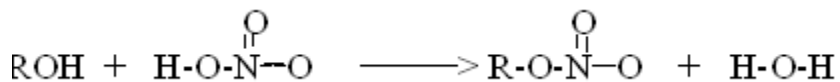


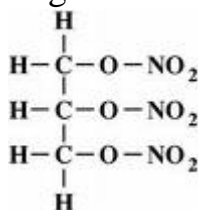
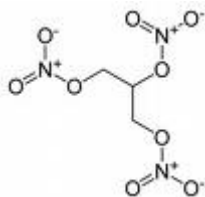
4.16 Nitrate Esters

Esters of biological importance can also be formed from the inorganic acids nitric acid and phosphoric acid.



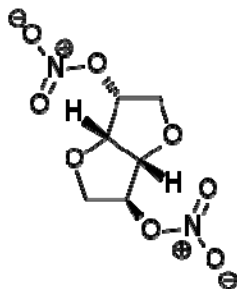
In nitrate esters the N=O bond is analogous to the C=O in regular esters.

An important example of medically important nitrate esters is **nitroglycerin**. Although developed as an explosive, it also turns out to be an excellent **vasodilator**. Vasodilation allows more blood to flow and nitroglycerin is primarily used to treat angina. Angina occurs when the heart is not getting sufficient oxygenated blood, usually due to clogged coronary arteries. Here are two different ways of drawing the structure of nitroglycerin.



Unfortunately the liver has enzymes which can hydrolyze nitroglycerin (to glycerin and nitrate ions) so quickly that very little active drug actually gets to the coronary arteries when the drug is taken orally. As a result nitroglycerin is typically taken as a capsule that is placed under the tongue where it is absorbed directly into the bloodstream, bypassing the GI tract.

Isosorbide dinitrate is another nitrate ester molecule that can cause vasodilation which is not metabolized as quickly as nitroglycerin and can be taken orally



Isosorbide dinitrate