Supporting Information for:

Polyvinyl alcohol-boronate gel for sodium hydroxide extraction

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General Experimental: Chemicals and solvents were purchased from Aldrich, Alfa Aeser, Fisher, and Acros. UV-visible spectroscopy measurements were made on a Cary 5000 spectrometer. All rheological data was collected using an AR2000 stress-controlled rheometer from TA instruments.

Procedure for Gel Preparation: Stock solutions of **BdBA** and **PVA** (98-99% hydrolyzed, average MW = 11,000-31,000 g/mol) were prepared in DMSO at 100 mM and 10%, respectively. The **PVA** stock solution was heated and stirred until the **PVA** solid was fully dissolved. Gels were prepared by combining the appropriate amounts of these stock solutions at room temperature. A spatula was used to stir the material and ensure proper combination. Gels formed within minutes.

Procedure for NaOH Absorption: A **BdBA**-**PVA** gel (50 mM **BdBA**, 5% **PVA** in DMSO) was prepared in a vial according to the general preparation procedure given above. The gels were then placed in a drawer and allowed to set at room temperature overnight. A spatula was used to scrape the gel from the edges of the vial and form a ball to maximize the surface area of the material. The gel ball was then washed three times with H_2O (3 mL) to ensure that any free **BdBA** and DMSO was removed. At this point, 1 mL of 25 mM aqueous NaOH was added. Aliquots of the solution surrounding the gel ball (50 μL) were removed at various time points and combined with 50 μL of a 10 mM solution of **phph** in MeOH. The concentration of NaOH was evaluated by UV-visible spectroscopy by recording the intensity of the **phph** λ_{max} at 555 nm. Spectra were obtained using a quartz Starna 16.10-Q-10 sub-micro cell with 10 mm path length. The pH was also confirmed using litmus paper and a pH probe. These experiments were done in triplicate.

Rheology Studies: Gels were prepared by following the general gel-forming procedure presented above. They were then allowed to set at room temperature overnight. Rheological experiments were performed at 20 °C using the parallel plate geometry (25 mm diameter). The gel samples were allowed to equilibrate on the plate for 10 min. Frequency sweeps were performed at 1% strain from 0.1 to 100 rad/s. Strain sweeps were performed at 10 rad/sec by varying the strain from 0.1 to 100%

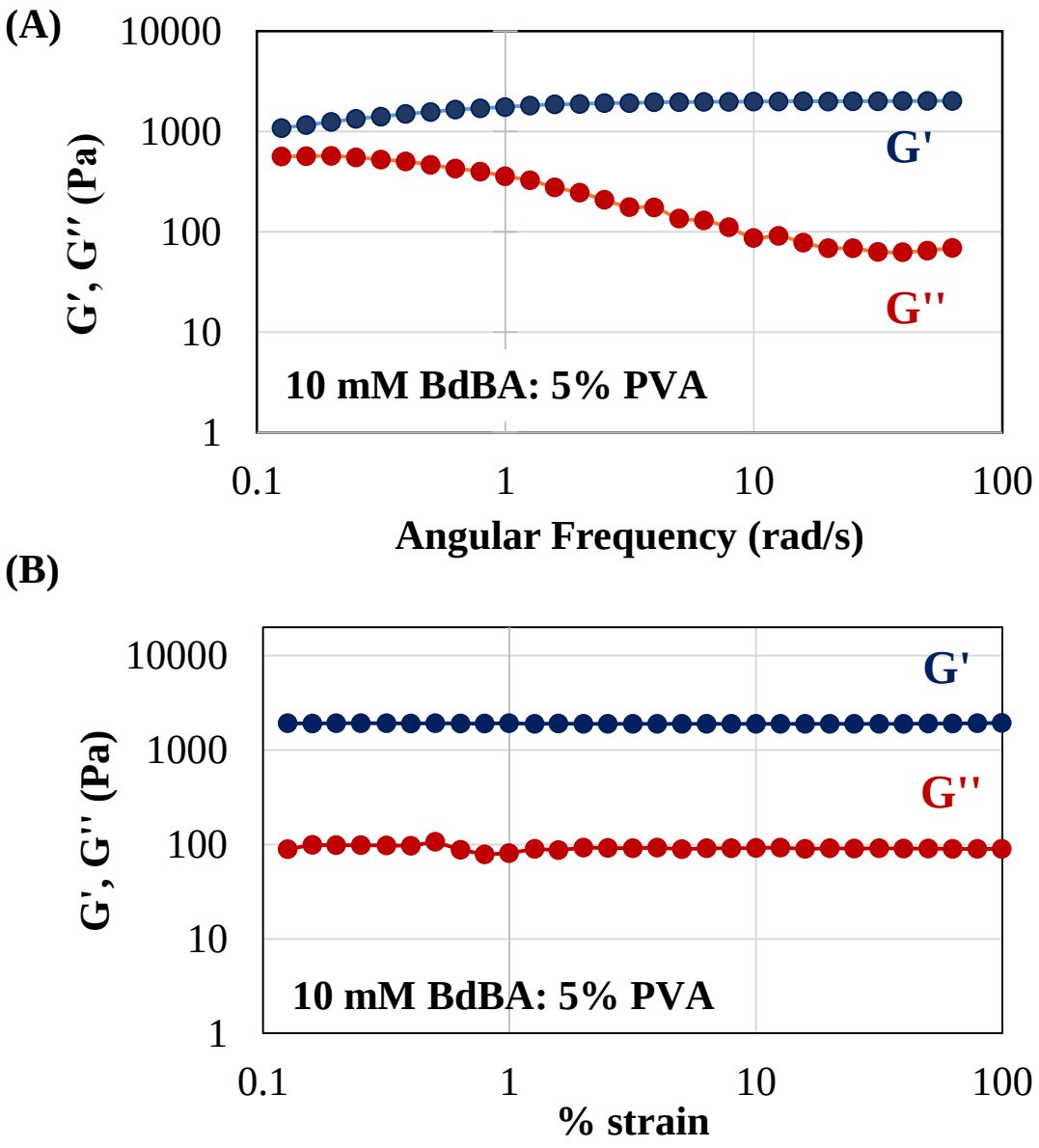

Figure S1. (A) Dynamic frequency sweep and (B) strain sweep of a **BdBA-PVA** gel (10 mM **BdBA**, 5% **PVA**).

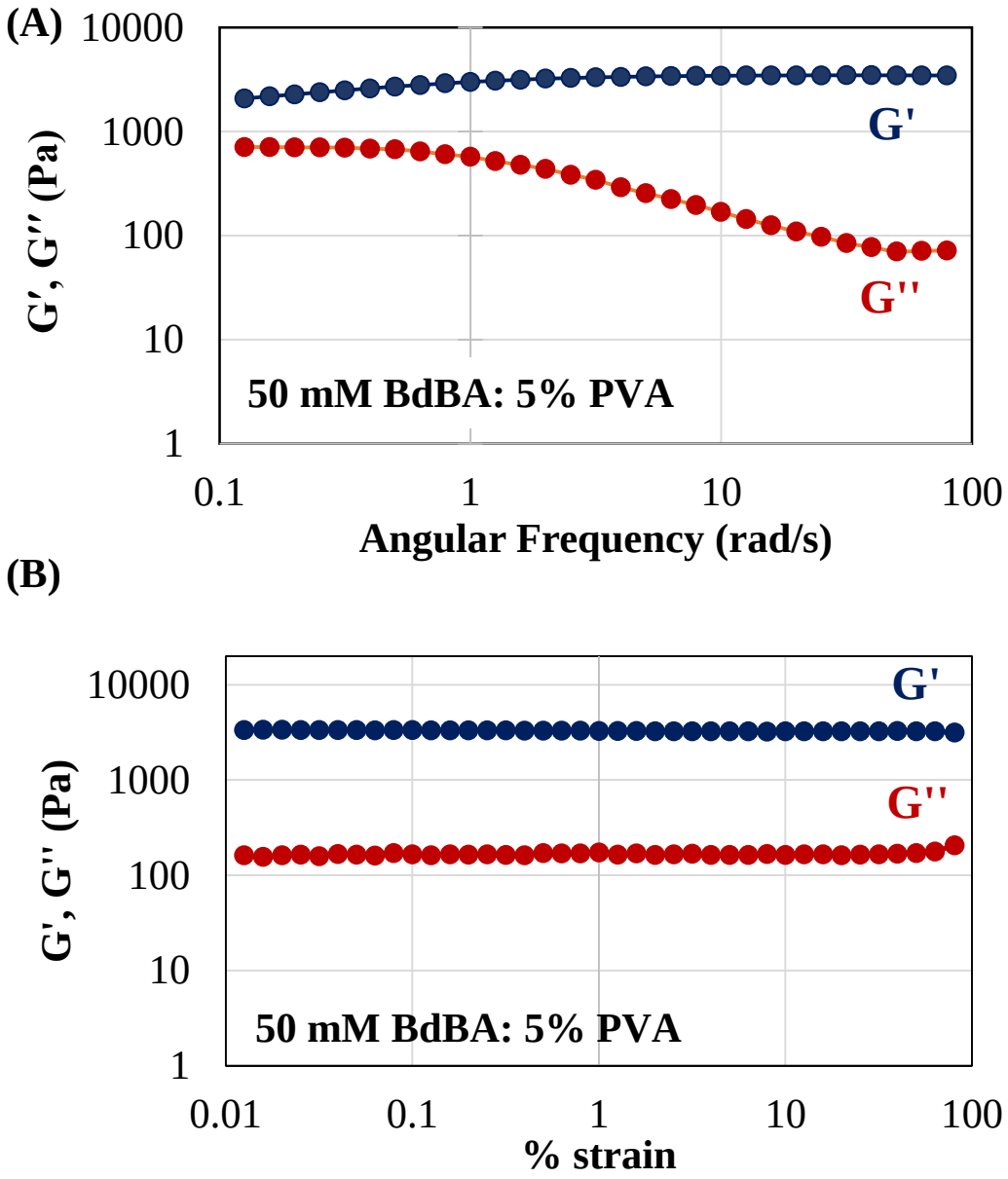

Figure S2. (A) Dynamic frequency sweep and (B) strain sweep of a **BdBA-PVA** gel (50 mM **BdBA**, 5% **PVA**).

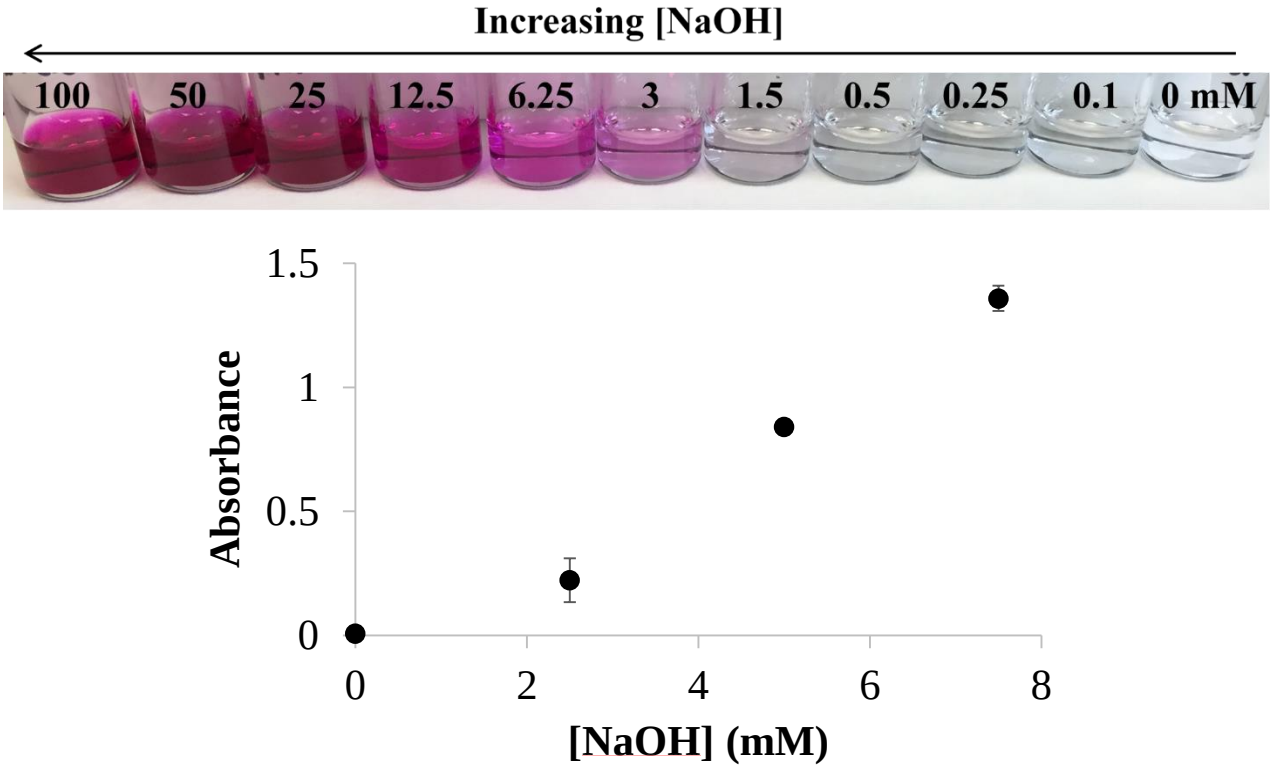

Figure S3. Visible color change seen upon treating **phph** with increasing [NaOH] (top) and changes in the UV-visible absorbance intensity at 555 nm as a function of [NaOH] (bottom) (5 mM in 50:50 H_2O:MeOH).

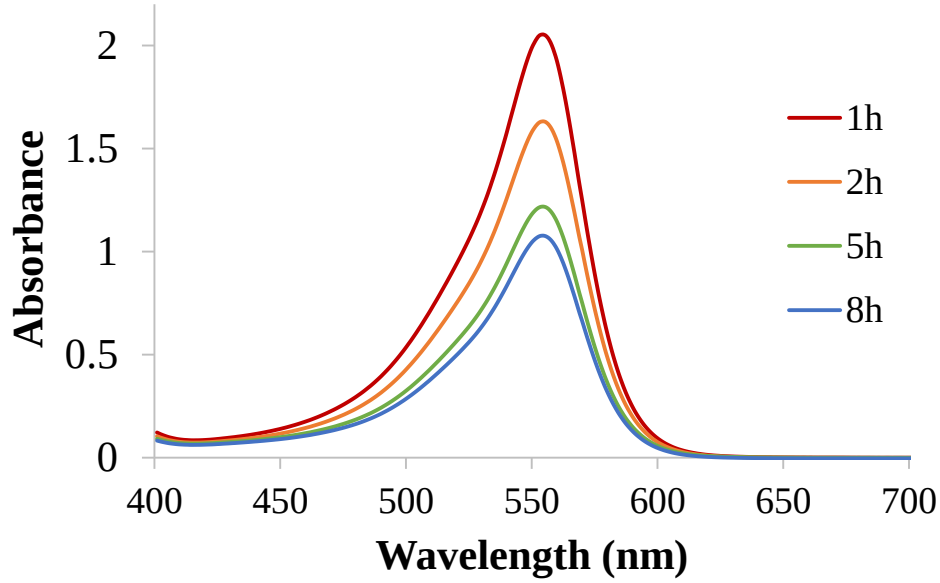

Figure S4. UV-visible spectra of mixtures of 50 µL **phph** (10 mM in MeOH) and 50 µL aliquots of the bulk aqueous NaOH solution after exposure to the **BdBA-PVA** gel (50 mM and 5%, respectively) for the indicated times. The gel was prepared to a volume of 0.3 mL and combined with 1 mL of NaOH (25 mM in H_2O).

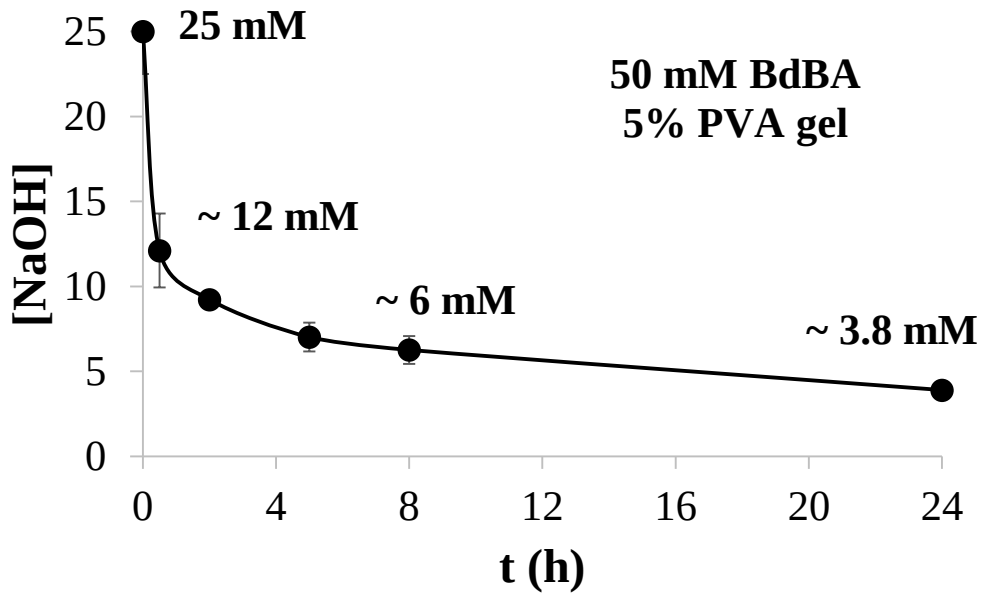

Figure S5. Decrease in [NaOH] as a function of time in the presence of the **BdBA-PVA** gel. The changes were monitored for up to 24 h. This figure provides the results from a longer time period than the corresponding figure in the main text.

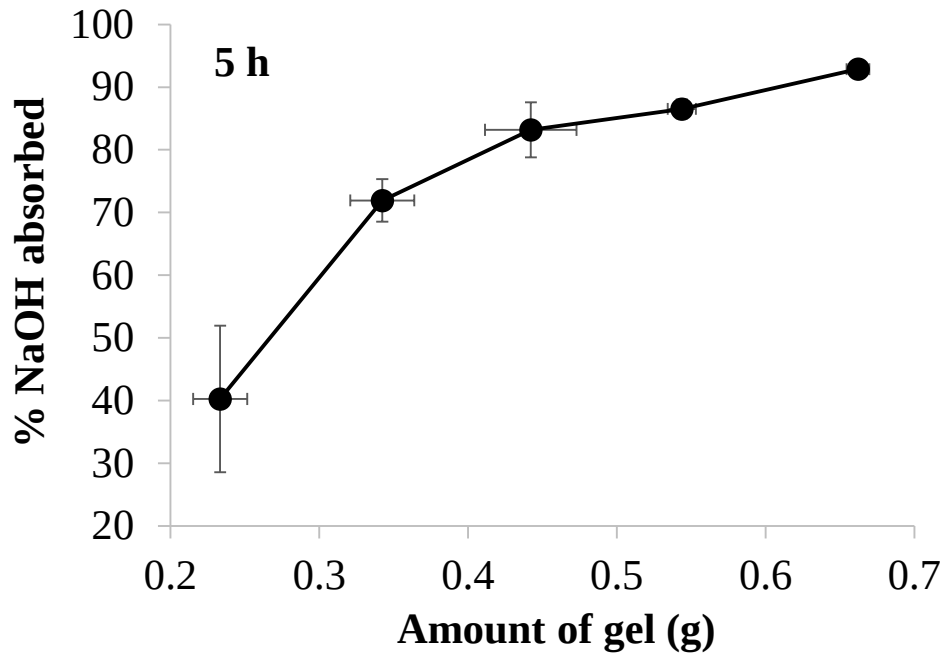

Figure S6. Plot of the % NaOH absorbed from the bulk aqueous solution after 5 h of contact with the **BdBA-PVA** gel (50 mM, 5%). Gels were prepared in vials to final volumes of 0.2, 0.3, 0.4, 0.5 and 0.6 mL using the appropriate amounts of the **BdBA** and **PVA** stock solutions. The gels were also weighed to confirm that the mass of the gel employed matched what would be expected based on the indicated volumes. To each vial, 1 mL of NaOH (25 mM in H_2O) was added and allowed to soak. After 5 h, 50 µL of the bulk NaOH solution was removed from each system and added to 50 µL of **phph** (10 mM in MeOH). UV-visible spectra were then recorded, and the concentration of NaOH absorbed was calculated using the value of the **phph** absorbance intensity at 555 nm.