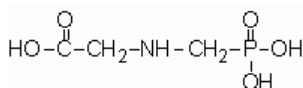


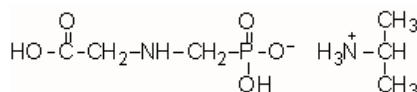
Active Ingredient vs. Acid Equivalent

C.L. Main

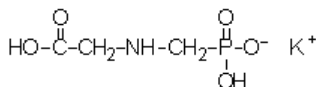
The **active ingredient** is the component of a pesticide formulation responsible for a pesticide's ability to control the target pest. Sometimes, however, the numbers preceding the formulation designation (L, EC, DF, etc.) do not indicate pounds active ingredient per gallon or pound, but rather the acid equivalent per gallon or pound. The term acid equivalent is confusing to many people. **Acid equivalent** is defined as that portion of a formulation that can be converted back to the corresponding parent acid. The distinction between the two formulation names is important when dealing with many formulations of glyphosate. The parent acid of glyphosate can be formulated as different salts.



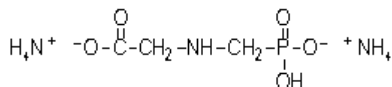
glyphosate parent acid



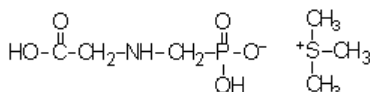
isopropylamine salt of glyphosate
(ex. Roundup Original[®], Glyphomax XRT[®])



potassium salt of glyphosate
(ex. Roundup WeatherMax[®], Roundup OriginalMax[®], Touchdown HiTech[™], Touchdown Total[™])



diammonium salt of glyphosate
(ex. Touchdown[®])



trimesium salt of glyphosate
(ex. Touchdown 5[®] *no longer available*)

Many different commercial formulations of glyphosate are available today and not all of these formulations contain the same amount of **acid equivalent**. To determine equivalent rates of two glyphosate-containing formulations you must calculate these rates based on **acid equivalent**. Compare different products of the three different salts of glyphosate:

Isopropylamine salt of glyphosate

Roundup Original[®] 4 lb. active ingredient per gallon (3 lb. acid equivalent per gallon)
Glyphomax XRT[®] 5.4 lb. active ingredient per gallon (4 lb. acid equivalent per gallon)

Diammonium salt of glyphosate

Touchdown[®] 3.65 lb. active ingredient per gallon (3 lb. acid equivalent per gallon)

Potassium salt of glyphosate

Roundup WeatherMax® 5.5 lb. active ingredient per gallon (4.5 lb. acid equivalent per gallon)
 Touchdown HiTech™ 6.17 lb. active ingredient per gallon (5 lb. acid equivalent per gallon)

Remember, the acid portion of a salt formulation binds at the target site and is responsible for herbicide activity.

Calculating the amount applied:

Further comparison of these products illustrates errors that can occur during application which lead to decreased herbicidal activity or increased herbicide costs.

The registered use rate for **Roundup WeatherMax®** in most situations is 22 fluid ounces per acre or 0.77 lb. acid equivalent per acre:

$$\frac{22 \text{ fluid oz.}}{\text{acre}} \times \frac{1 \text{ gal. product}}{128 \text{ fluid oz.}} \times \frac{4.5 \text{ lb. acid equivalent}}{1 \text{ gal. product}} = \frac{0.77 \text{ lb acid equivalent}}{\text{acre}}$$

If you apply 22 fluid ounces per acre of other formulations, you will apply different amounts of acid equivalent per acre:

Roundup Original®

$$\frac{22 \text{ fluid oz.}}{\text{acre}} \times \frac{1 \text{ gal. product}}{128 \text{ fluid oz.}} \times \frac{3 \text{ lb. acid equivalent}}{1 \text{ gal. product}} = \frac{0.52 \text{ lb acid equivalent}}{\text{acre}}$$

Glyphomax XRT®

$$\frac{22 \text{ fluid oz.}}{\text{acre}} \times \frac{1 \text{ gal. product}}{128 \text{ fluid oz.}} \times \frac{4 \text{ lb. acid equivalent}}{1 \text{ gal. product}} = \frac{0.69 \text{ lb acid equivalent}}{\text{acre}}$$

Touchdown HiTech™

$$\frac{22 \text{ fluid oz.}}{\text{acre}} \times \frac{1 \text{ gal. product}}{128 \text{ fluid oz.}} \times \frac{5 \text{ lb. acid equivalent}}{1 \text{ gal. product}} = \frac{0.86 \text{ lb acid equivalent}}{\text{acre}}$$

If you want to apply 0.75 lb acid equivalent per acre of these formulations you need to apply the following fluid ounces of product per acre:

Roundup Original®

$$\frac{0.75 \text{ lb. acid equivalent}}{\text{acre}} \times \frac{1 \text{ gal. product}}{3 \text{ lb. acid equivalent}} \times \frac{128 \text{ fluid oz.}}{1 \text{ gal. product}} = \frac{32 \text{ fl. oz.}}{\text{acre}}$$

Glyphomax XRT[®]

$$\frac{0.75 \text{ lb. acid equivalent}}{\text{acre}} \times \frac{1 \text{ gal. product}}{4 \text{ lb. acid equivalent}} \times \frac{128 \text{ fluid oz.}}{1 \text{ gal. product}} = \frac{24 \text{ fl. oz.}}{\text{acre}}$$

Touchdown HiTech[™]

$$\frac{0.75 \text{ lb. acid equivalent}}{\text{acre}} \times \frac{1 \text{ gal. product}}{5 \text{ lb. acid equivalent}} \times \frac{128 \text{ fluid oz.}}{1 \text{ gal. product}} = \frac{19 \text{ fl. oz.}}{\text{acre}}$$

Clearly, reading and following label guidelines will prevent applying an incorrect amount of glyphosate possibly reducing the cost of such applications.

What about weed control differences?

Differences in weed control with the various glyphosate products are likely to be caused by differences in the adjuvants included in the formulated products rather than the salt used in the formulation. Adjuvant recommendations vary according to the particular product used. **When equivalent rates of glyphosate are used and label recommendations for additives are followed, the likelihood of seeing a difference in weed control among glyphosate products is very small.** Registered uses of the various glyphosate products are different. For example, most commonly available glyphosate products are registered for burndown in no-till situations. Only certain brands and formulations are registered for postemergence application to Roundup Ready corn or cotton, or for application to cotton when using hooded sprayers.