

The just and true formulation of emulsions using Pemulen TR2

2% gel concentrates:

pH 6.5: Suspend 4g Pemulen TR2 into 100 mL distilled or deionized water, stir until uniform and well dispersed. Dissolve 4.0g (3.56 mL) triethanolamine into 95 mL water. With vigorous stirring, mix the Pemulen suspension with the TEA solution. Using the procedure below, adjust to pH 6.5 with additional TEA or additional Pemulen suspension.

pH 7.5: Suspend 4g Pemulen TR2 into 100 mL distilled or deionized water, stir until uniform and well dispersed. Dissolve 6.0g (5.34 mL) triethanolamine into 95 mL water. With vigorous stirring, mix the Pemulen suspension with the TEA solution. Using the procedure below, adjust to pH 7.5 with additional TEA or additional Pemulen suspension.

pH 8.5: Suspend 4g Pemulen TR2 into 100 mL distilled or deionized water, stir until uniform and well dispersed. Dissolve 6.0 grams (5.34 mL) triethanolamine and 6.2g (5.6 mL) 10% sodium hydroxide solution into 85 mL water. With vigorous stirring, mix the Pemulen suspension with the TEA/NaOH solution. Using the procedure below, adjust to pH 8.5 with additional 10% NaOH solution or additional Pemulen suspension.

To measure the pH of a Pemulen gel, remove a small amount of the gel (about 1 gram) and dilute with distilled or deionized water (about 20 mL) until the solution is an evenly dispersed liquid (about 0.1% Pemulen). Check the pH with pH indicator dye. Use the MCP pH buffer concentrate diluted with an additional 4mL of distilled or deionized water at the same pH as a reference. If the pH of the gel is low, add a bit more of the base: TEA for pHs less than 8.0, 10.0% NaOH for pH 8.5. If the pH is too high, add additional Pemulen suspension, mix well, and repeat the testing process. Note that the Pemulen is not completely reacted with the base(s) for a day or two after mixing. At that point there should be no lumps remaining in the gel.

To prepare the 1% working solution dilute the stock Pemulen gel 1:1 with other aqueous preparations. If diluting the stock gel with a single concentrated stock solution from the MCP, for each 5 mL of stock Pemulen, add 2 mL of concentrated MCP solution and 3 mL water. If adding two MCP components, add 2 mL of each MCP solution and 1 mL water to the 5 mL of stock Pemulen gel. First, break up the big lump of Pemulen into the MCP solutions with a spatula. I find that a battery-powered milk frother works wonders for dispersing the thick Pemulen stock gel in the aqueous solution.

To use your Pemulen TR2 to make an emulsion:

To make the emulsion: take the 1% working Pemulen gel mixed as above. Add any non-water soluble/miscible solvent and stir with a spatula until the Pemulen is somewhat dispersed. Use the milk frother to mix the Pemulen. It should quickly form a stable, milky-white emulsion. 10% benzyl alcohol in the Pemulen is an excellent starting point for testing the emulsion. Pemulen TR2 can make stable emulsions with as much as 40%, and sometimes more, added solvent by volume.

Pemulen is a non-volatile material. Rinse, rinse, rinse with pH adjusted water at the same pH.