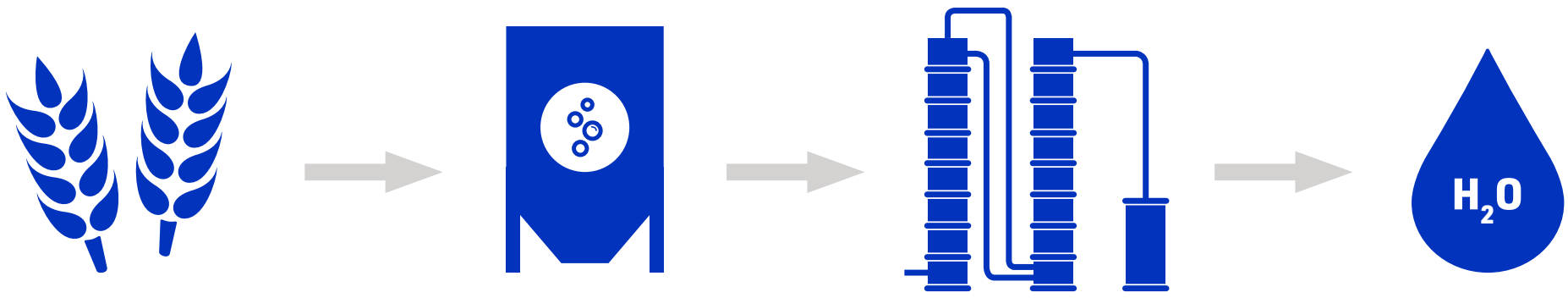
The Chemistry of Vodka

COMPOUND INTEREST



RAW MATERIALS

Traditionally made using cereal grains or potatoes

FERMENTATION

Yeast added to mash to make approx 16% alcohol solution

DISTILLATION & FILTRATION

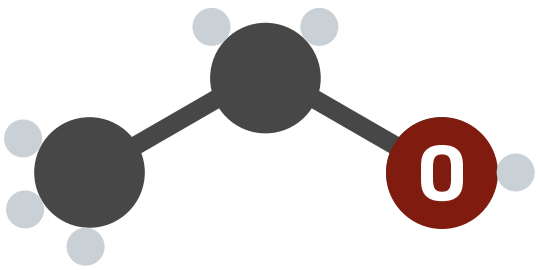
Removes most impurities and concentrates alcohol up to 96%

DILUTION

Water is added to the alcohol to dilute it to 40%

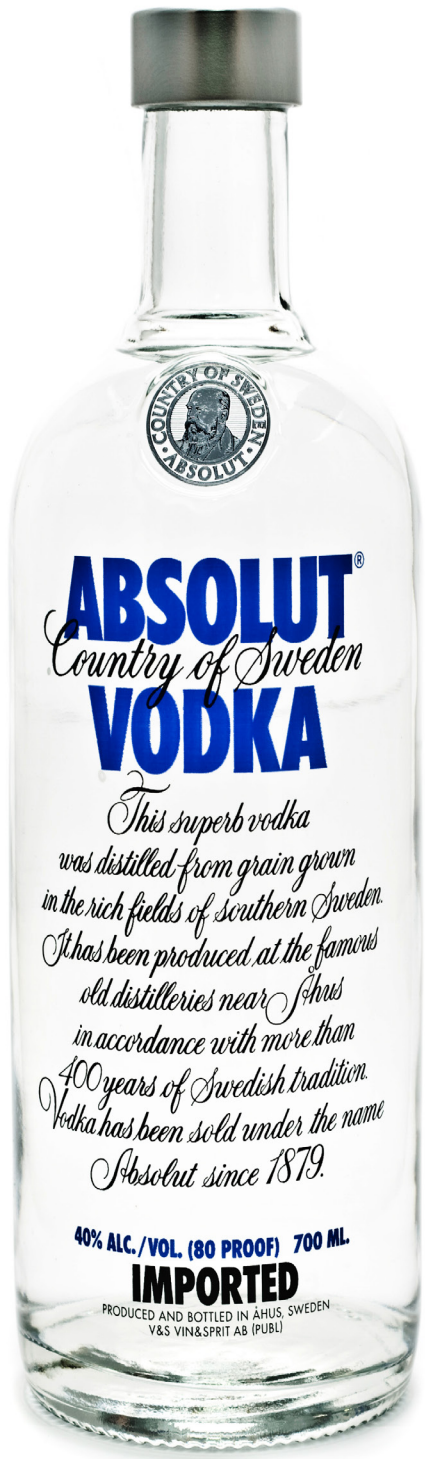
In the USA and Europe, most manufacturers filter vodka through activated charcoal to remove impurities. More traditional methods keep filtration to a minimum, instead using accurate distillation to remove impurities.

Ethanol hydrates



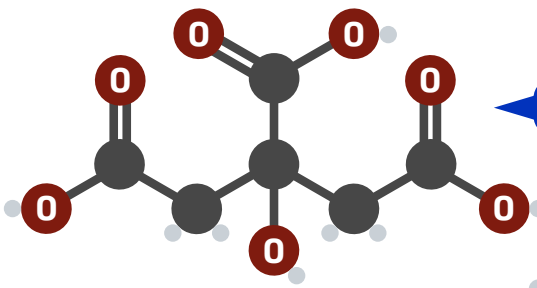
Ethanol

Ethanol and water molecules in vodka can bunch together in clusters called hydrates. The most common hydrate has a cage-like structure, and around five water molecules to every ethanol molecule. This hydrate varies in concentration in different vodkas, and it's been suggested it may affect a taster's perception of vodka (though this hypothesis is yet to be confirmed).

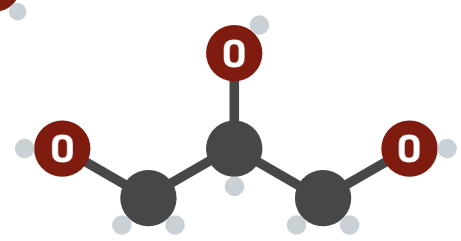


Additives

Vodka can sometimes be more than just ethanol and water. Most countries permit some additives. These include citric acid, which is permitted up to 0.1% by volume, glycerol, and sugar (maximum of 0.2% by volume). These additives do not need to be disclosed on the label.



Citric acid



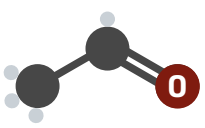
Glycerol

Both added as 'smoothing agents'

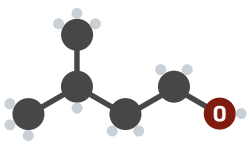
Manufacturers also use additives to produce flavoured vodkas. One of the best-known is Żubrówka, a vodka of Polish origin flavoured using bison grass. The bison grass gives it a yellowish colouring but also leads to the vodka containing coumarin. Coumarin has minor liver toxicity in large amounts and so Żubrówka was banned in the USA until a coumarin-free version could be formulated.

Impurities

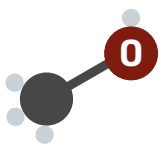
Though distillation and filtration removes most impurities in vodka, milligram amounts of some compounds, including those shown below, can remain. Cheaper brands of vodka tend to have a larger amount of remaining impurities, which could affect flavour perception.



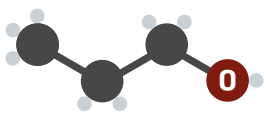
Acetaldehyde



Isoamyl alcohol



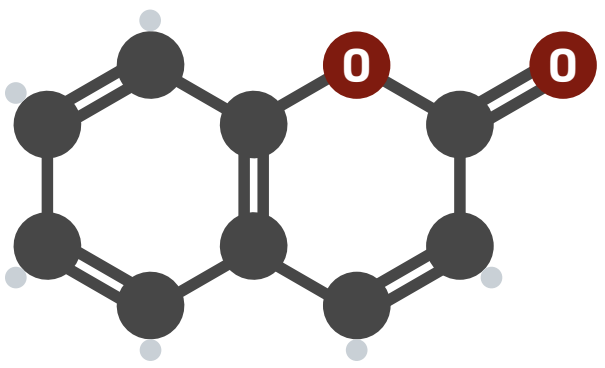
Methanol



Propanol

KEY

- Carbon
- O Oxygen
- Hydrogen



Coumarin