UNIMORE
UNIVERSITÀ DEGLI STUDI DI MODENA E REGGIO EMILIA

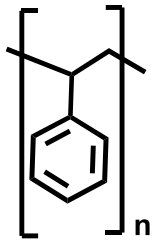
Centro Interdipartimentale Grandi Strumenti
CINQUANTA

"La risonanza magnetica nucleare nella caratterizzazione di polimeri e co-polimeri stirenici"

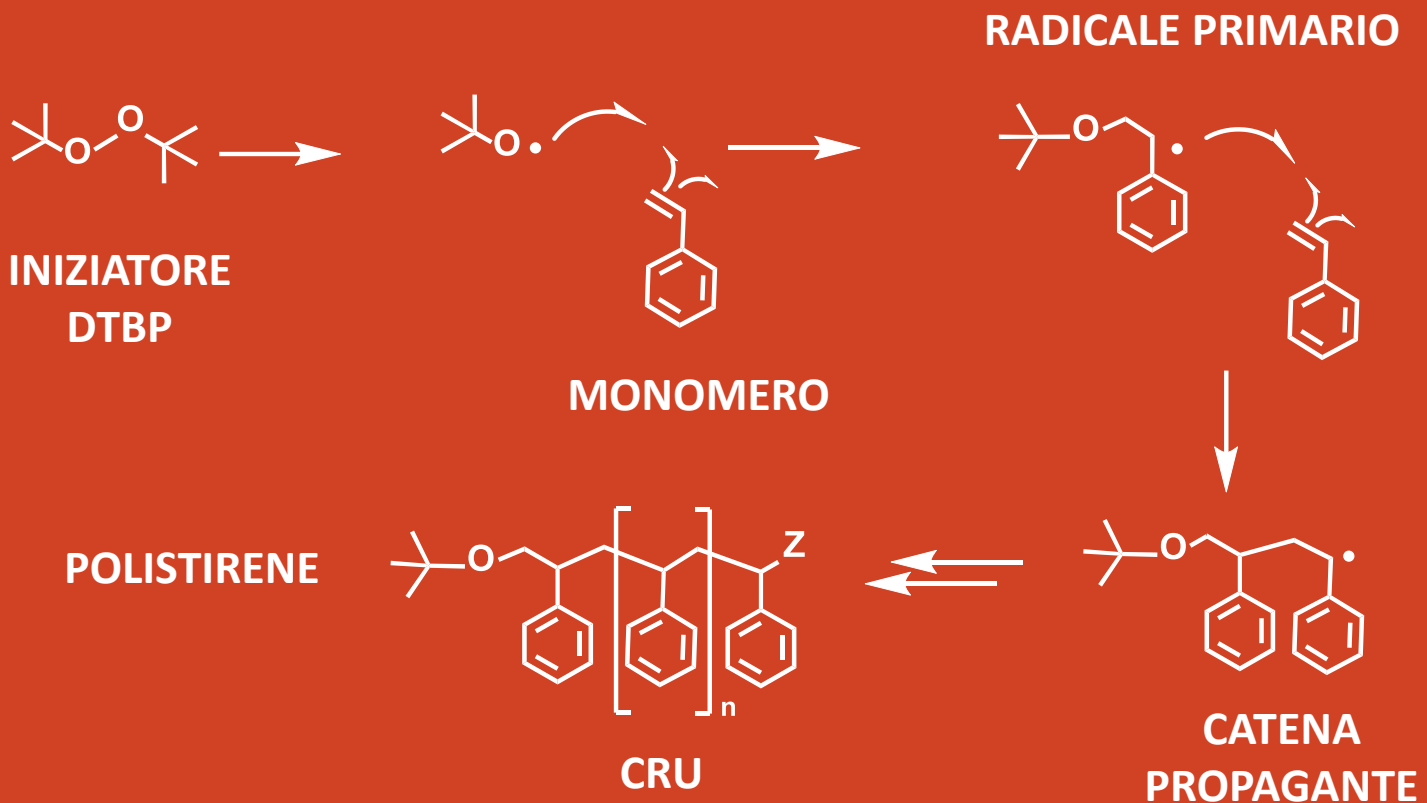
Prof.ssa F. Parenti

Dipartimento di Scienze Chimiche e Geologiche

Polistirene



Polimerizzazione a RADICALE LIBERO (FRP)



NMR nell'analisi di polimeri

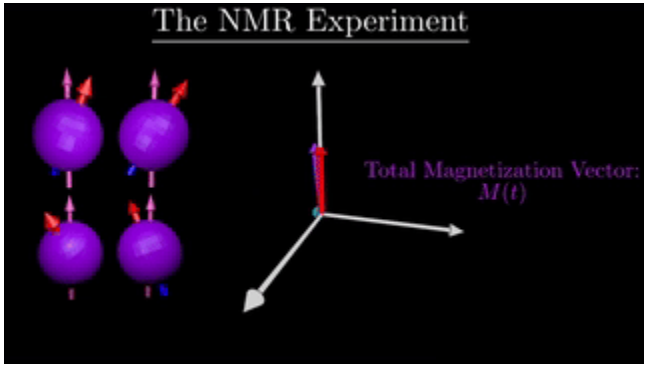
- **Composizione e struttura chimica**
(CRU e gruppi terminali)

- **Regolarità strutturale**
(isomeria costituzionale, tassia, ramificazioni, conformazione)

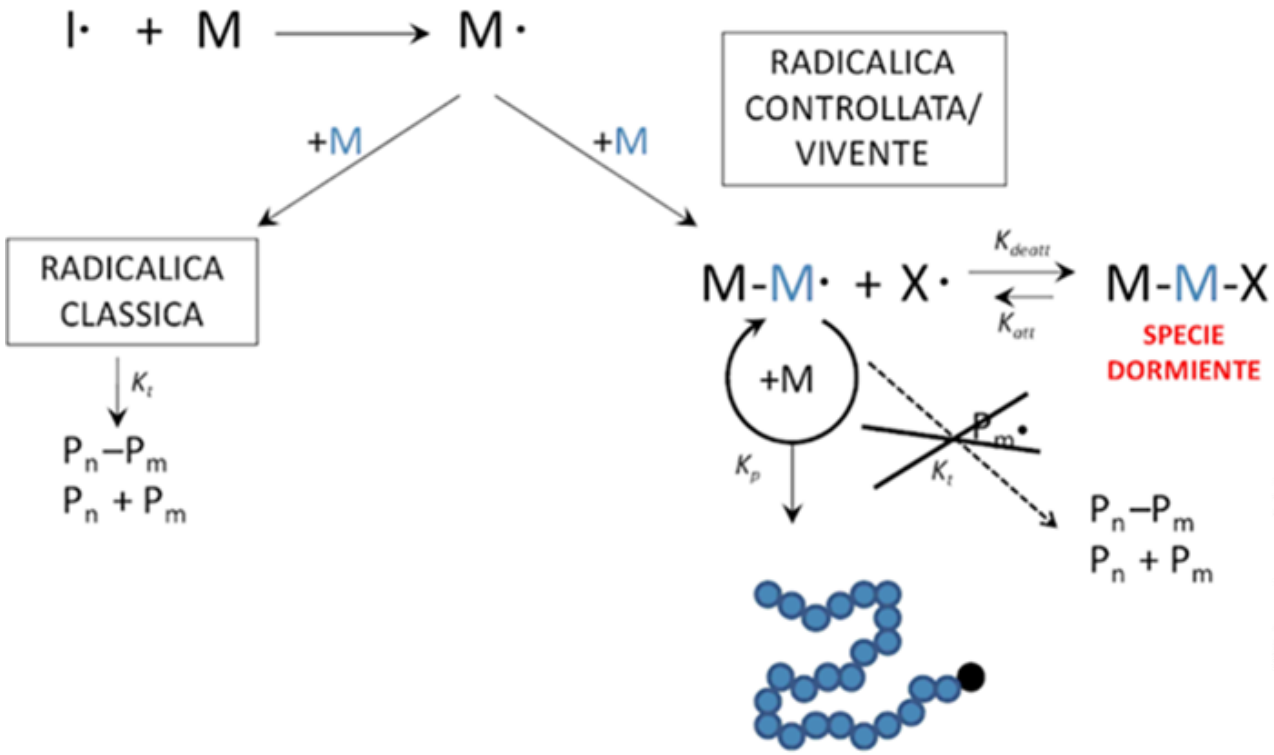
- **Controllo qualità**
(additivi, impurezze…)

- **Controllo avanzamento reazione**
(completezza, cinetiche…)

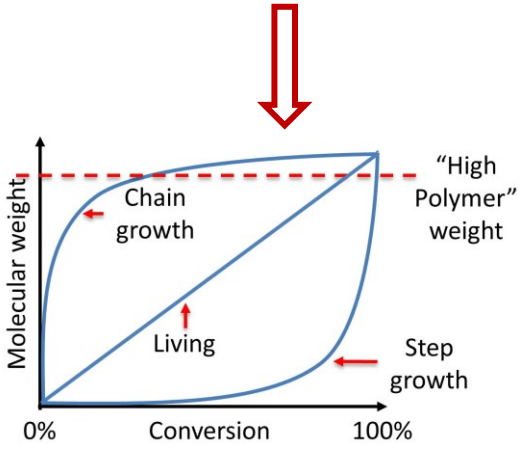
- **Determinazione M_n**



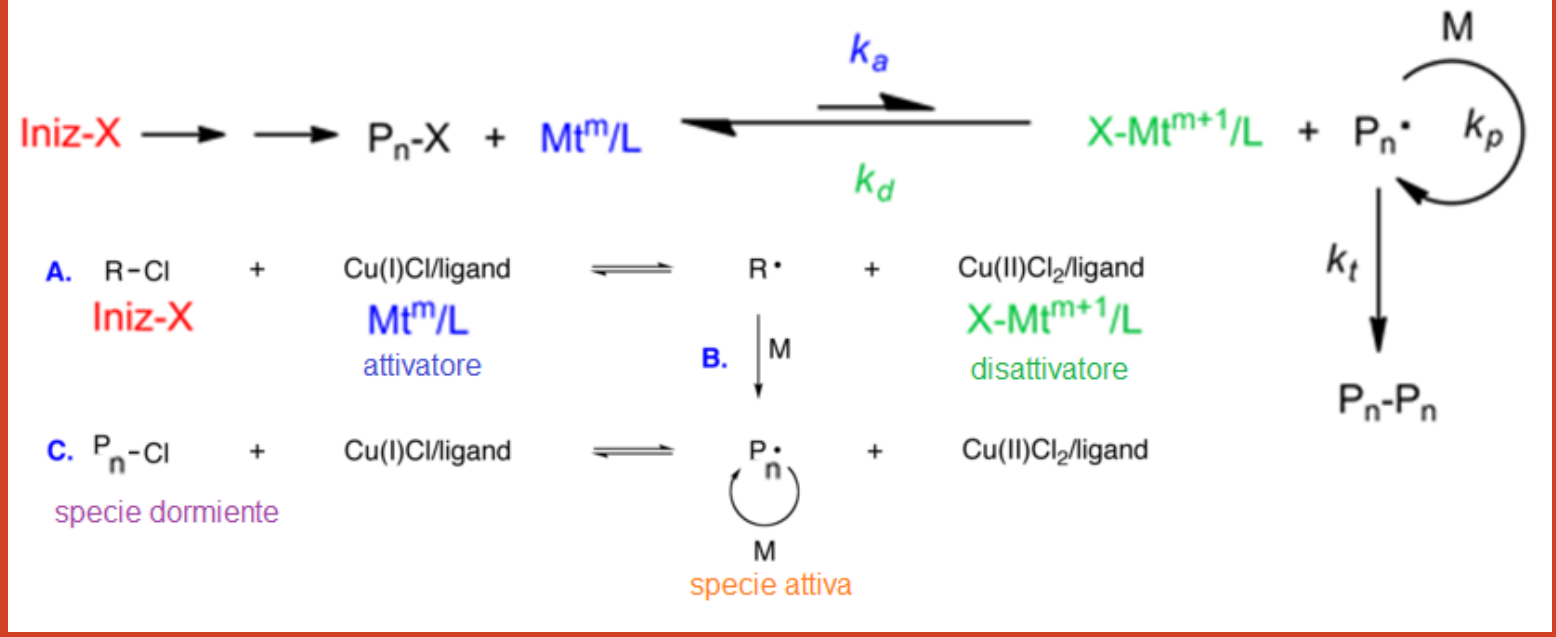
Polimerizzazioni radicaliche controllate



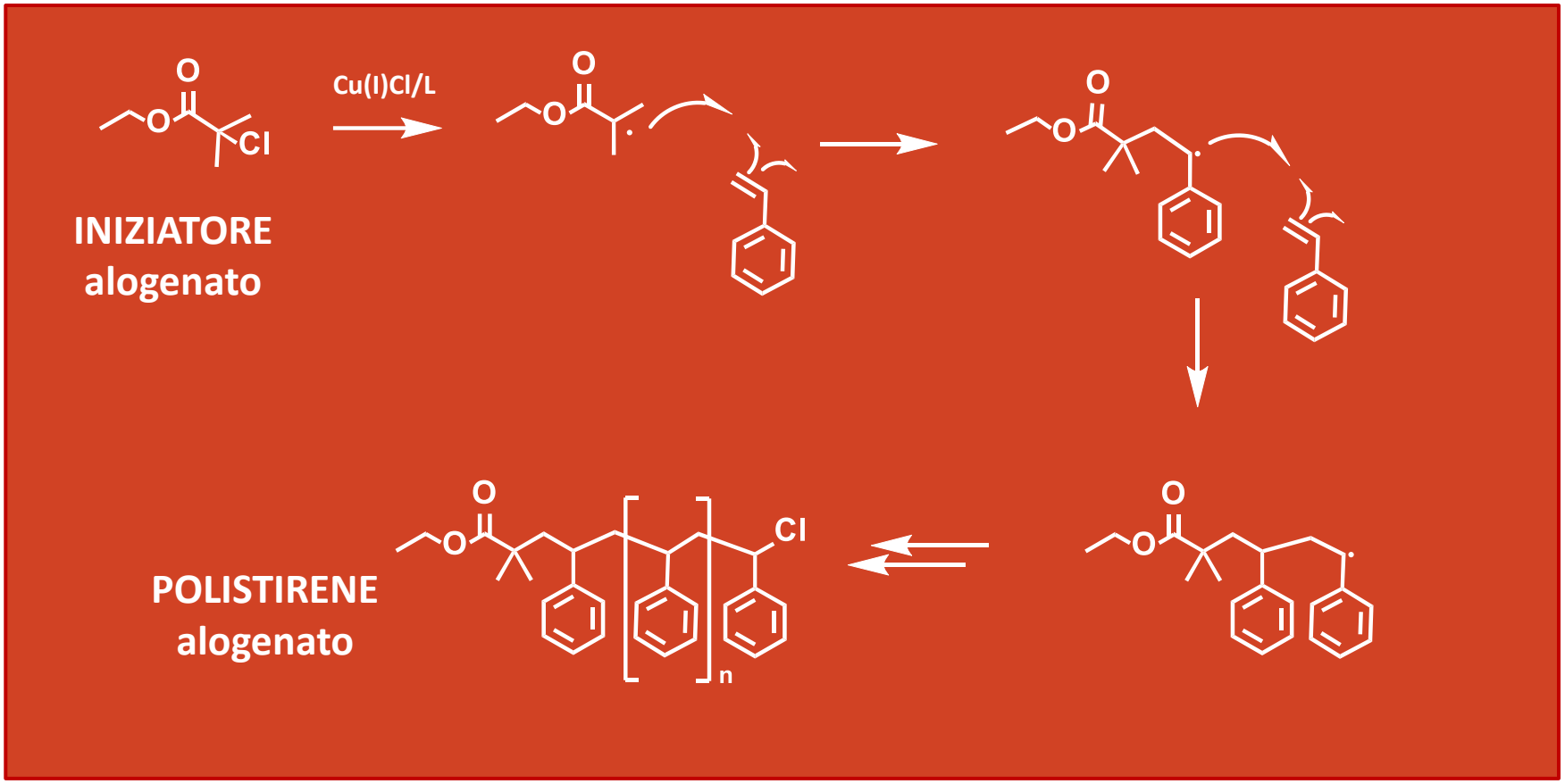
- ✓ Bassa [R·]
- ✓ No terminazioni
- ✓ Bassa PDI
- ✓ Controllo del PM



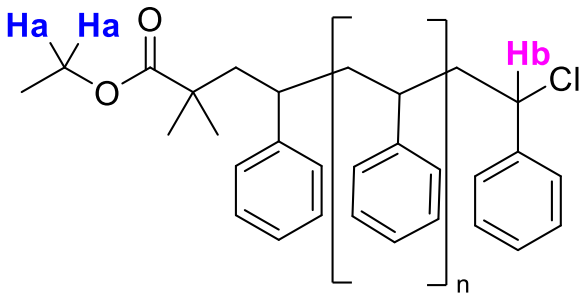
Polimerizzazione Radicalica a Trasferimento di Atomo (ATRP)



ATRP polistirene



Determinazione della «*vivenza*»



Polymer Chemistry

ROYAL SOCIETY OF CHEMISTRY

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Influences of nitrogen base excess on ARGET ATRP of styrene with ascorbic acid acetonide and traces of oxygen and water†

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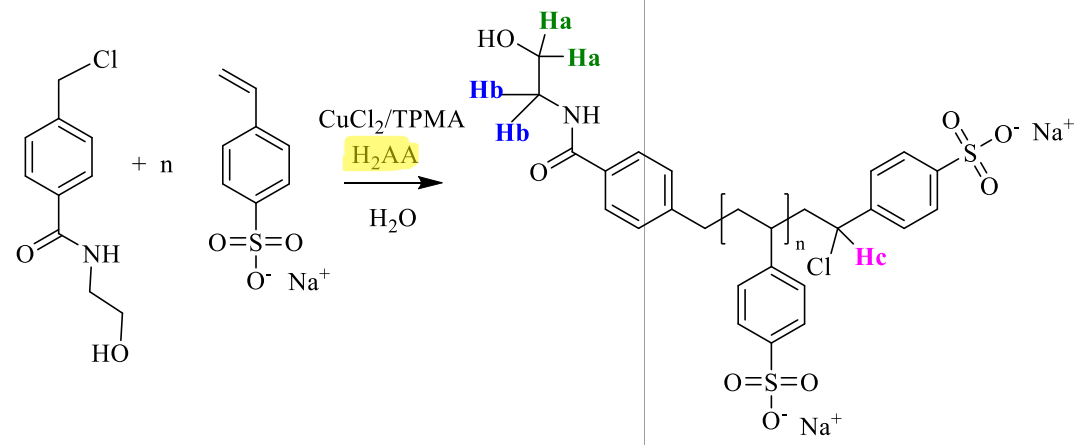
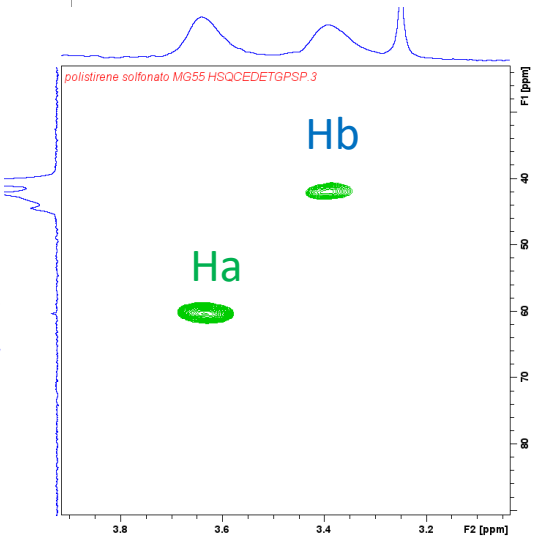
Determinazione di M_n

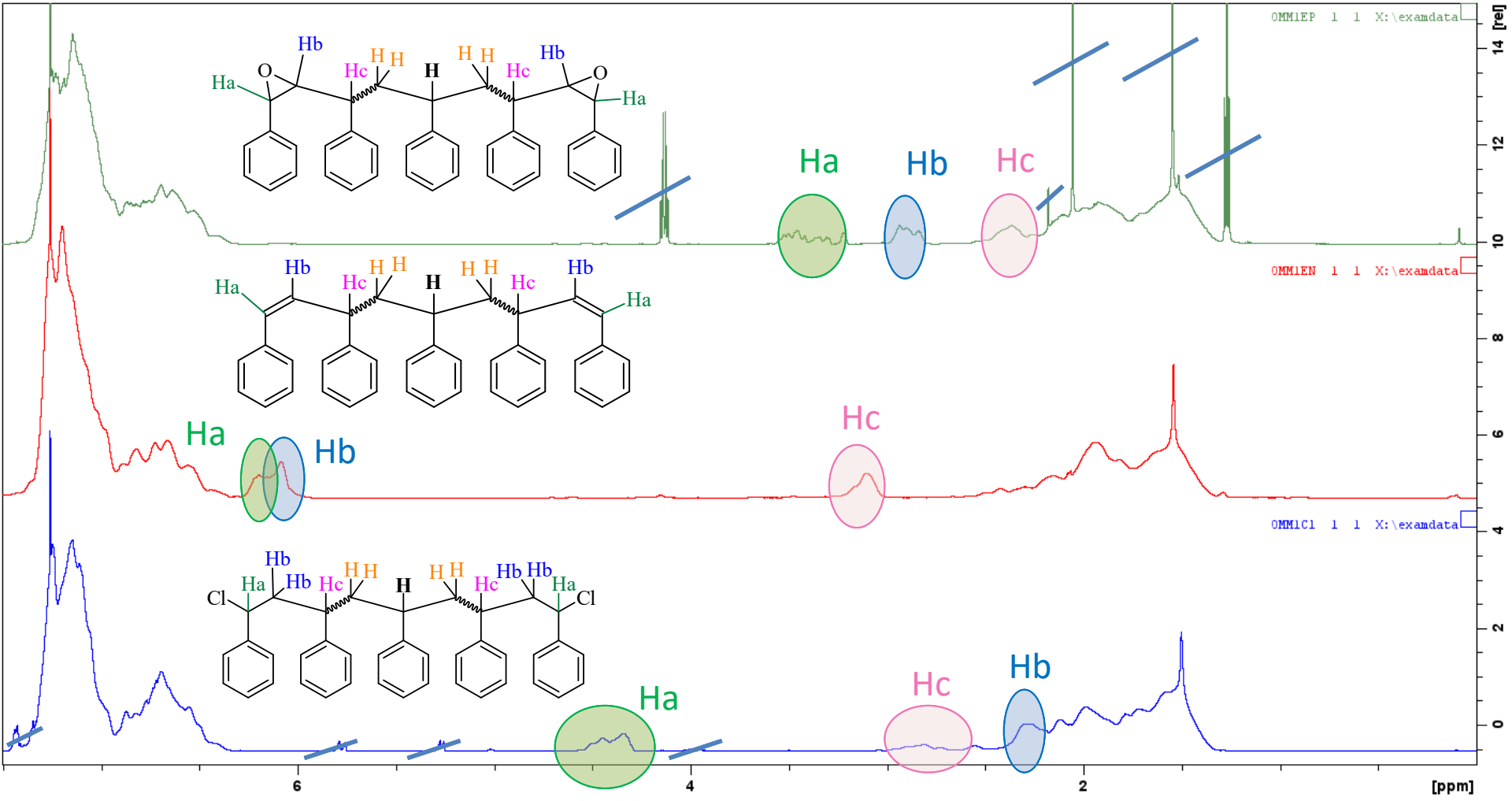




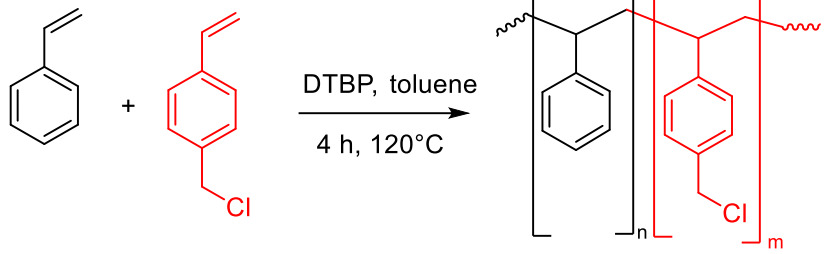
$$\mathbf{n=DP=}\frac{int_{HarCRU}}{n^{\circ}\,HarCRU}\cdot\frac{n^{\circ}\,H_{alINIZ}}{int_{HalINIZ}}=\frac{358.8}{4}\cdot\frac{4}{4}=89.7$$

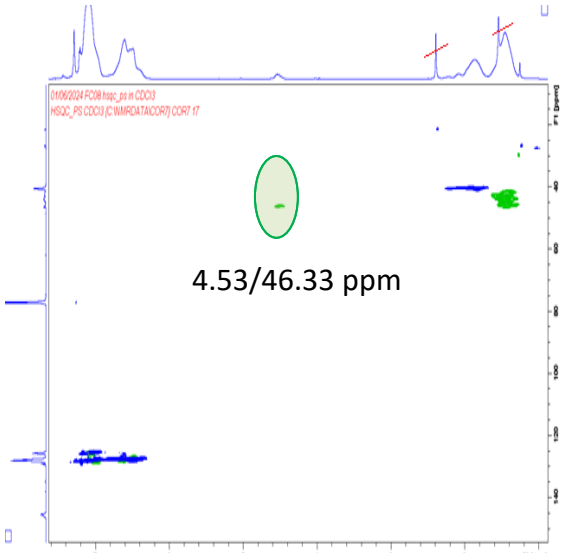
$$\mathbf{M_n=n\cdot MM_{cru}=89.7\cdot 207.2=18.5\ kDa}$$

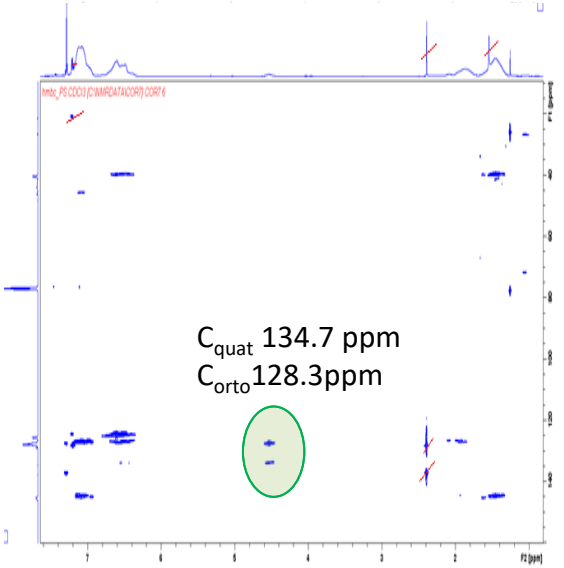
Post-funzionalizzazione



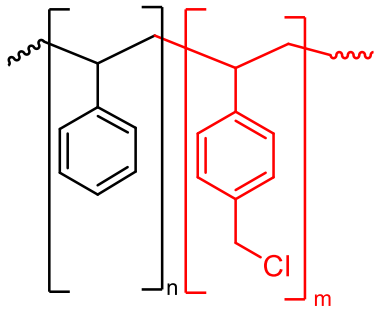
Copolimero stirene-*co*-4-clorometilstirene (feed 5% CMS)







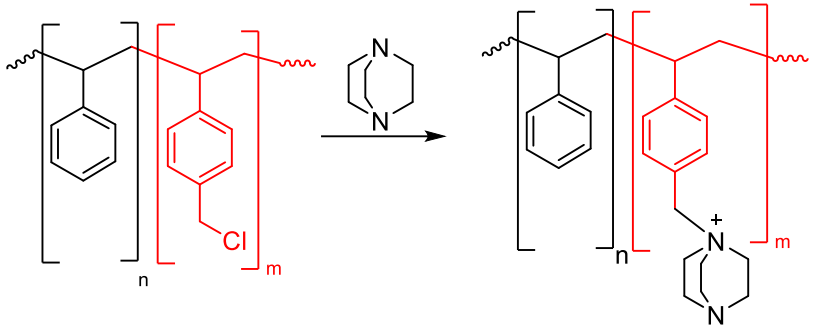
Calcolo della composizione copolimerica

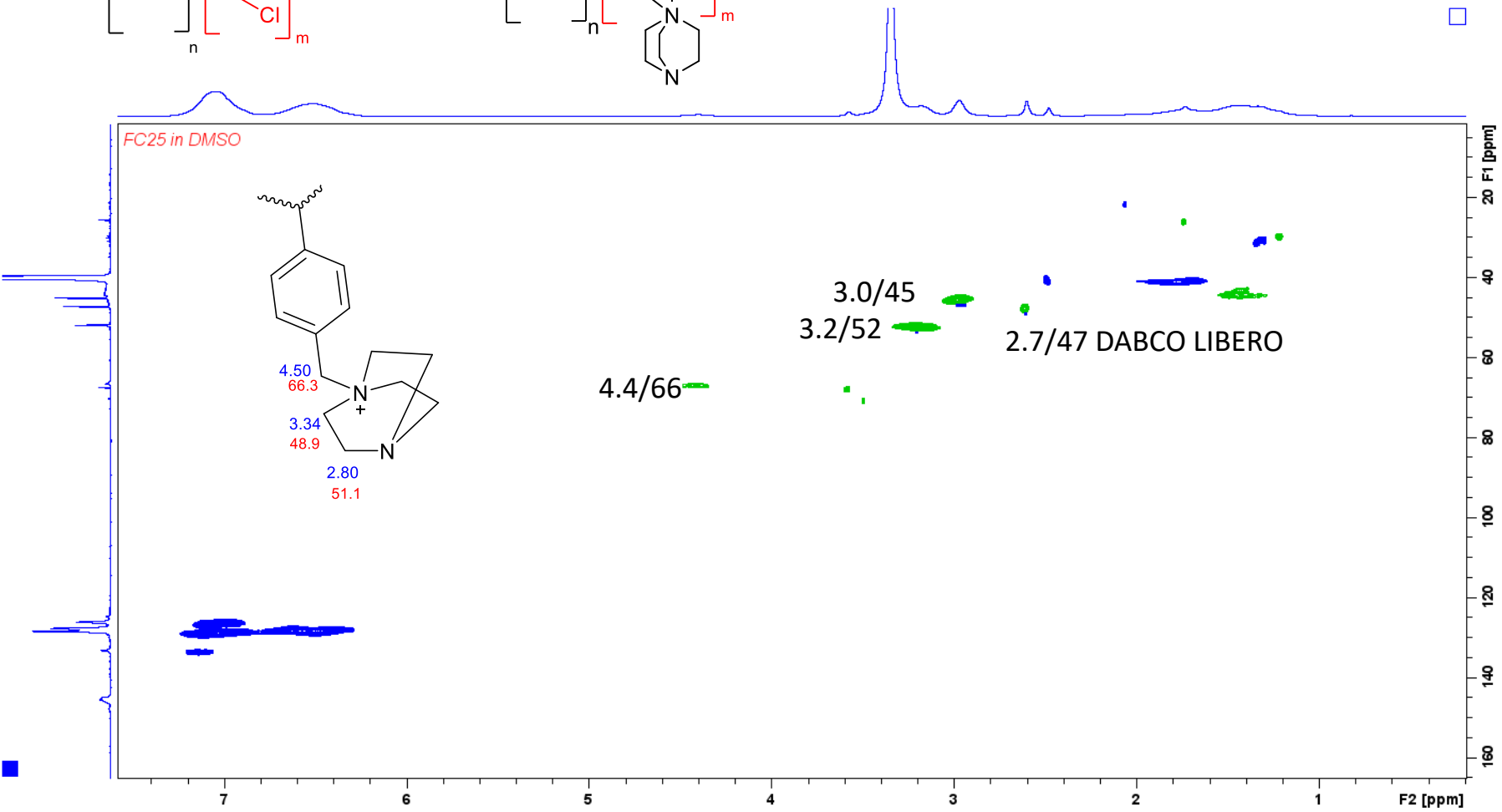


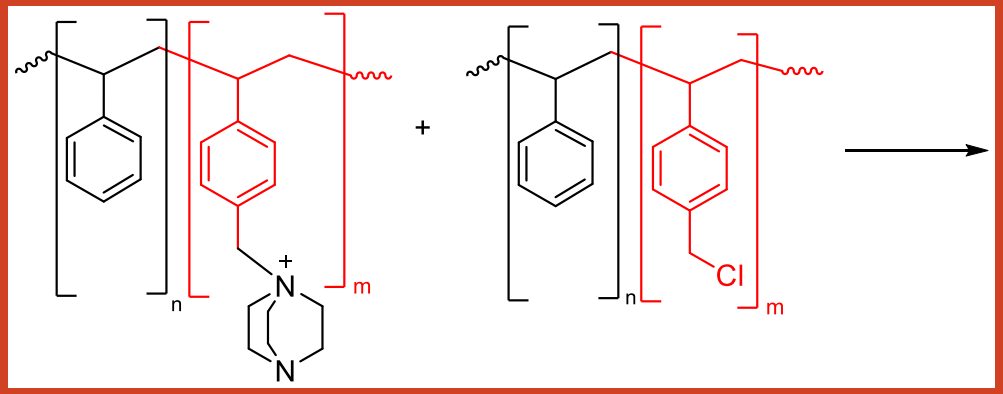
$$I_{HarS} = I_{Har} - 2 \cdot I_{HalCMS} = 95.1 - 2 \cdot 2 = 91.1$$

$$\%_{CMS} = \frac{I_{HalCMS}}{n^{\circ}_{HalCMS}} \cdot \frac{n^{\circ}_{HarS}}{I_{HarS}} \cdot 100 = \frac{2}{2} \cdot \frac{5}{91.1} \cdot 100 = 5.5\ \%$$

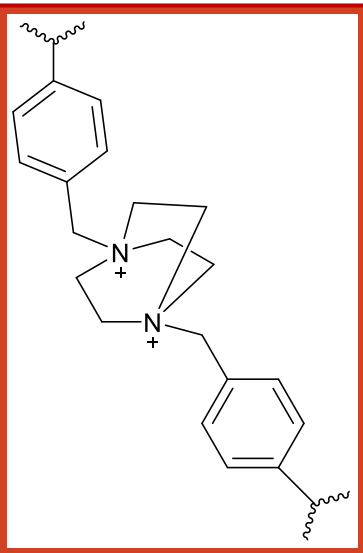
Post-funzionalizzazione

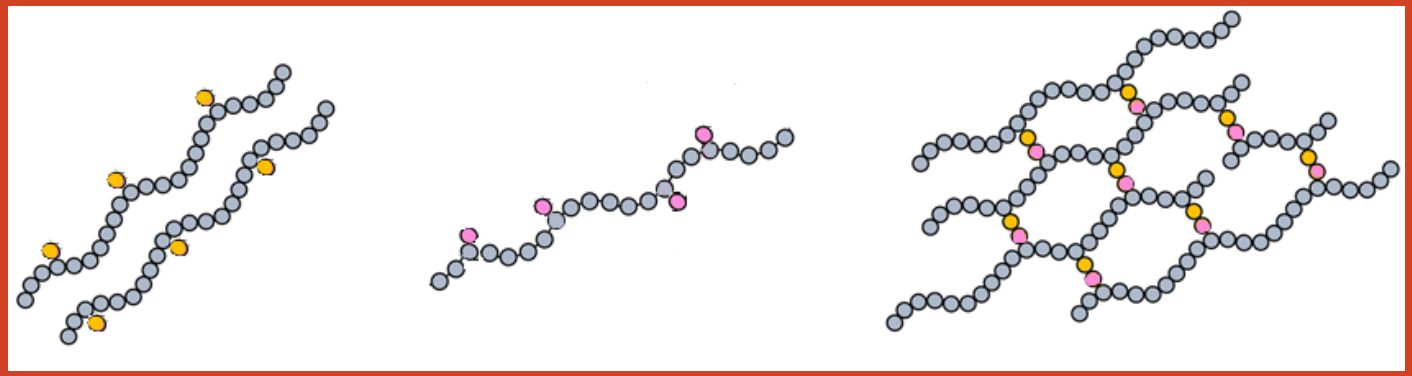






INSOLUBILE!!!





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Ringrazio il comitato organizzatore del CIGS per avermi dato l'opportunità di esporre i risultati della mia ricerca in questa importante occasione e tutti voi per l'attenzione!