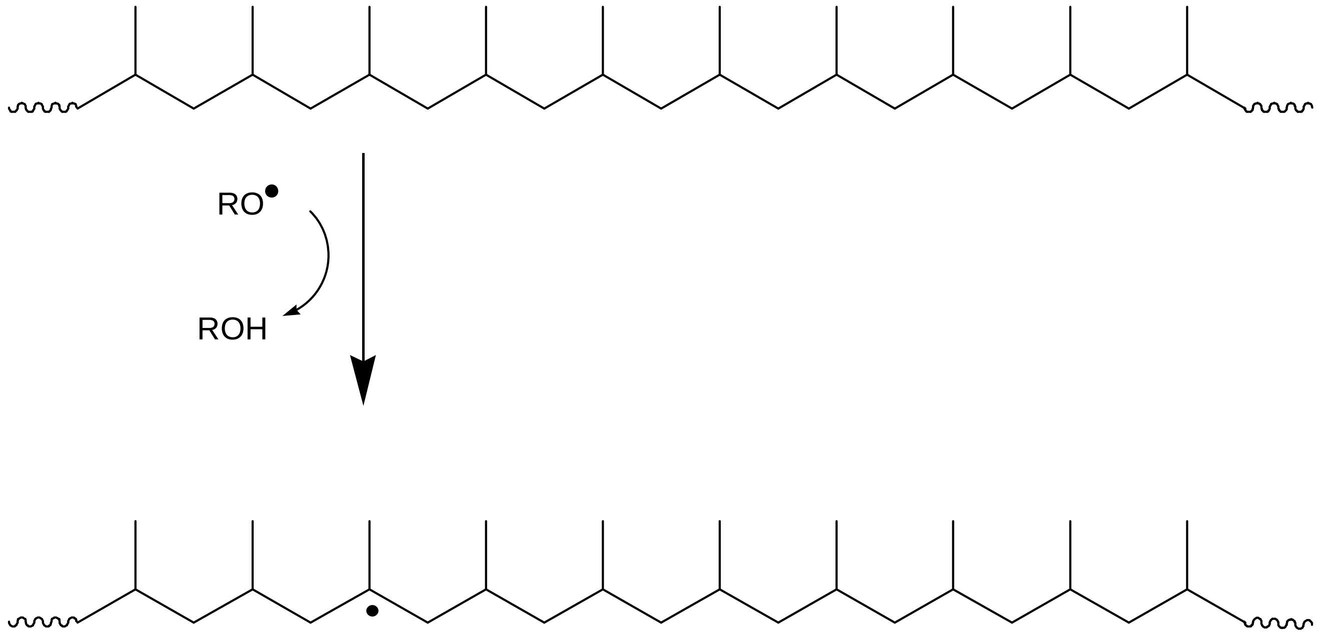


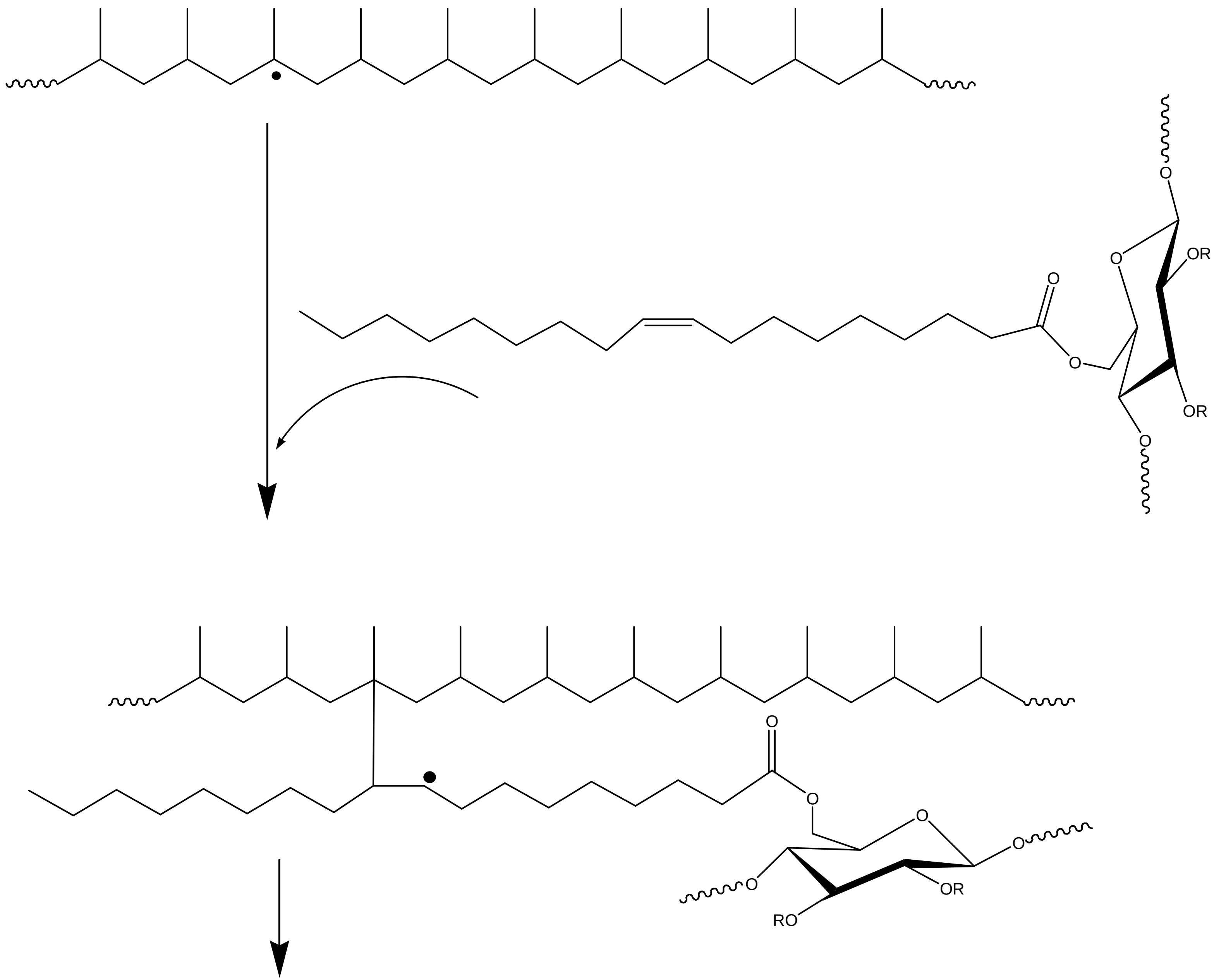
Confronto tra gli spettri IR della fibra pura e della fibra esterificata:



PREPARAZIONE DI UN BLEND POLIMERICO INNOVATIVO TRA

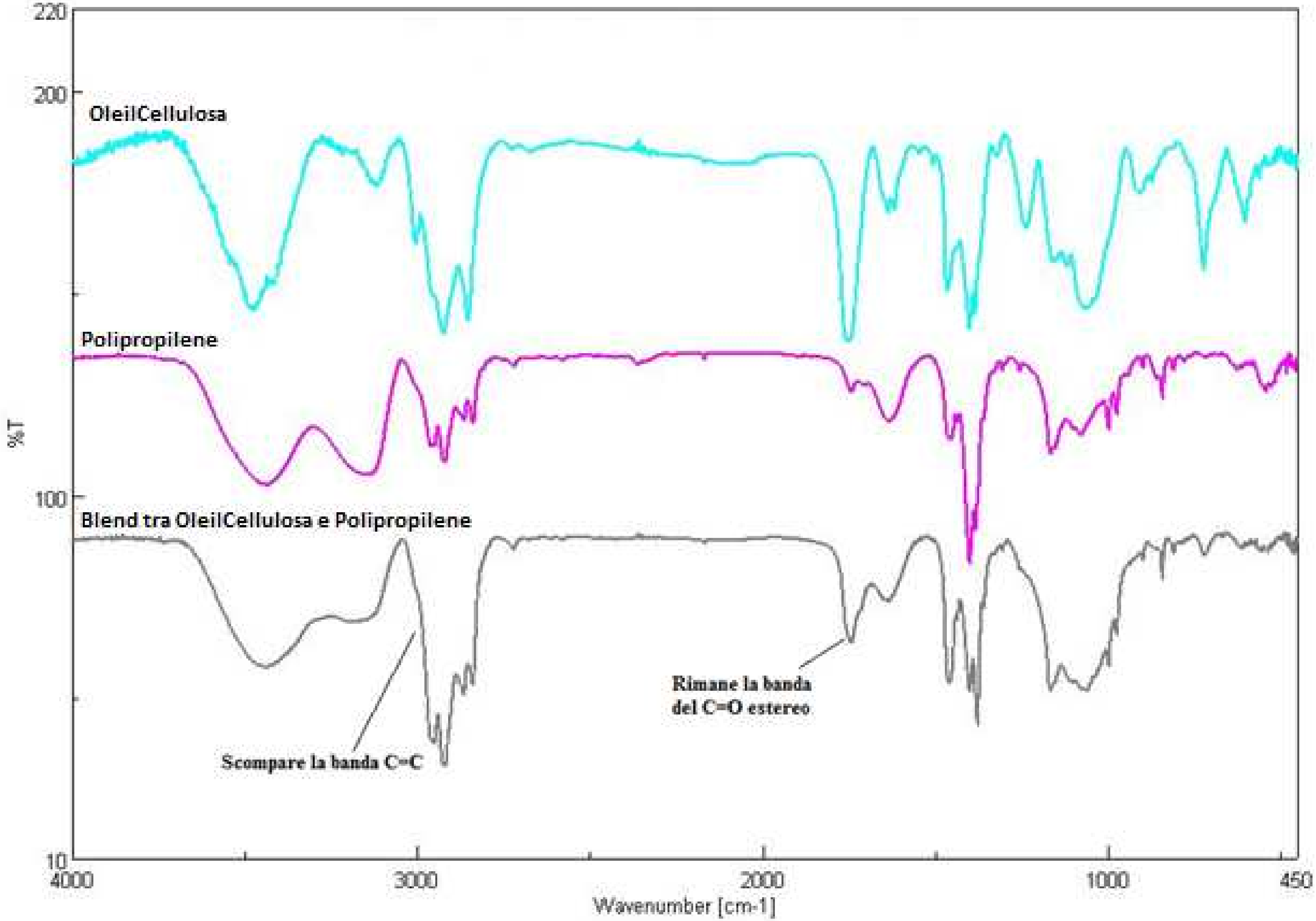
OLEILCELLULOSA **E** ***POLIPROPILENE***





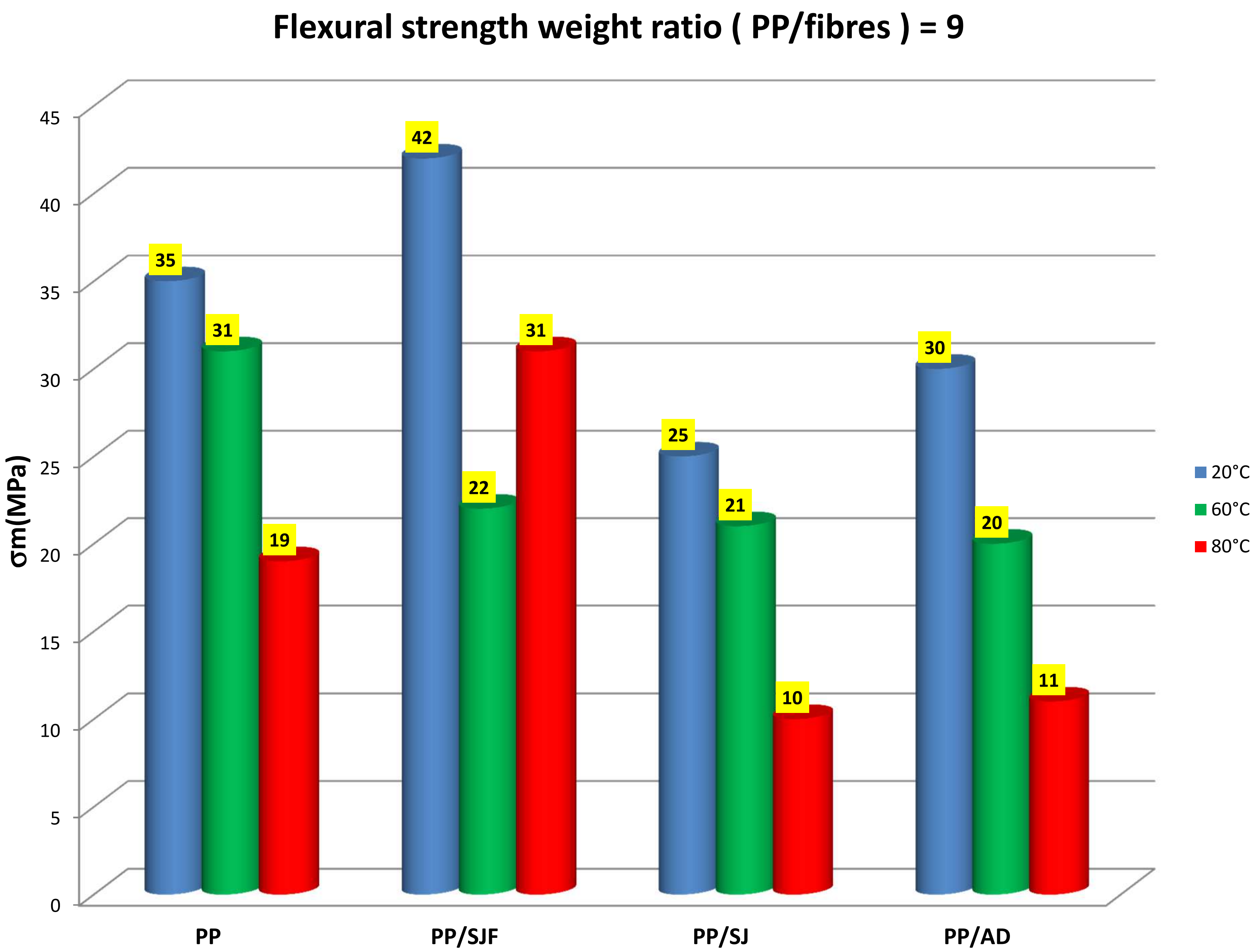
O
OR
O
OR
O
O
O
O
O
O
O
OR
RO

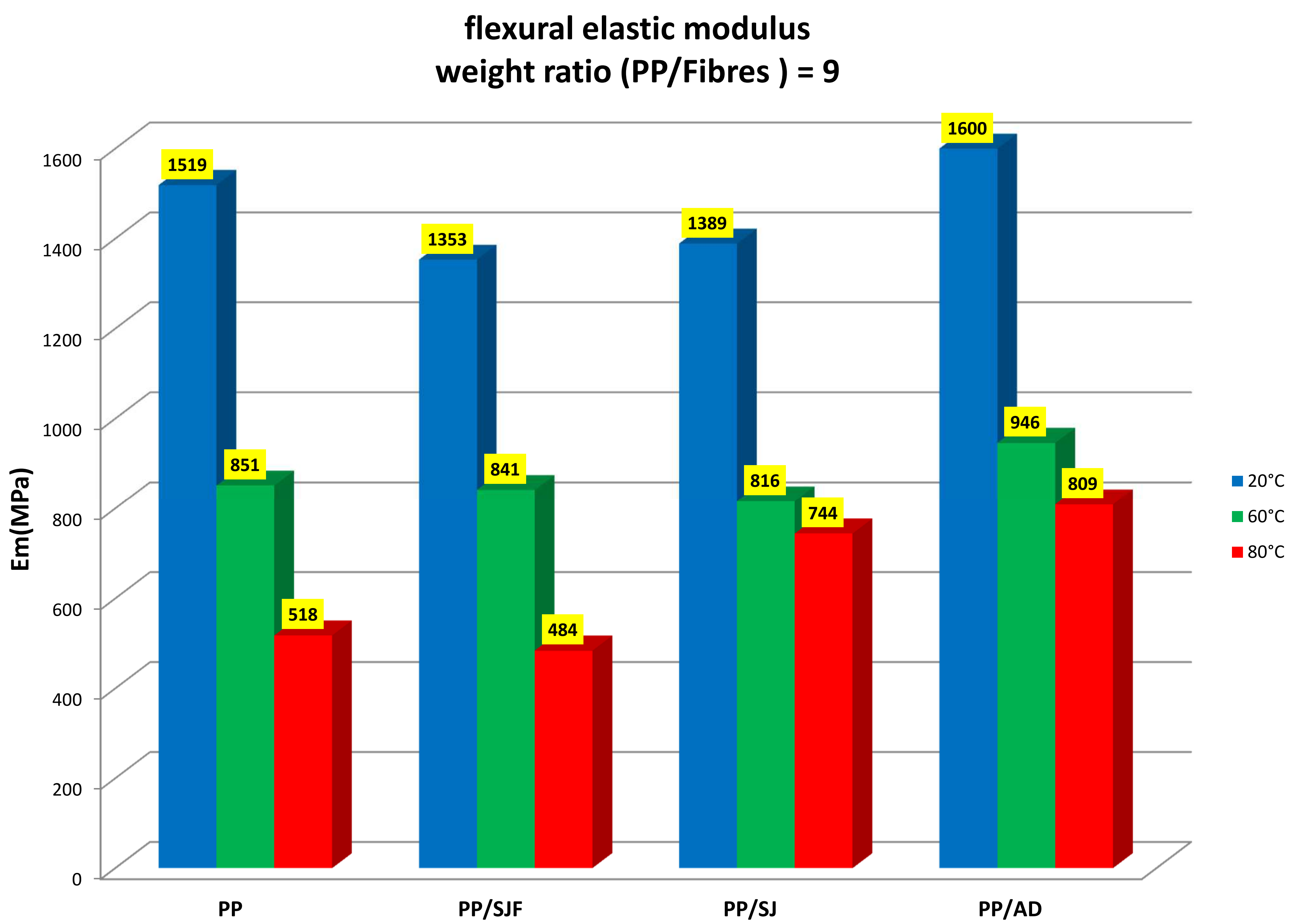
Spettri IR dell' OleilCellulosa, del Polipropilene e del nuovo blend formato



double Extruder for fibers/plastic mixing

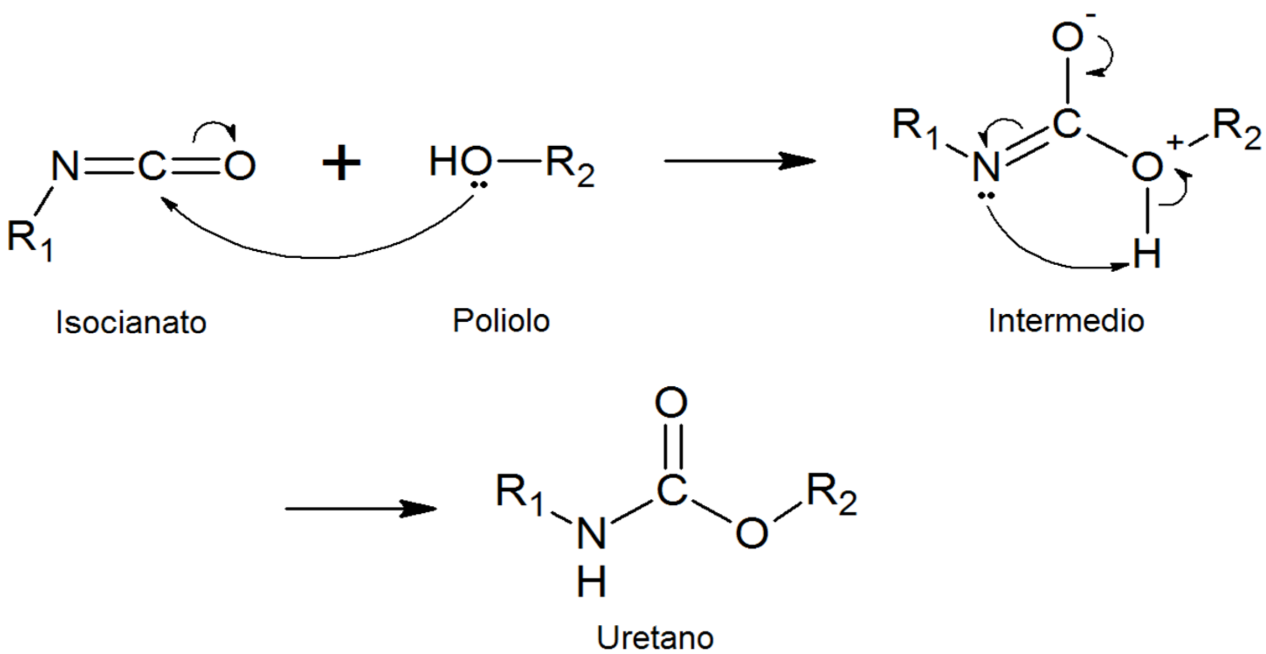
PP composites with With broom and reed fibers


Flexural strength weight ratio (PP/fibres) = 9
σm(MPa)
45
40
35
30
25
20
15
10
5
0
35
31
19
42
22
31
25
21
10
30
20
11
PP
PP/SJF
PP/SJ
PP/AD
20°C
60°C
80°C

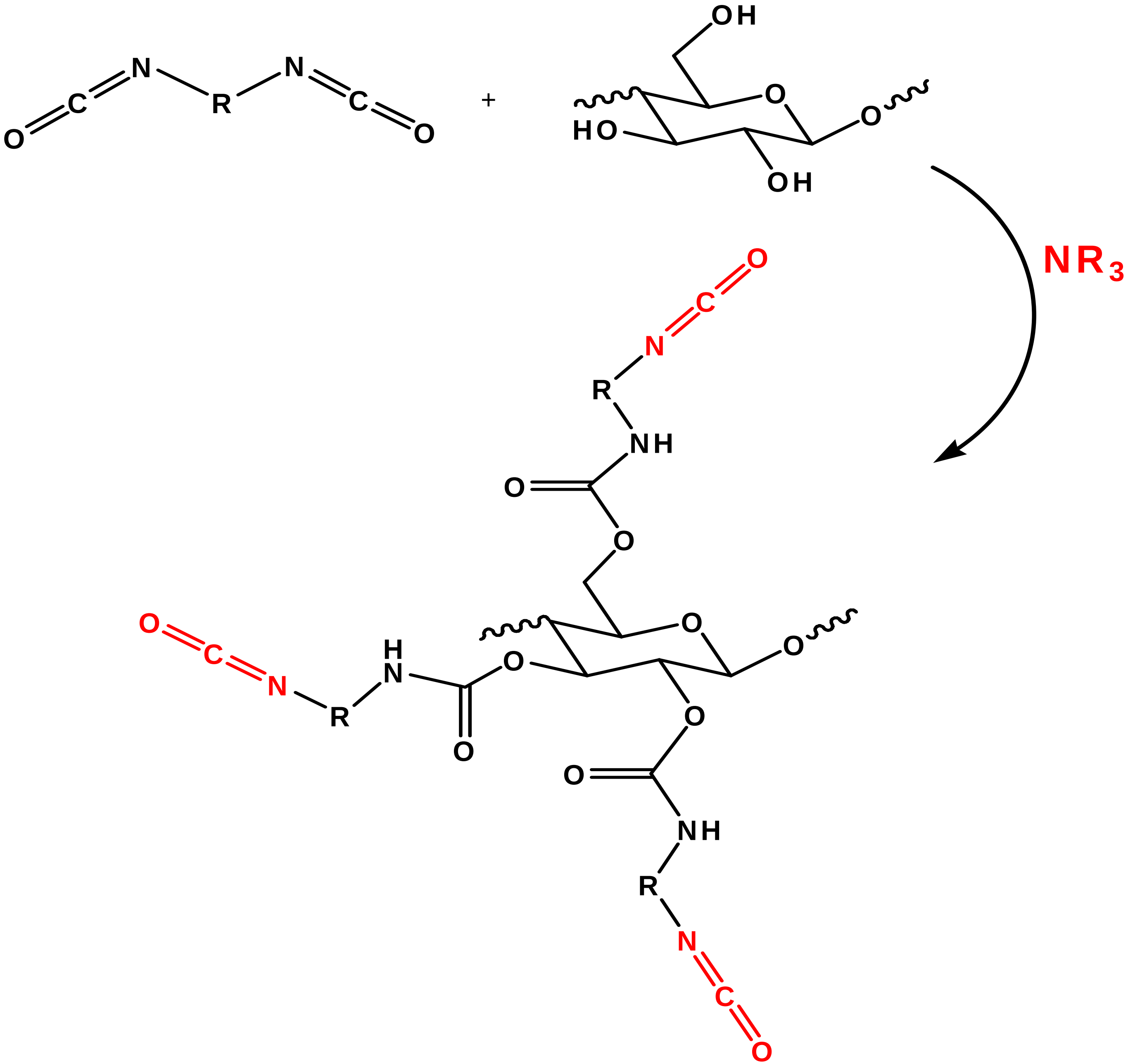

flexural elastic modulus
weight ratio (PP/Fibres) = 9
Em(MPa)
1600
1400
1200
1000
800
600
400
200
0
1519
851
518
1353
841
484
1389
816
744
1600
946
809
PP
PP/SJF
PP/SJ
PP/AD
20°C
60°C
80°C

Sintesi di poliuretani da fibra di ginestra micronizzata

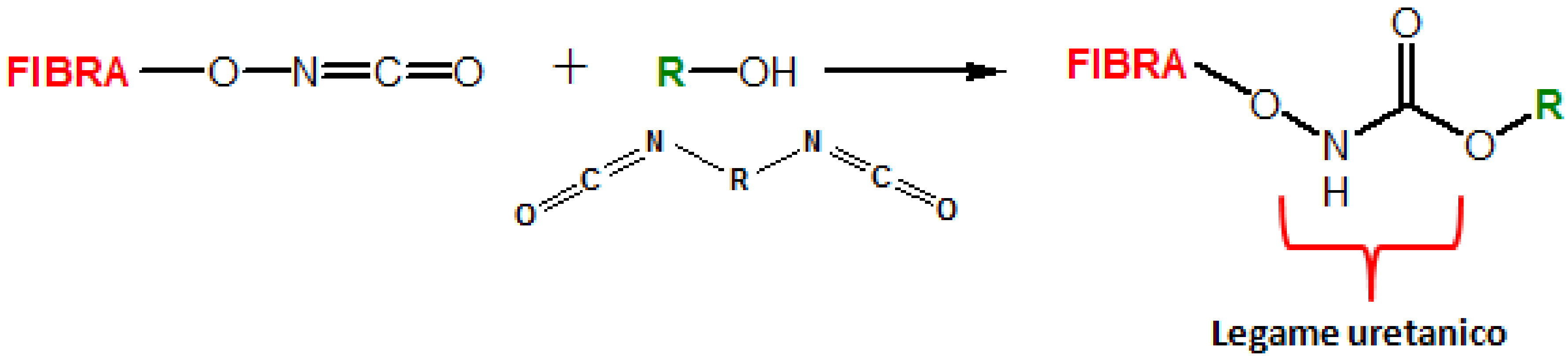
La chimica dei PU è essenzialmente quella degli isocianati, del gruppo NCO e della sua elevata attitudine a reagire con gruppi ossidrilici:

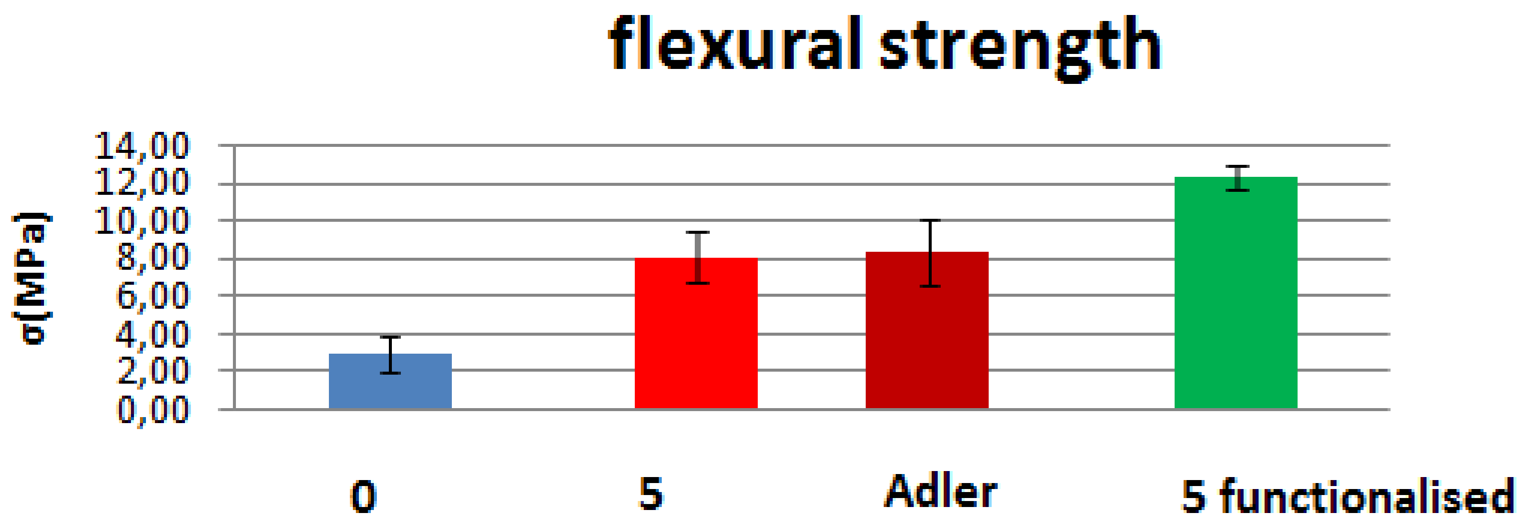


Reazione tra fibra e diisocianato:



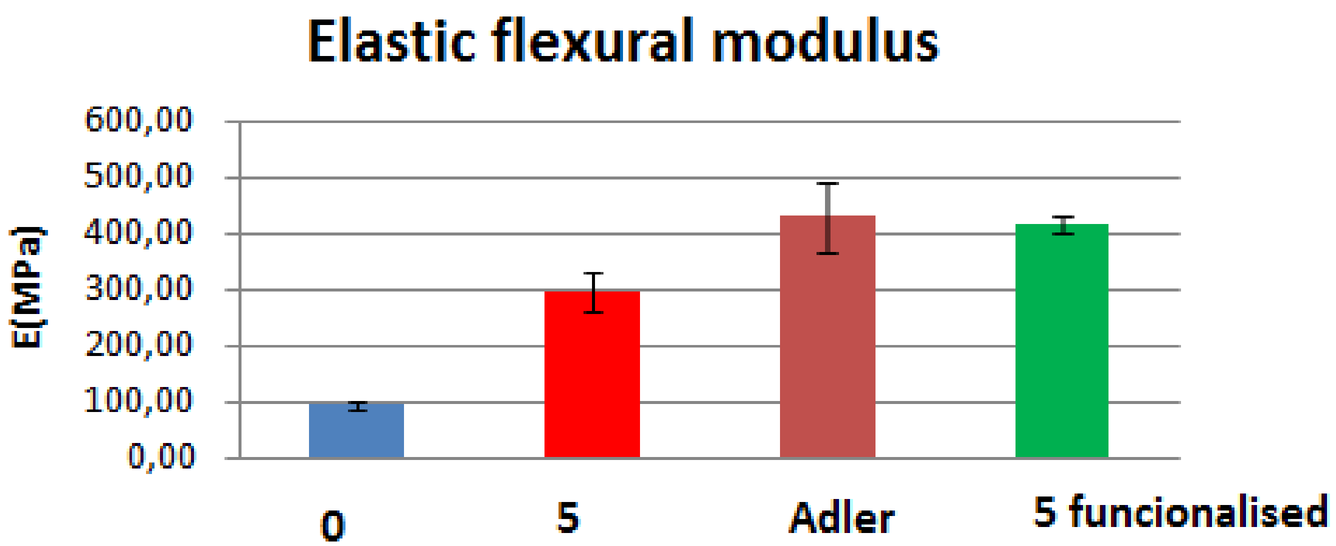
Formazione del poliuretano:





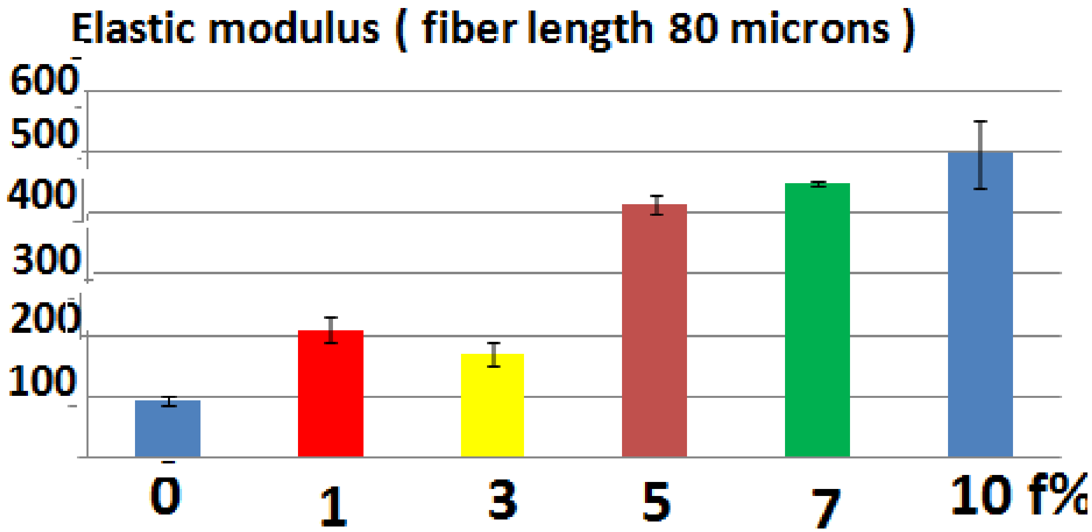
orizzontal axis reports the percentage of fiber

Adler= PU produced by ADLER with mineral fibers

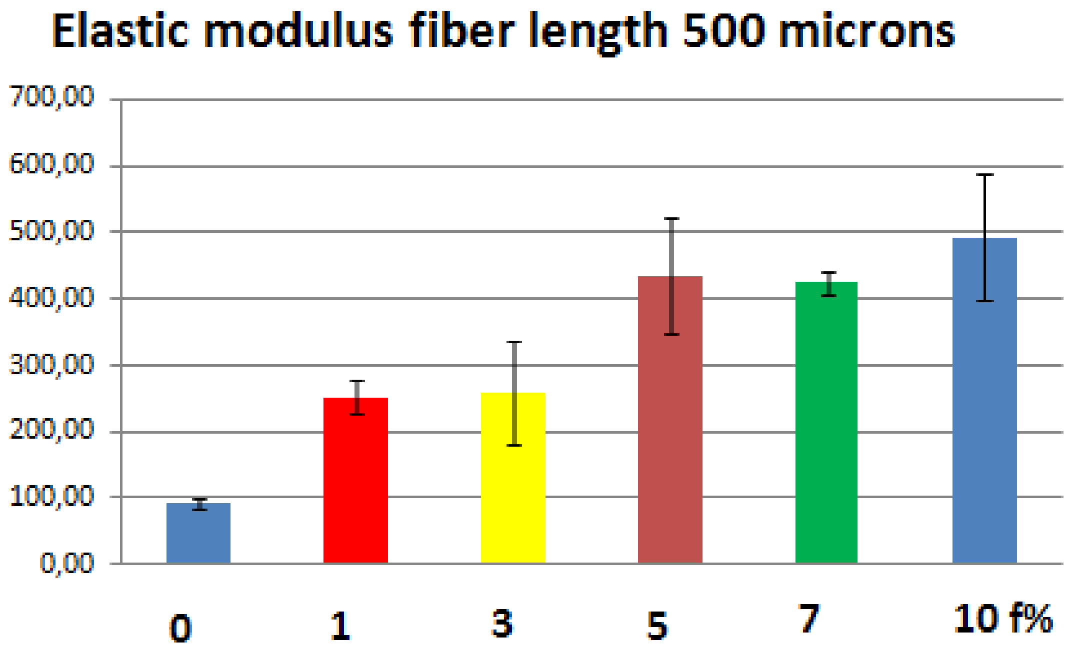


orizzontal axis reports the percentage of fiber

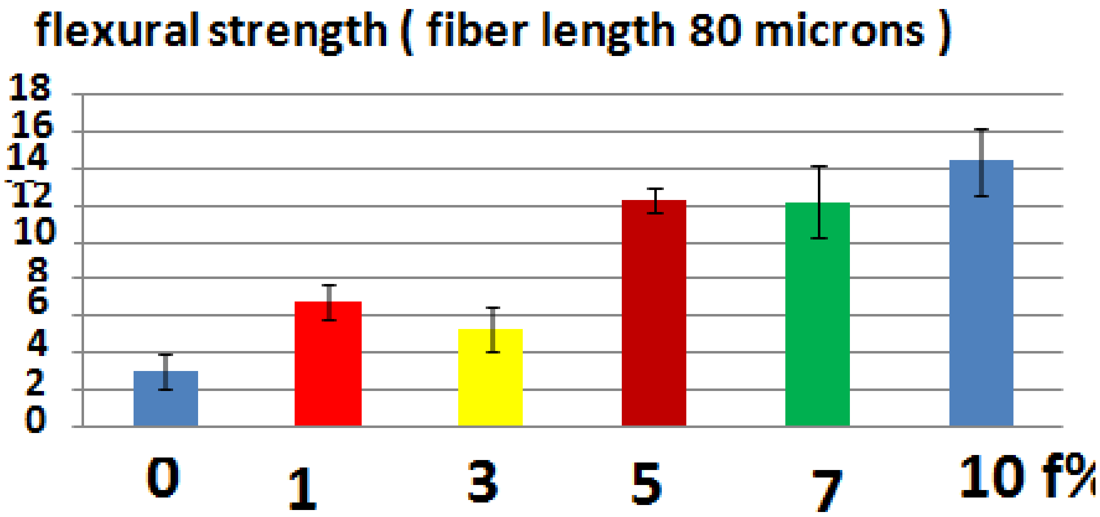
Adler= PU produced by ADLER with mineral fibers



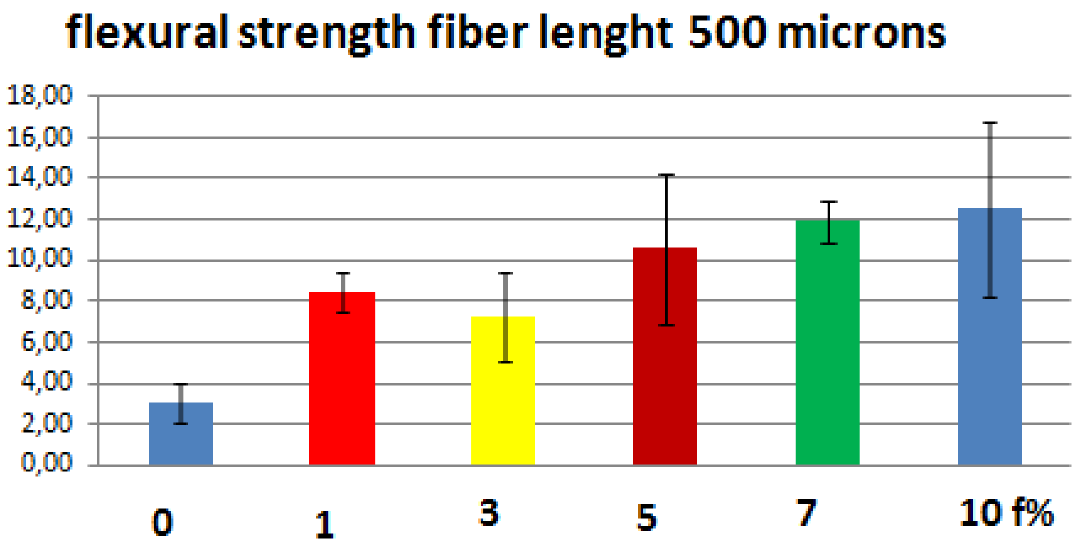
Flexural elastic modulus
For PU/functionlised
cellulose fibers



Vertical axis in MPA



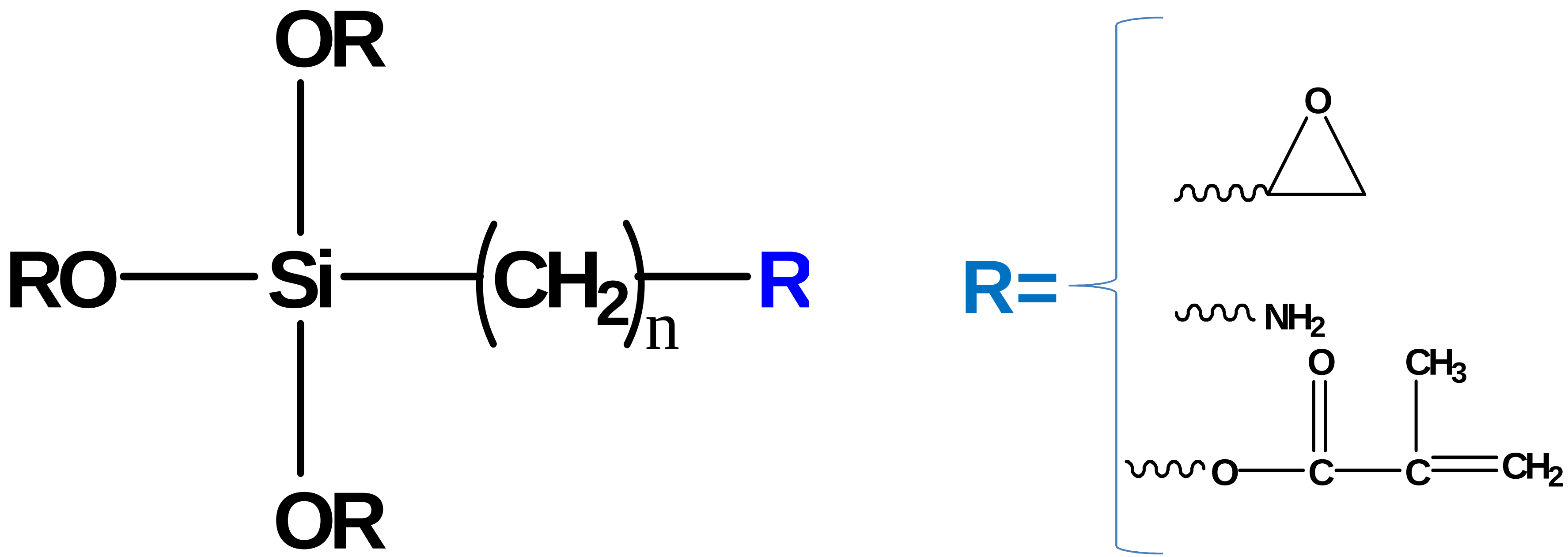
Flexural strength
For PU/functionlised
cellulose fibers



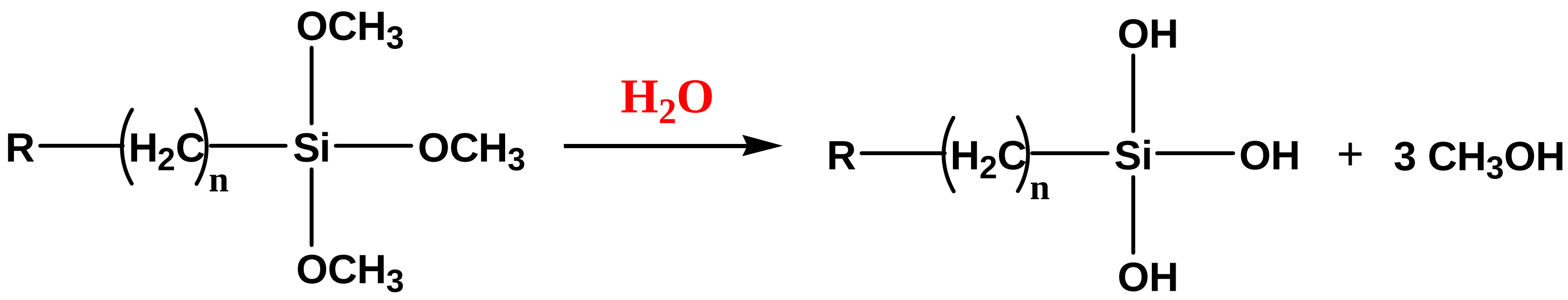
Vertical axis in MPA

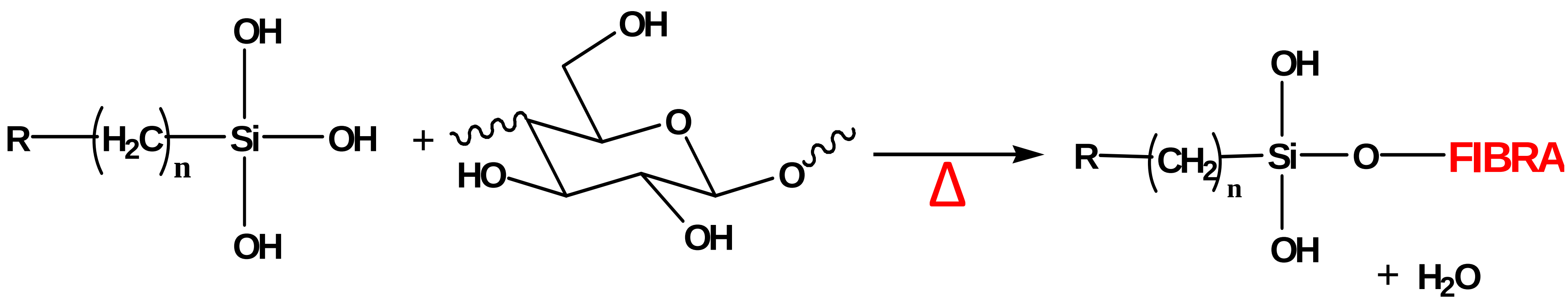
NUOVI COMPATIBILIZZANTI IN VIA DI SPERIMENTAZIONE

SILANI

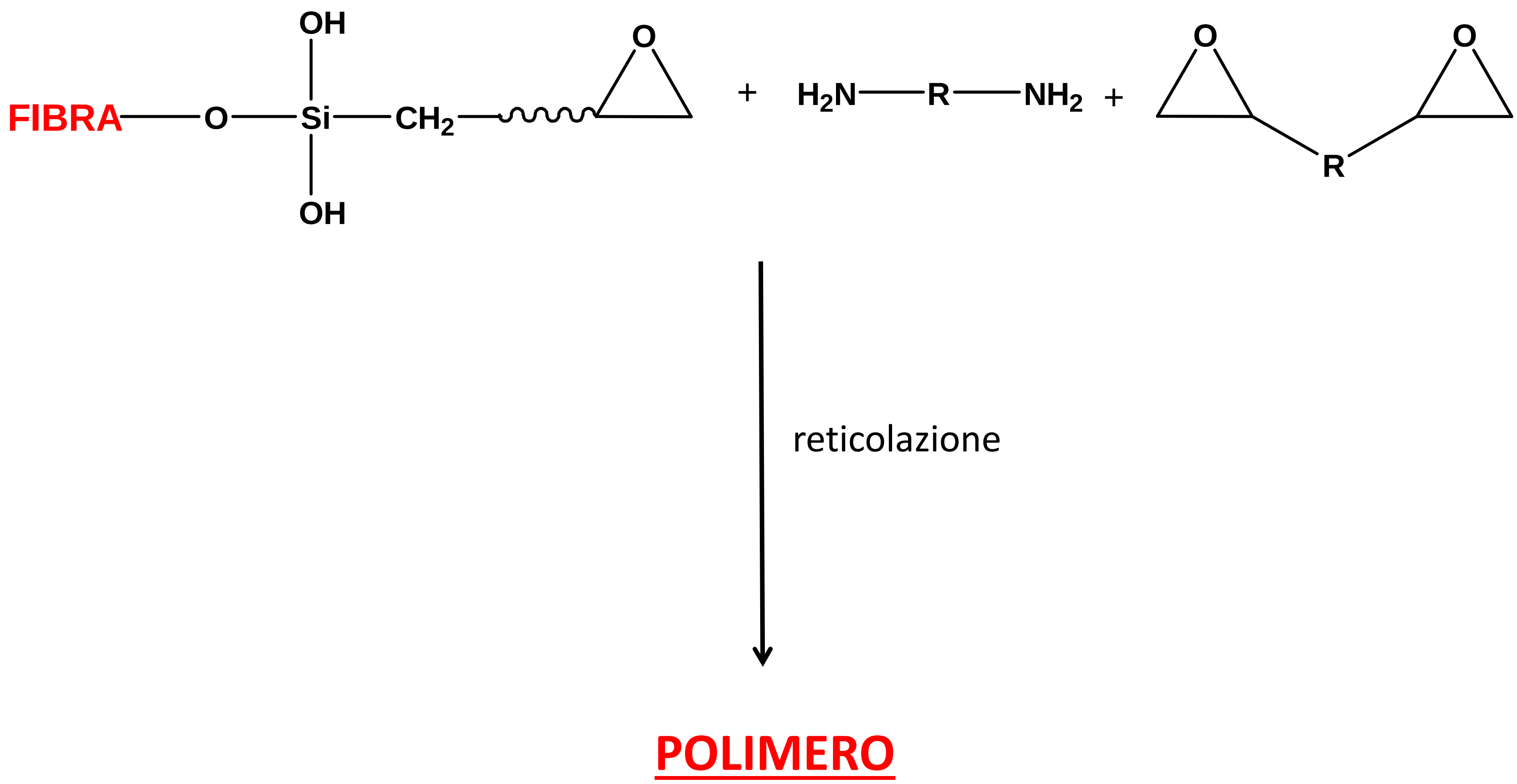


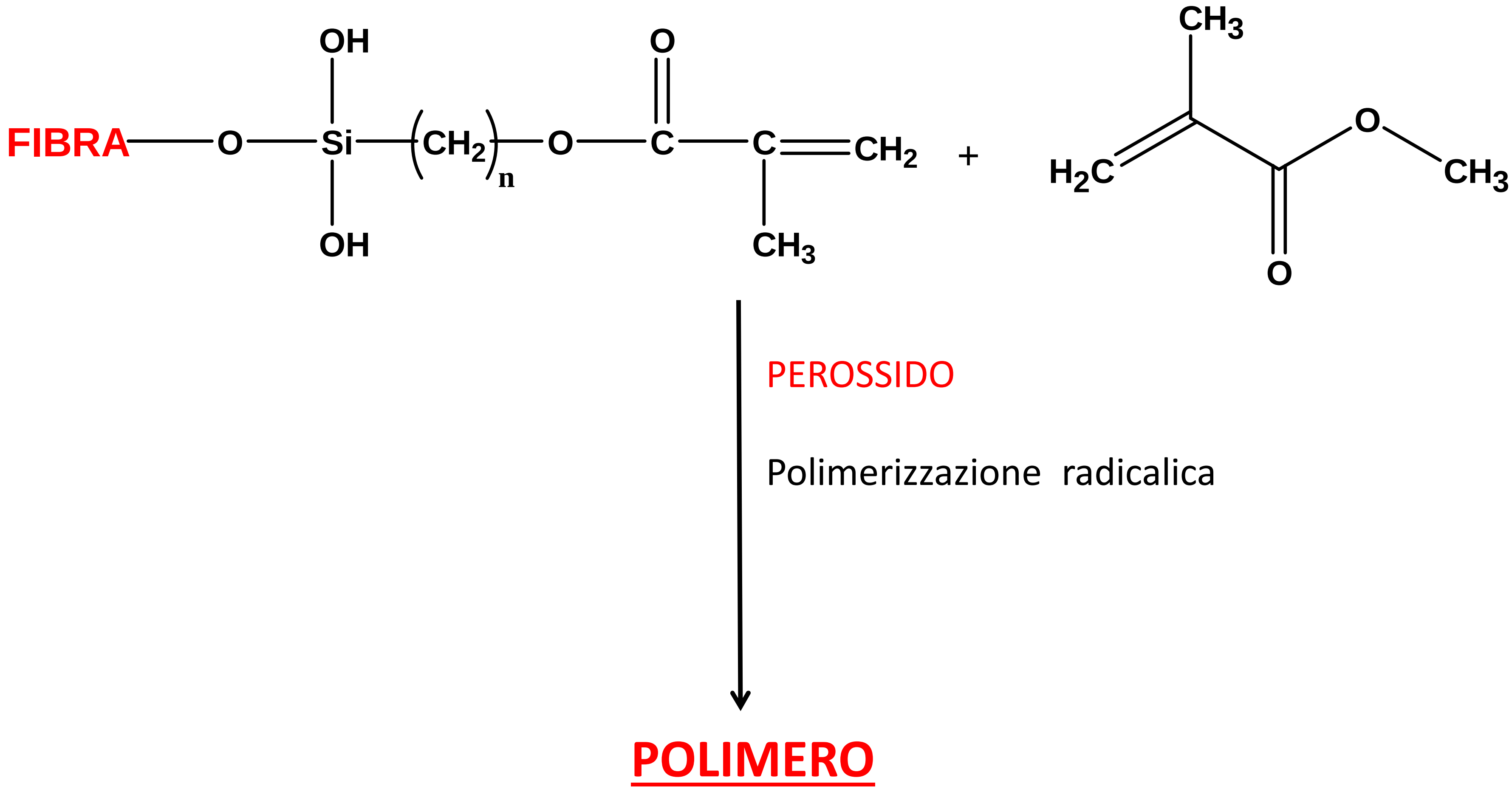
I silani reagiscono con i gruppi ossidrilici della fibra previa idrolisi dei gruppi OR legati all’atomo di silicio i quali possono essere gruppi –metossi o –etossi:





Inizialmente si formano legami idrogeno tra i gruppi ossidrilici che ad alte temperature diventano covalenti.


FIBRA
OH
O
Si
CH2
OH
O
+
H2N
R
NH2
+
O
O
R
reticolazione
POLIMERO


FIBRA
OH
O
Si
OH
CH2
n
O
C
C
CH2
CH3
+
CH3
H2C
O
CH3
O
PEROSSIDO
Polimerizzazione radicalica
POLIMERO