

# ALCOHOL AND ALCOHOL TOLERANCE

A photograph of two glasses of beer on a table. The glass on the left is a tulip-shaped beer glass filled with a golden beer topped with a thick white head of foam. The glass on the right is a tall, slender flute glass, also filled with beer and foam, with a stream of beer being poured into it from above. The background shows a white tablecloth with a red ribbon and some folded white napkins.

# ALCOHOL

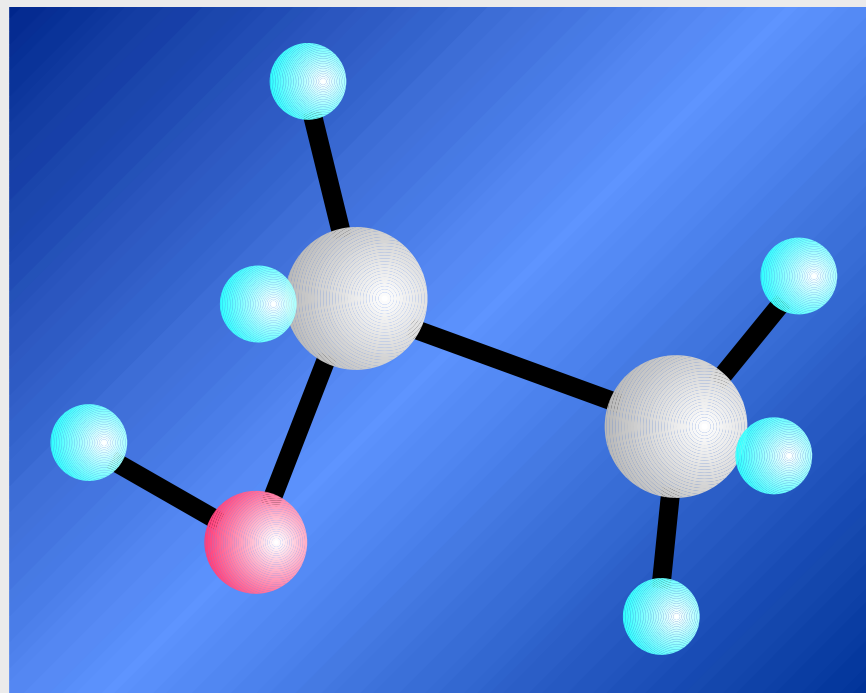
**Alcohols** are organic chemical compounds consisting of a chain of carbon atoms on which one or more of the hydrogen atoms are replaced by one or more hydroxyl (-OH) groups.

The general formula is as follows:



# ALCOHOL IN BEVERAGE FORM

When alcohol is referred to in the context of beverages, generally **ethanol** or **ethyl alcohol** ( $\text{C}_2\text{H}_5\text{OH}$ ) is meant.



# ALCOHOL IN BEVERAGE FORM

**Ethanol** is produced by fermentation of starch and sugar. Pure ethanol is a colourless and tasteless liquid which mixes easily with water.

The familiar taste of alcohol develops as a result of the by-products of alcohol production.

Methods of producing alcohol:

☞ fermentation

☞ distillation.

Maximum alcohol concentration achieved by fermentation:  
approx. 15 % by vol.

Concentrations > 15 %:  
distillation

# ALCOHOL CONTENT OF VARIOUS DRINKS

<b>Drink</b>	<b>approx. % by vol.</b>	<b>gram alcohol in 0,3 l</b>
Lager	4	9
Export beer	5	11
Strong beer	up to 8,5	up to 20
<b>gram alcohol in 20 ml</b>		
Gin	40	6
Cognac	42	7
Whisky	43	7
Wodka	43	7
Rum	80	13
<b>gram alcohol in 150 ml</b>		
Sherry, Port	22	26
Sparkling wine	9-14	14
Fortified wine	12	14

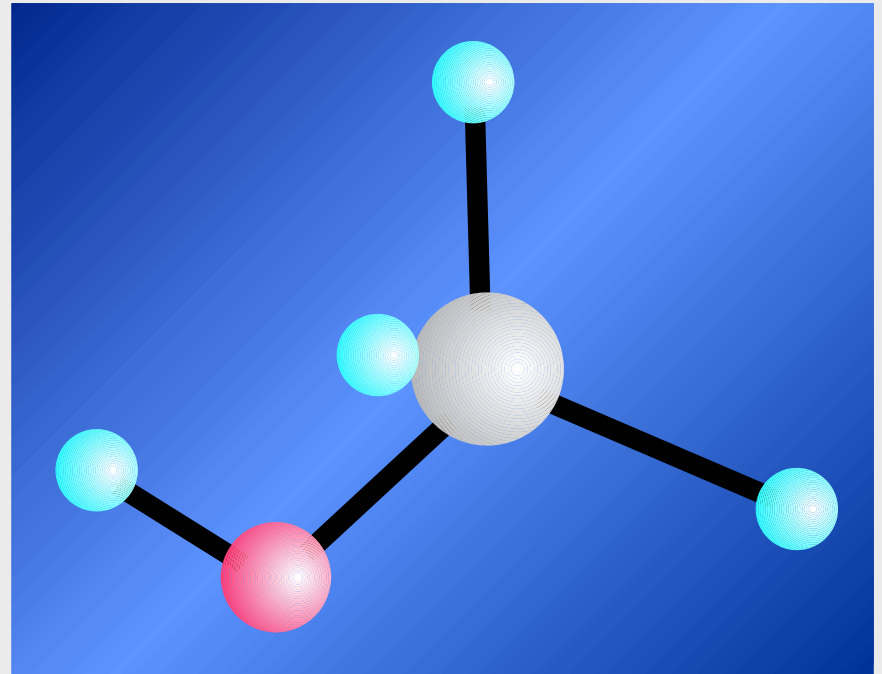
# OTHER ALCOHOLS

## METHANOL

### Methanol (or methyl alcohol)

is a type of alcohol with just one carbon atom, three hydrogen atoms and the -OH group.

This type of alcohol is highly toxic and can result in blindness.

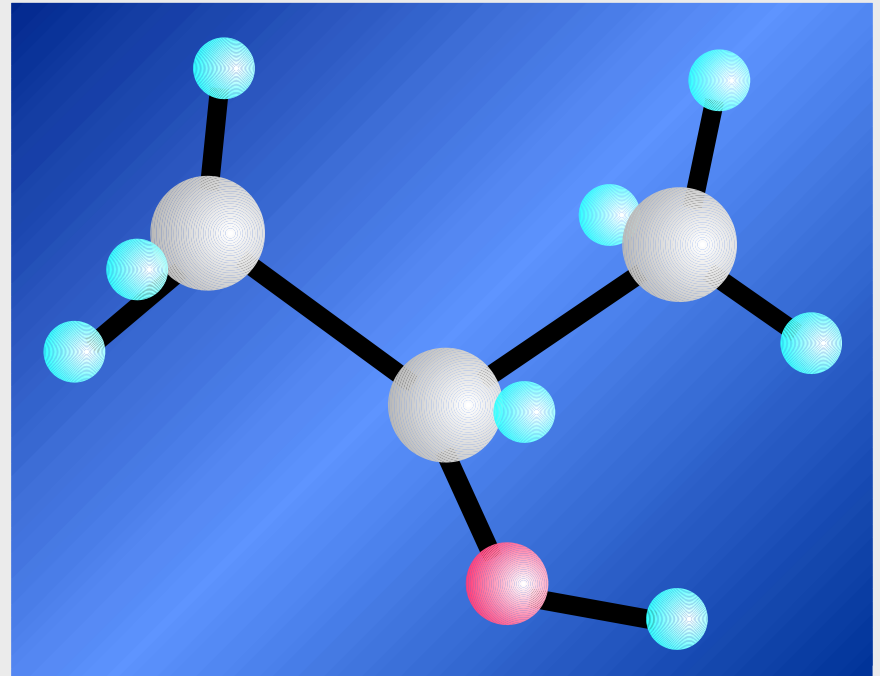


# OTHER ALCOHOLS

## PROPANOL

Propanol (or propyl alcohol)  
contains three carbon atoms in  
the formula.

This type of alcohol is not  
normally consumed by humans  
and is often used as a solvent or  
antifreeze.



# ALCOHOL TOLERANCE



# ALCOHOL TOLERANCE



Varies greatly  
from one person  
to another

Critical daily consumption:

**Man:** 60 g pure alcohol  
(~ 1 l wine;  
1.5 l normal-strength beer;  
9 units of spirits of 20 ml  
each  
(32 % alcohol))

**Woman:** slightly less

**Child:** particularly sensitive

# ALCOHOL TOLERANCE

## Factors influencing the effect of alcohol:

- Constitution
- Climate
- Physical condition (tiredness, hunger, stomach contents)
- Predisposition
- Habits

If a certain level is exceeded, the result is

- acute

or

- chronic

alcohol poisoning.

# ACUTE ALCOHOL POISONING



Generally harms only the nervous system



Normal intoxication

# ACUTE ALCOHOL POISONING

➡ Alcohol has a disinhibiting effect on the cerebral cortex

- happy and relaxed mood
- increased feeling of self-worth
- greater need to talk to other people

➡ Paralysis stage

- speech becomes slurred
- person starts to stagger and walk unsteadily
- occasionally results in severe agitation, excitement or arousal

From a medical point of view, this is not generally harmful so long as drinking stops once the paralysis stage is reached.

# CHRONIC ALCOHOL POISONING



damages the nervous system



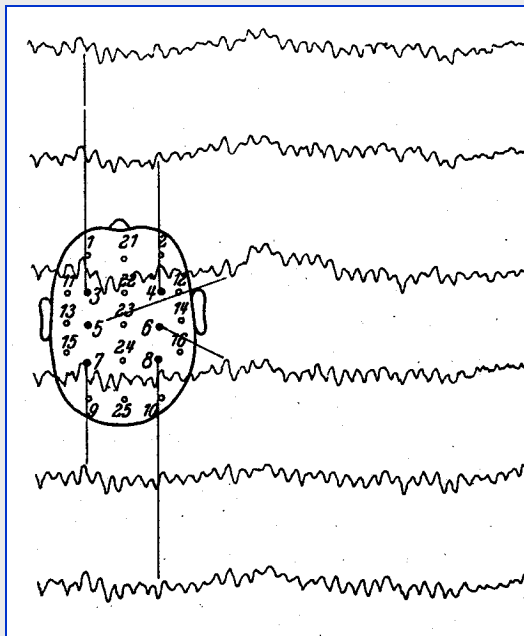
normal intoxication



damages heart, vessels, liver,  
kidney, stomach lining etc.

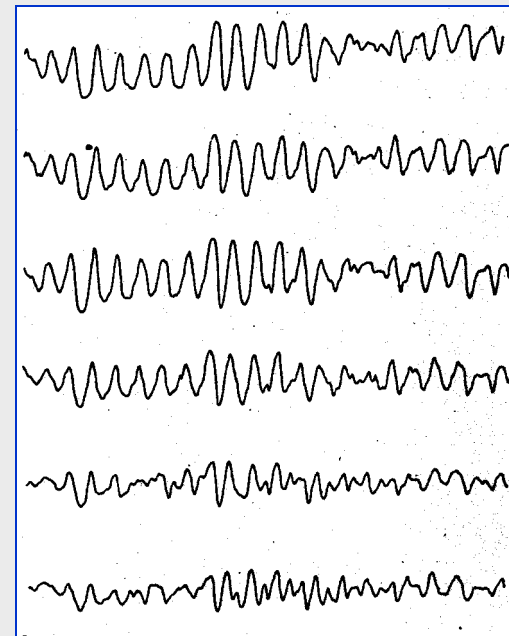
## Alcohol and bioelectric cerebral cortex activity (EEG)

**Before drinking starts**



↔  
**1 sec**

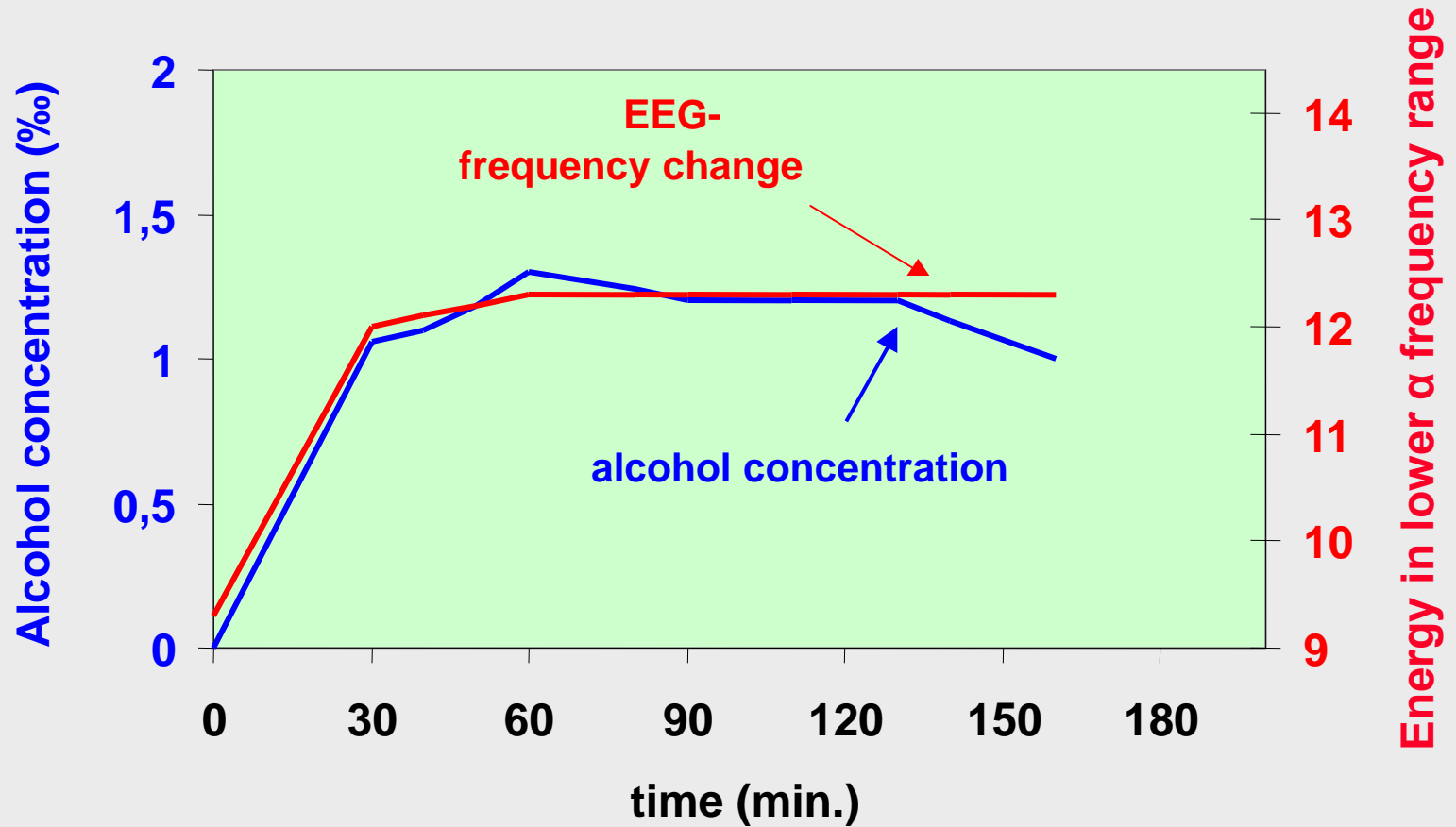
**BrAC = 1,6 ‰**



↔  
**1 sec**

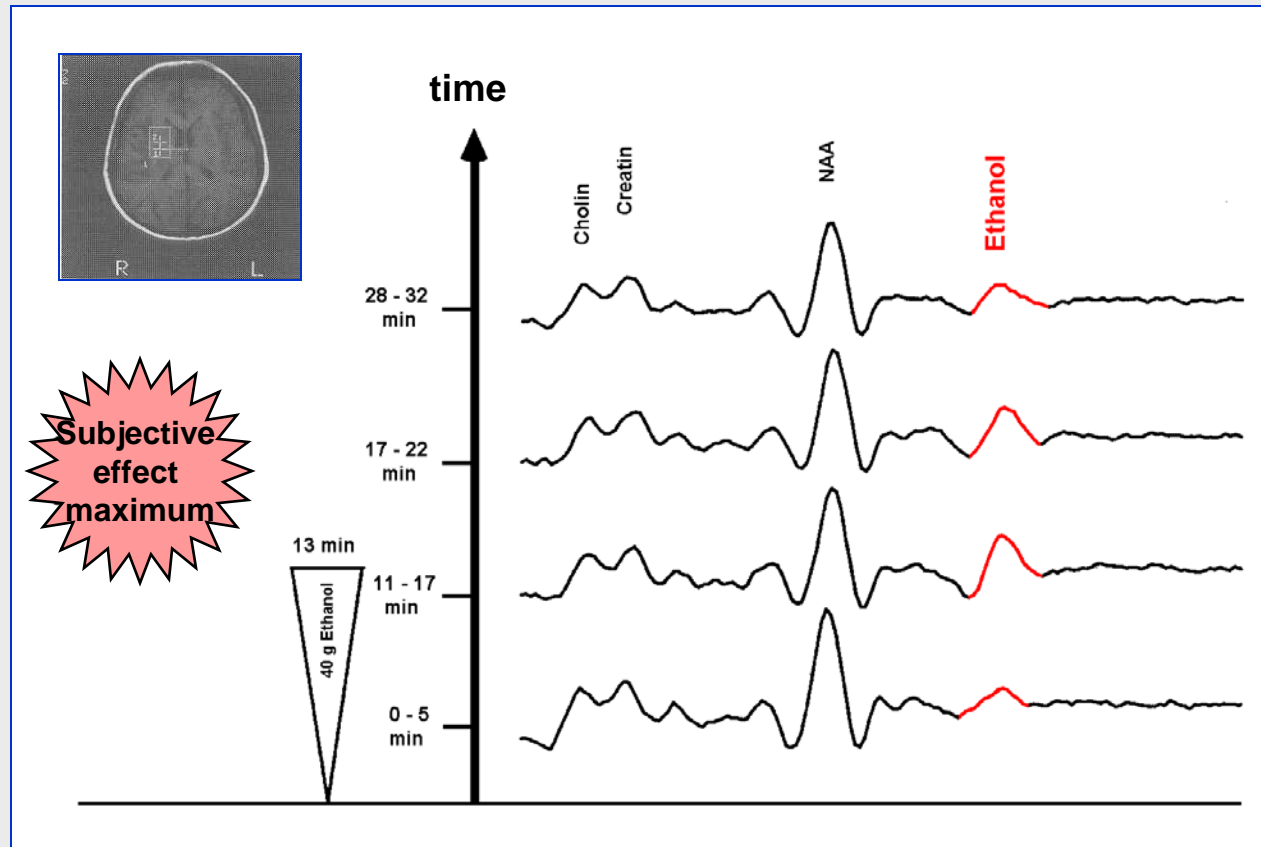
H.Caspers, G.Abele (Münster): Dtsch.Z.gerichtl.Med. 45, 492 (1956)

## Alcohol concentration and EEG frequency change



V.E.Pollock et al. (Los Angeles): Arch. Gen. Psychiatry. 40, 857 (1983)

## Ethanol uptake in the basal ganglia of the brain (magnetic resonance spectroscopy)



R.Amberg, R.Fürmaier, H.Hirt, R.Urbach (Freiburg, Mainz): Blutalkohol 39, 61 (2002)



**One draught  
above heat  
makes him a fool,  
the second mads him and  
a third drowns him!**

**Shakespeare  
(from "Twelfth Night")**