

## Answer on the question #54105 – Chemistry – General chemistry

### Question:

I am highly allergic to both propylene glycol and polyethylene glycol. When I buy a new product I check ingredients from the U.S. Household Products data base to see if it is related to PG and PEG. Alternate names or synonyms are listed. How do I tell how closely linked the chemical is to PG or PEG? For example, sodium laureth sulfate lists PEG as an alternate name even though it is not an alcohol like the glycols. Thank you

### Answer:

Chemically, propylene glycol is a diol (two alcohol groups), and polyethylene glycol is a polyether (fig. 1). Though PEG has the ending alcohol group (-OH), the molar mass usually reaches 20 thousand grams per mole (that is huge, comparatively to 76 grams per mole for PG). Thus, the chemical properties of the compounds and, hence, their biological activity, are rather different.

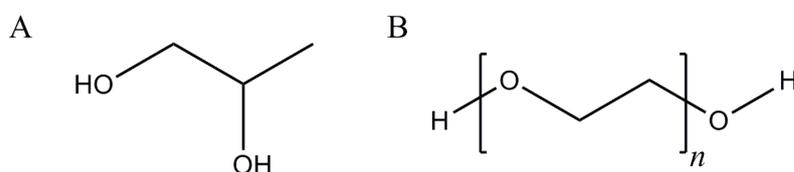


Figure 1. Chemical structures of: A – propylene glycol (PG) and B – polyethylene glycol (PEG).

Sodium laureth sulfate structure is shown on the figure 2. The similar feature of PEG and its structure is the ethoxyl groups (-CH<sub>2</sub>-O-CH<sub>2</sub>-). The number of these moieties varies from one product to another, but the common ones contain three of them, i.e. n=3.

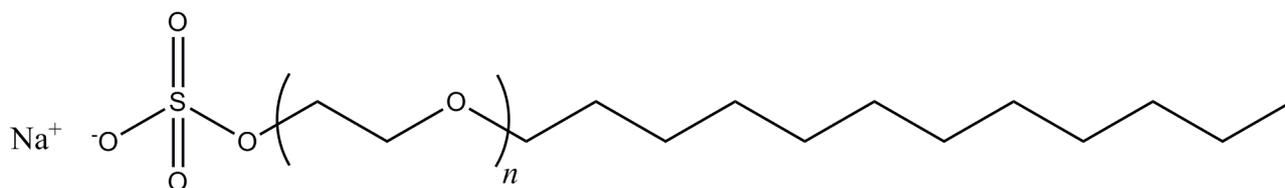


Figure 2. Structure of sodium laureth sulfate  $CH_3(CH_2)_{10}CH_2(OCH_2CH_2)_nOSO_3Na$ .

In conclusion, the chemical structure similarity is represented by alcoholic and ethoxyl groups. These compounds are usually regarded as being non-toxic, and the allergy reactions are rather rare.

