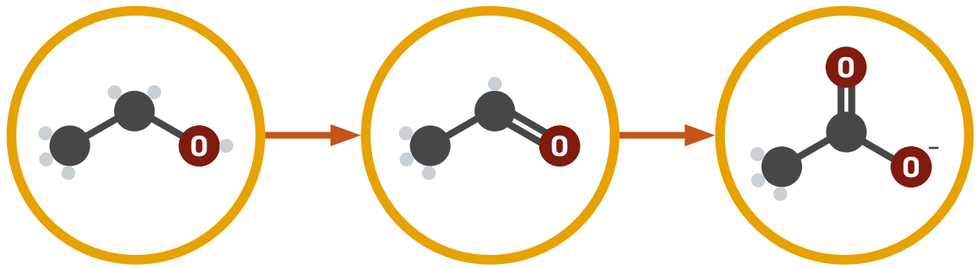
The Chemistry of a Hangover

COMPOUND INTEREST

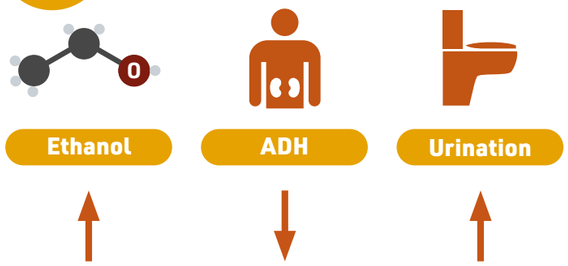
For most of us, a hangover is the price to pay for a night of drinking. However, we still don't know what exactly it is that causes them. In this graphic, we look at what happens to alcohol in your body, and some of the prime suspects for causing your hangover.



What happens to alcohol in your body?

In the liver, the alcohol dehydrogenase enzyme converts ethanol to acetaldehyde. The aldehyde dehydrogenase enzyme then converts acetaldehyde into acetate. Acetate is broken down into carbon dioxide and water, then eliminated from the body. On average, the liver breaks down alcohol at the rate of one unit (8 grams or 10 millilitres of pure alcohol) every hour.

1 Dehydration

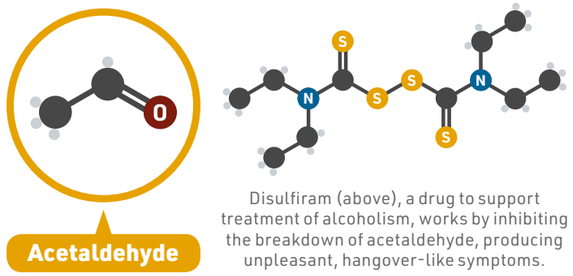


During alcohol intoxication, release of the anti-diuretic hormone (ADH) vasopressin is decreased, increasing urination.

Alcohol has a diuretic effect on the body, increasing urine production. Alcohol-induced dehydration has been suggested as a cause for some hangover symptoms, but research suggests it isn't a major factor.

2 Acetaldehyde

Acetaldehyde is rapidly converted into acetate in the liver.

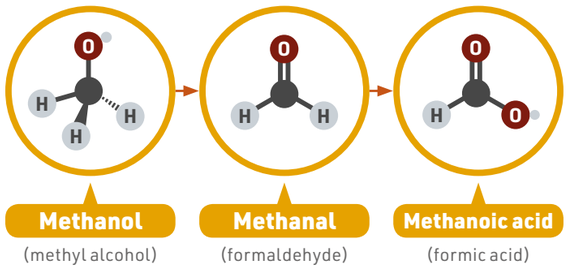


Disulfiram (above), a drug to support treatment of alcoholism, works by inhibiting the breakdown of acetaldehyde, producing unpleasant, hangover-like symptoms.

Acetaldehyde, produced by the breakdown of alcohol, has toxic effects that could cause hangover symptoms. However, acetaldehyde concentration doesn't significantly correlate with hangover severity.

3 Congeners

Very small amounts of methanol are found in many alcoholic drinks.



Congeners are compounds other than ethanol in drinks. These include alcohols such as methanol, which breaks down into toxic formaldehyde and formic acid. Congeners can increase hangover severity.

4 Immune system

Cytokines are small proteins released by cells which affect other cells. They play an important role in the immune system.

In particular, IL-12 & IFN-γ concentration changes show significant correlations with hangover severity.

Alcohol causes changes in cytokine concentrations in the immune system. Studies have shown the effects caused by some cytokines are very similar to those of a hangover, strongly supporting their role.