Recyclable Thiol-ene Polymers via Thiol-Disulfide Exchange Reaction

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Research question: To what point can the structure of a recyclable polymer be modified before degradation is inhibited?

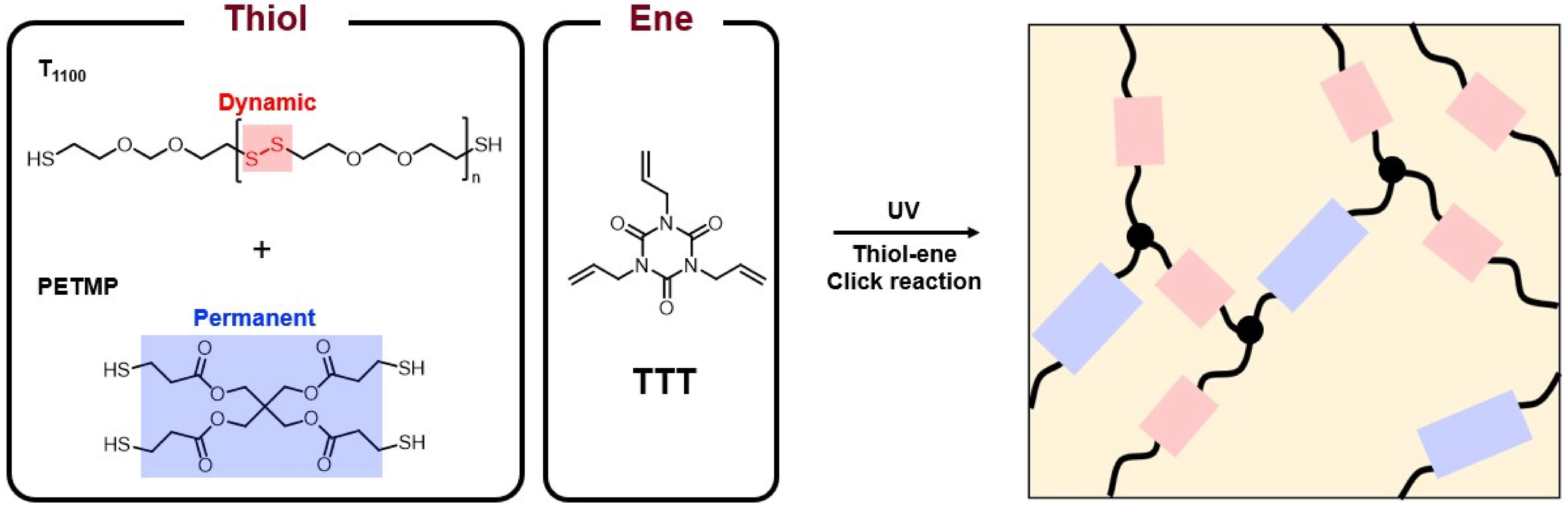


Figure 1: Three molecules with ene, thiol, and disulfide functional groups react under UV light to form a recyclable thermoset polymer

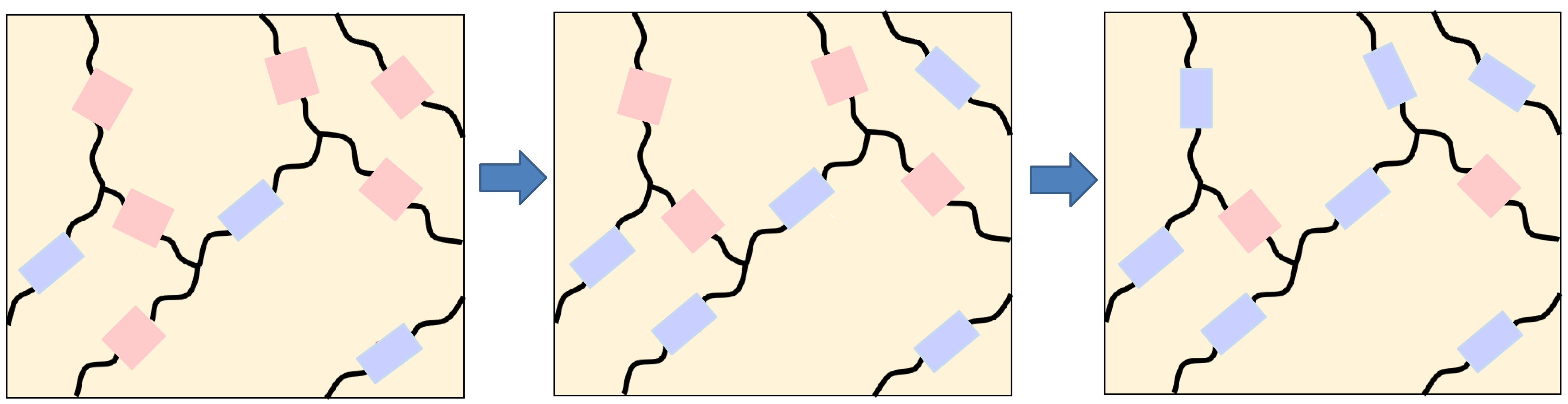
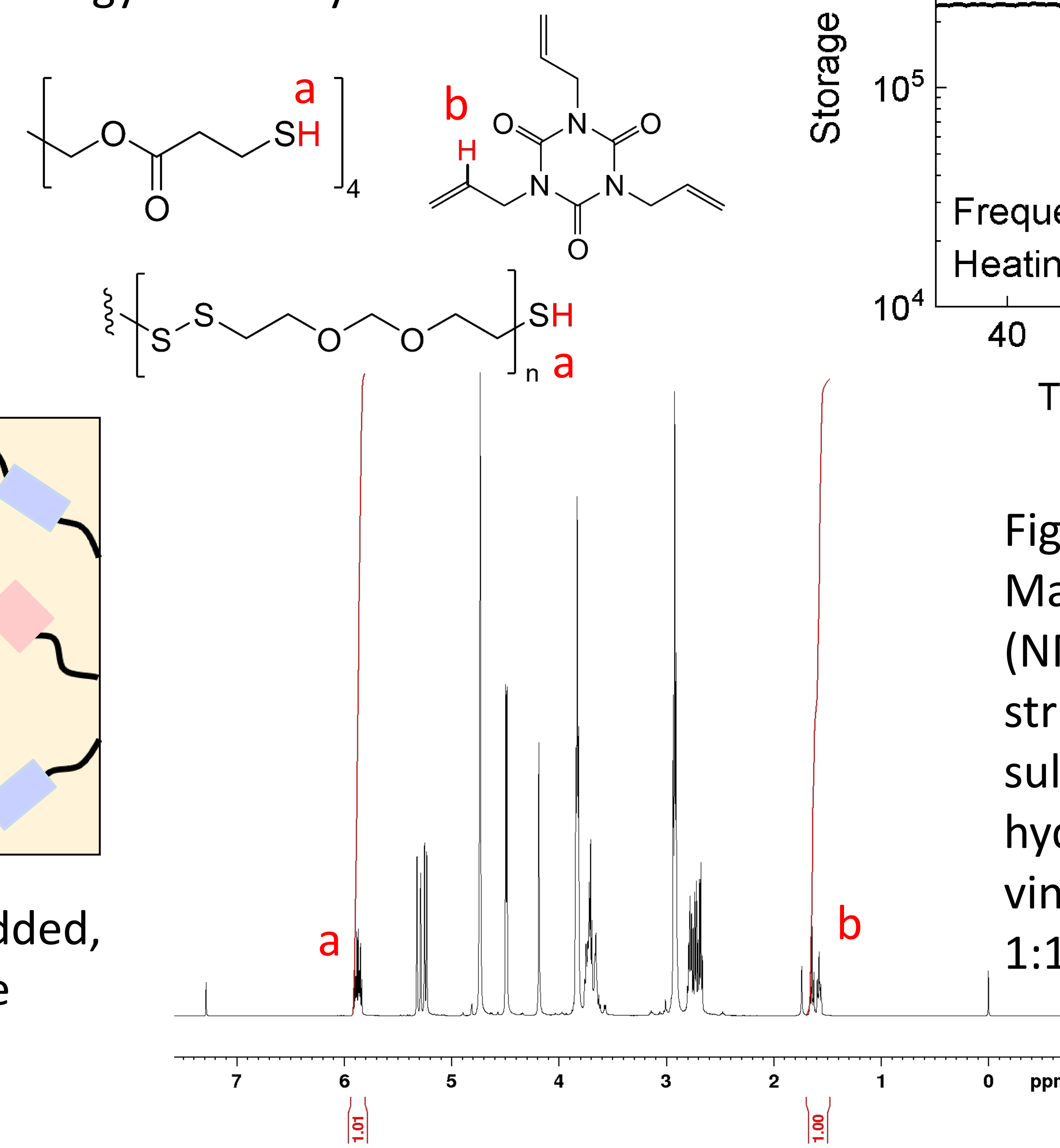


Figure 2: As more pentaerythritol tetrakis(3-mercaptopropionate) (PETMP) is added, the more permanent linkages dominate the network, making the polymer more resilient. The highest thiol group ratio that can be added without inhibiting degradation is 40:60

Figure 4: The storage modulus of the modified and unmodified formulas are measured. The higher this value is, the greater the ability of the solid to store energy elastically



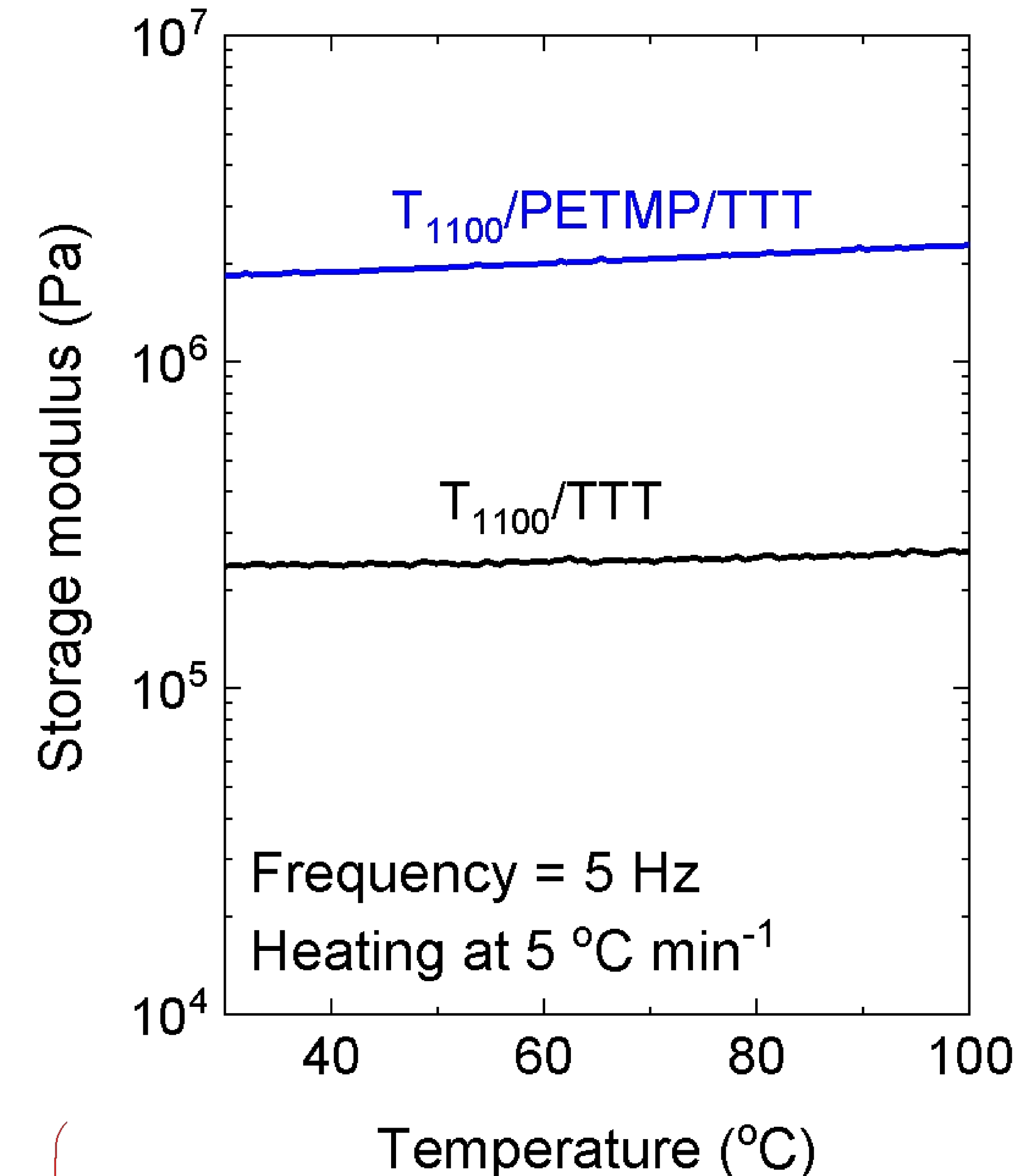


Figure 3: Nuclear Magnetic Resonance (NMR) plot for the structure. The ratio of sulfur-bonded hydrogen (a) and vinylic hydrogen (b) is 1:1

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