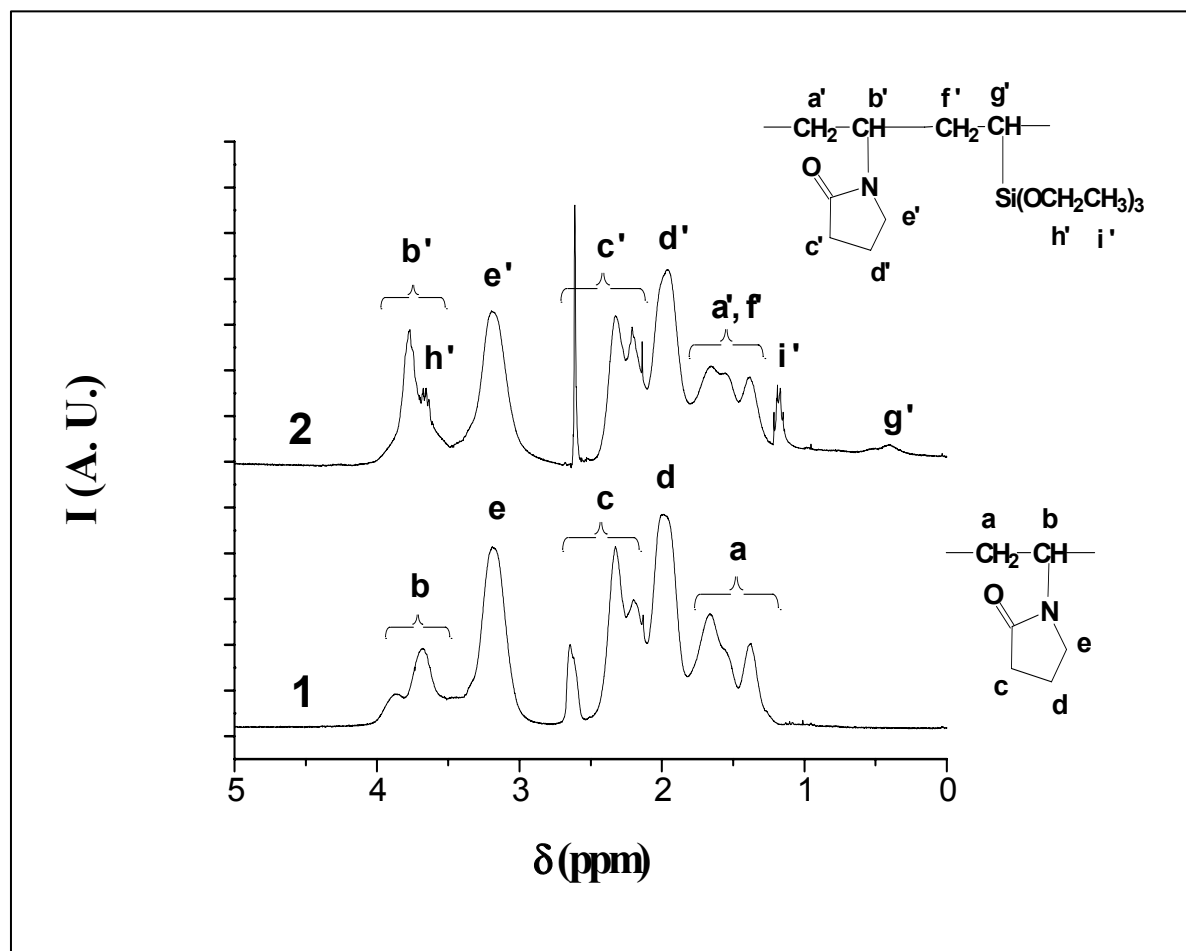# New covalent bonded polymer-calcium silicate hydrate composites

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Figure S1 : ^{1}H NMR spectra of polymers : 1 = PVP-T0 ; 2 = PVP-T9
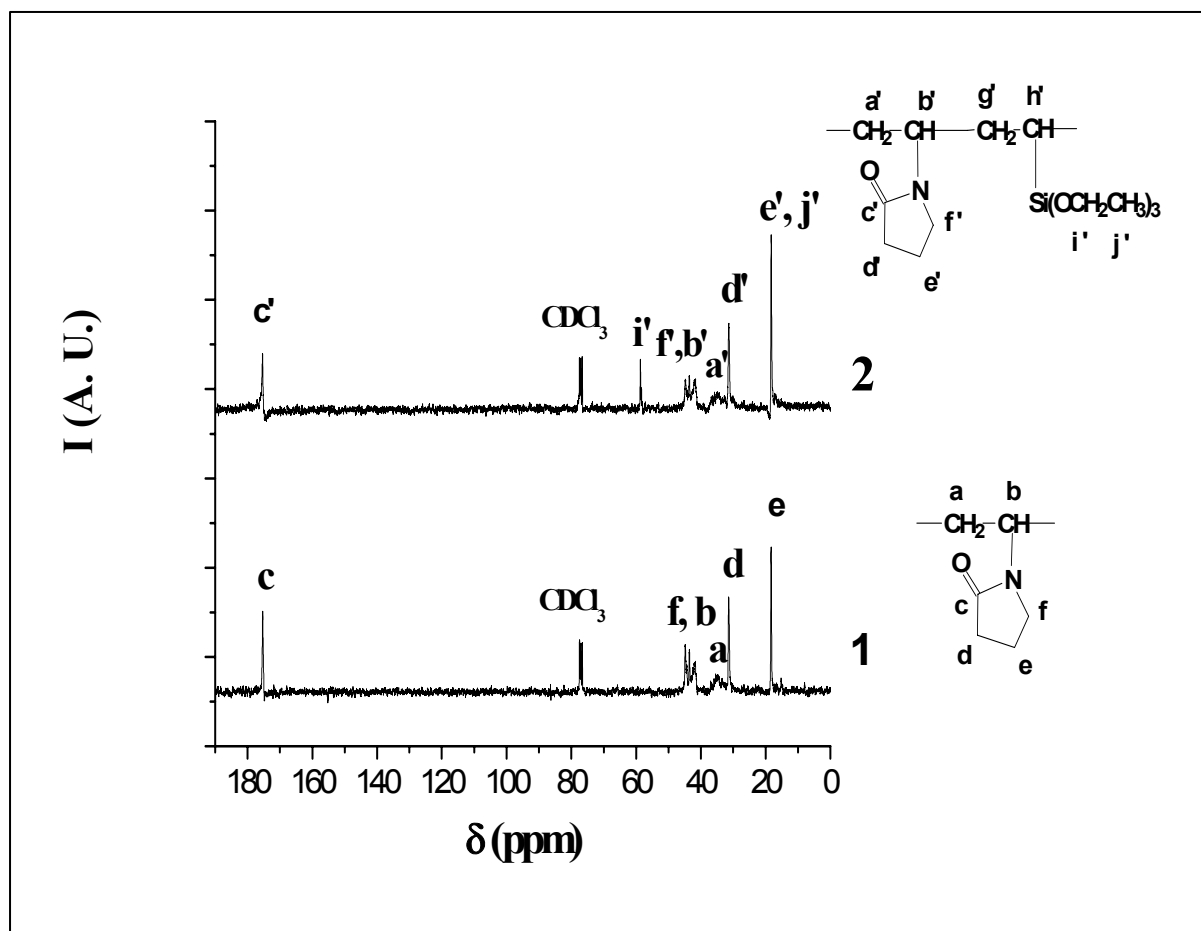
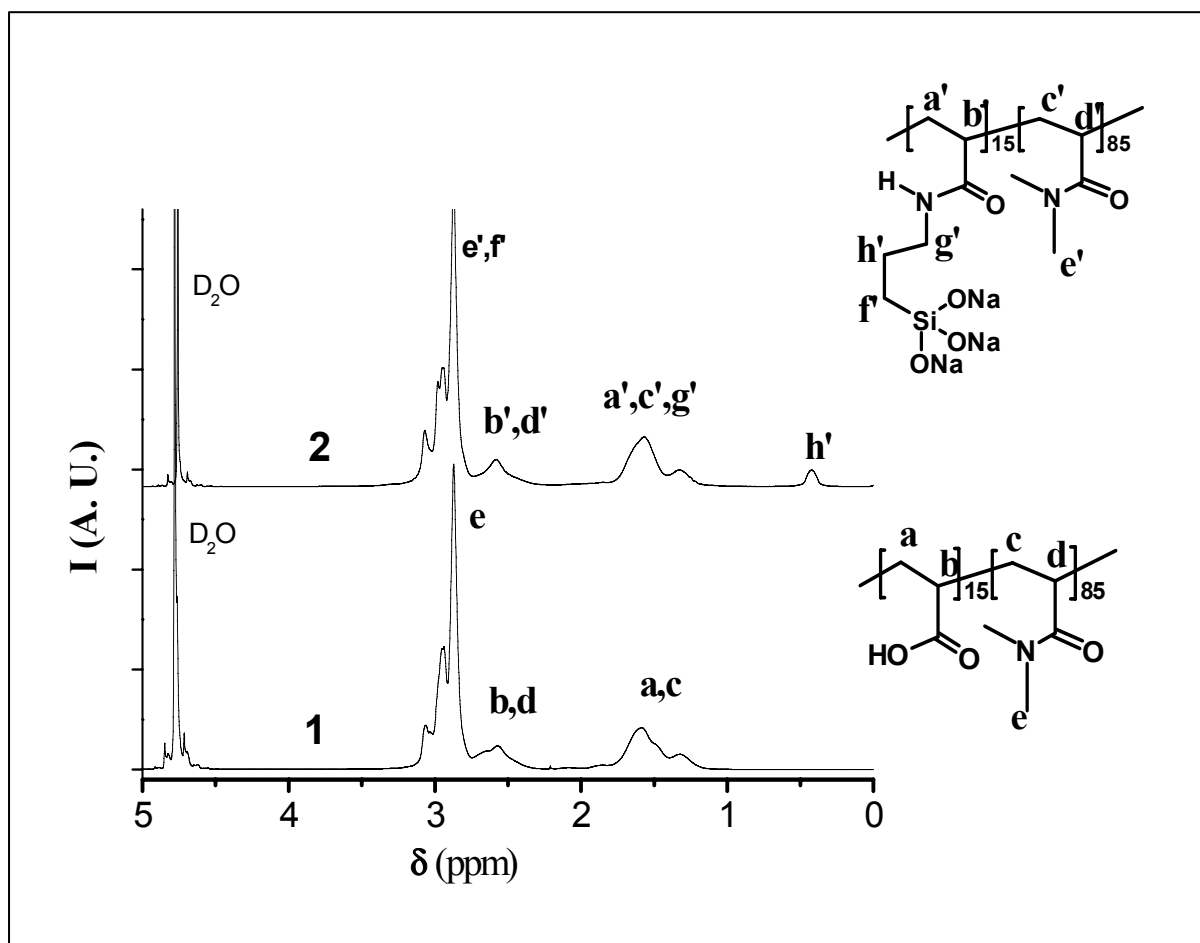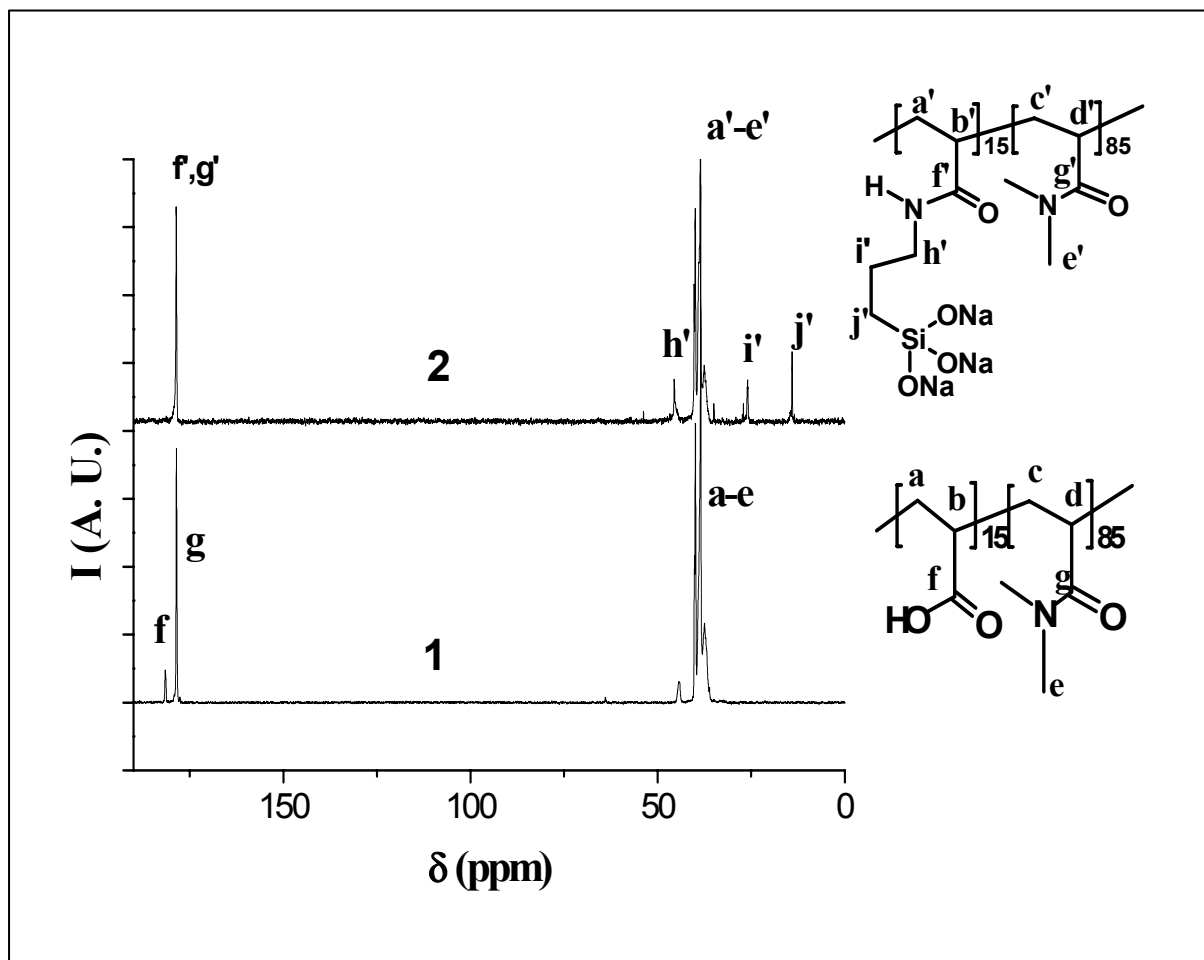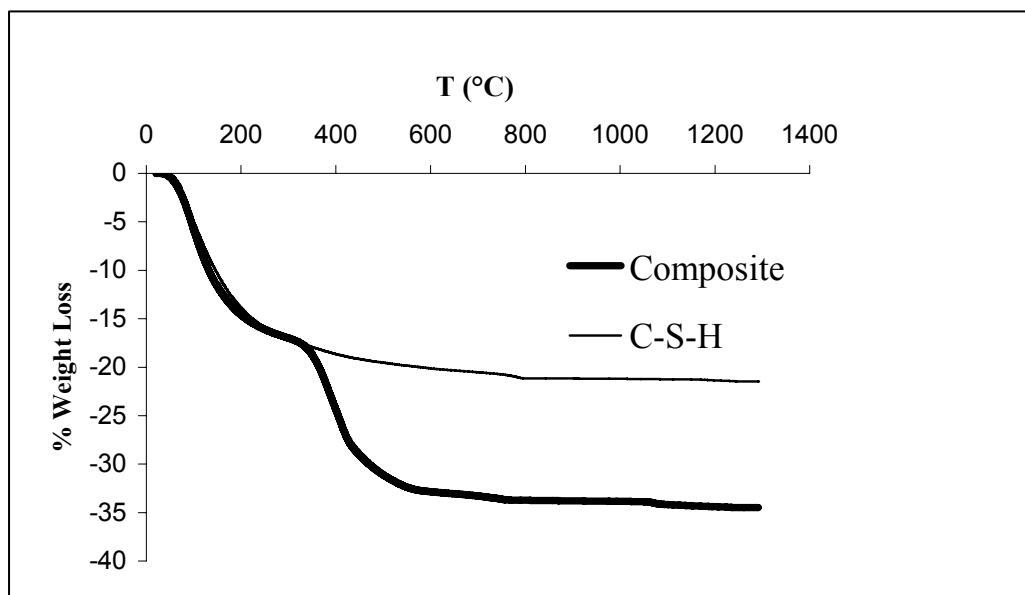**Figure S2 :** ^{13}C NMR spectra of polymers : 1= PVP-T0 ; 2= PVP-T9

Figure S3: ^{1}H NMR spectra of polymers : 1=PDMA-AA ; 2= PDMA-T15-D0

Figure S4: ^{13}C NMR spectra of polymers : 1=PDMA-AA ; 2=PDMA-T15-D0

Determination of the polymer content in the composites from thermogravimetric analysis.

Figure S5 : typical thermogram of a pure C-S-H sample and of a composite sample

The exothermic weight loss between 300 and 640°C (*%(300-640°C)*) in the composite is attributed to the polymer combustion and to desorption of small amount of water. In pure inorganic C-S-H, the weight loss between 300 and 640°C (*%(300-640°C in C-S-H)*) (about 5%) is only attributed to desorption of small amount of water. Therefore, the percentage of organic is given by the difference *%(300-640°C) -%(300-640°C in C-S-H)*.

For all materials, the weight loss under 250°C (generally 10-15%) and above 640°C (less then 1%) are respectively attributed to desoption of physisorbed water and decarbonatation of $CaCO_3$. Above 850°C, no additional weight loss is observed and there only remains anhydrous calcium silicate. The percentage of anhydrous calcium silicate is given by the relation 100-*%(25-850°C)*, where *%(25-850°C)* represents the total weight loss. The polymer

content in the composite with respect to anhydrous calcium sicilicate ($m_P/(m_{Si}+m_{Ca})$) is

therefore obtained by the following equation :

$$m_P/(m_{Si}+m_{Ca})= [(\%(300\text{-}640°C) - \%(300\text{-}640°C \text{ in C-S-H})) \times 100] / [100 - \%(25\text{-}850°C)]$$