

~~Chemical reactions~~

- ① what is cement? chemical reactions
- ② Sulfate attack chemical reaction ✓
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Sulfate attack in mortar and concrete may be 'Internal' or 'external'. The internal attack is caused by incorporating soluble source into concrete during the time of mixing, for example gypsum in aggregate. The external sulfate attack is caused when sulfates penetrate in solution, for instance in ground water, into concrete from the outside (Cohen, 2006). o/c

External sulfate attack

External sulfate attack is the most familiar type and characteristically takes place where water that contains sulfate which is dissolved infiltrates into concrete. A practically well illustrated reaction frontage may often be viewed in sections that are polished; further front concrete is ordinary, or close to ordinary. At the back of reaction front, the concrete's microstructure and composition would have altered. The changes can vary in severity or type, but generally include; loss of tie between aggregate and cement paste; wide cracking, and expansion. (ref.)

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Changes in the composition of paste take place, with mono-sulfate stage changing to *ettringite* and in afterward phases, formation of gypsum. The required extra calcium is given by *calcium silicate hydrate* and *calcium hydroxide*, contained in cement paste. The consequence of these alterations is a general loss of the strength of concrete. These effects are characteristic of attack from solutions of potassium sulfate or sodium sulfate. Solutions that contain *magnesium sulfate* are normally extra aggressive, for equivalent concentration. The reason for this is that; magnesium too plays a role within the reaction, by substituting the calcium contained in solid