

Weathering, alkalinity, and acidity across the periodic table

			C	N	
Na	Mg	Al	Si*	P*	S
K	Ca	Sc	Ti	V	Cr
Rb	Sr	Y	<p>Elements that, when weathered at the Earth surface, lead to neither more alkaline nor more acidic solutions:</p> $\text{SiO}_2 + 2\text{H}_2\text{O} \rightarrow \text{Si(OH)}_4^0$		
	Ba	REEs			

Elements that, when weathered from reduced form in the oxidizing Earth-surface environment, lead to more acidic solutions:



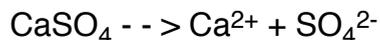
Acids

Elements that, when weathered from silicates at the Earth surface, lead to more alkaline solutions:



Alkalinity

Note the careful wording at left about "from silicates" and at right about "from reduced form". As a counter-example, weathering of anhydrite by dissolution involves Ca (not in a silicate) and S (oxidized rather than reduced) and thus produces neither alkalinity nor acidity:



Note that the blue side of this table characterizes the weathering of silicate minerals, which dominate Earth's crust. The red side, on the other hand, represents the weathering of a small proportion of the crust. That's why weathering as a whole makes acidic waters (e.g., rainwater and soil water) more alkaline (like groundwater and, ultimately, like seawater).

* At the Earth surface, P exists in very small quantities as phosphide from extraterrestrial or mantle sources, and the same is true of Si with silicides. Weathering of these reduced phases would lead to acidity. However, the known volume of silicide and phosphide phases near the Earth surface would probably fit in a trash can and can therefore be ignored in generalizing about oxidation and weathering at Earth's surface.