

2,3-butanedione

ASSESSMENT

Without covering the glass, swirl the beer to release the aroma. Take a single short sniff. Repeat as necessary.

THRESHOLD

10 – 40 µg/l

ORIGINS

Produced in beer from a precursor formed by yeast during fermentation. Can also be formed by contaminant lactic acid bacteria.



CONFUSIONS

- Butyric acid
- Vanillin
- Isobutyraldehyde

IMPORTANCE

Desirable flavor in some ales, stouts and lagers, eg Pilsner. Off-flavor in other lager beers. Considerable efforts are made by breweries to tightly control this flavor character.

REMARKS

2,3-Butanedione is one of two vicinal diketones found in beer. The ratio of diacetyl to pentanedione concentrations can be used as an indicator of bacterial contamination in beer.

CAS NUMBER

431-03-8

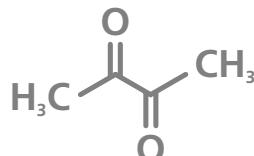
OFF-FLAVOR KIT

available from www.cicerone.org



Diacetyl

"like butter, or
butter popcorn"



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beer

flavor standard

dimethyl sulfide

ASSESSMENT

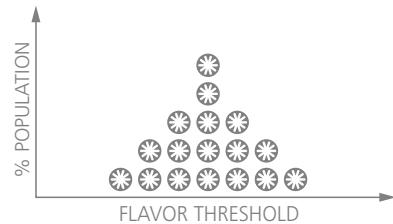
Without covering the glass, swirl the beer to release the aroma. Take a single short sniff. Repeat as necessary.

THRESHOLD

30 - 50 µg/l

ORIGINS

Formed from malt-derived precursors, primarily during wort production and – to a lesser extent – during fermentation.



CONFUSIONS

- Methyl thioacetate
- Ethanethiol
- Dimethyl trisulphide

IMPORTANCE

Desirable flavor in some pale lager beers and ales. Off-flavor in other beers. Excessive levels are indicative of growth of contaminant bacteria during fermentation.

REMARKS

The perception of dimethyl sulfide is influenced by the presence of aromatic higher alcohols such as 2-phenylethanol in beer.

CAS NUMBER

75-18-3

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available from www.cicerone.org



DMS

"like sweetcorn or
tomato sauce"



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beer flavor standard acetaldehyde

ASSESSMENT

Cover the beer with your hand and swirl the glass to release the aroma. Remove your hand and take a single long sniff. Repeat as necessary.

THRESHOLD

5 mg/l

ORIGINS

Produced by yeast during fermentation. Indicative of fermentation problems and poor control of dissolved oxygen in packaging.



CONFUSIONS

- Ethyl hexanoate
- 2,4,6-Trichloroanisole
- *cis*-3-Hexenol

IMPORTANCE

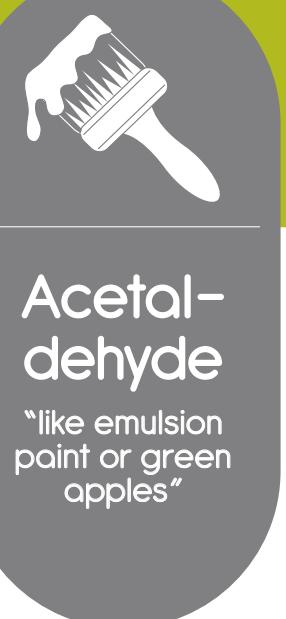
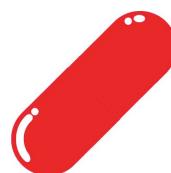
Present in all beers. Characteristic flavor of some beer styles, eg Bière de Garde. Off-flavor at high concentrations.

REMARKS

The flavor impact of acetaldehyde is influenced by the sulphur dioxide concentration in the beer.

CAS NUMBER

75-07-0



3-methyl-2-butene-1-thiol

ASSESSMENT

Best detected by smelling the beer at a distance. Hold the glass at arm's length and take short sniffs to prevent the risk of adaptation.

THRESHOLD

4 – 30 ng/l

ORIGINS

Formed as a result of exposure of beer to daylight or artificial light. This initiates a reaction involving hop bitter acids, vitamins and sulphur compounds. Small amounts are also formed in beer production.



CONFUSIONS

- Sulphur dioxide
- *cis*-3-Hexenol
- Ethanethiol

IMPORTANCE

Off-flavor associated with exposure to light of beer packaged in clear or green glass. Consumers are very tolerant of this off-flavor. Many successful beers contain this flavor at the point of consumption.

REMARKS

Beers which have been bittered with chemically-modified hop extracts do not develop this character.

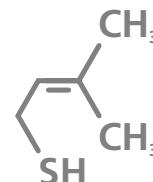
CAS NUMBER

5287-45-6



Light-struck

"like a skunk or
freshly brewed
coffee"



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trans-2-nonenal

ASSESSMENT

Without covering the glass, swirl the beer to release the aroma. Take a single short sniff. Repeat as necessary.

THRESHOLD

50 – 250 ng/l

ORIGINS

Formed in malt and wort production where it binds to malt proteins. Carried through the brewing process in this bound form. Released during storage of finished beer in pack.



CONFUSIONS

- 2,4,6-Trichloroanisole
- 2-Ethyl fenchol
- Isobutyraldehyde

IMPORTANCE

Off-flavor in beer associated with ageing. Formation of this flavor is more pronounced when precautions have not been taken in relation to minimizing process oxidation.

REMARKS

Sulphur dioxide in beer reversibly reacts with *trans*-2-nonenal to reduce its flavor impact.

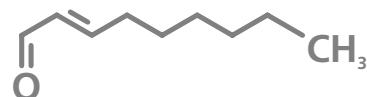
CAS NUMBER

18829-56-6



Papery

"like cardboard
or oxidized beer"



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infection

ASSESSMENT

Without covering the glass, swirl the beer to release the aroma. Take a single short sniff. Repeat as necessary.

THRESHOLD

Different for each component

ORIGINS

Improperly cleaned draft lines can harbor bacteria that release several off-flavors into beer.

CONFUSIONS

- Acetic acid (Vinegar)
- Diacetyl

IMPORTANCE

This combination of flavors indicates poor draft system sanitation.

REMARKS

This standard includes multiple flavors: acetic acid, 2,3-butanedione and citric acid.



Infection

"like bile, or
stomach acid."

INFECTION:

Components are acetic acid, citric acid and 2,3-butanedione

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