



# Dimethyl Sulfide

Use in vegetable, fruit, dairy, brown, fermented, and seafood and meat flavors

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**D**imethyl sulfide (FEMA# 2746, CAS# 75-18-3) (**F-1**) smells of boiled cabbage.<sup>a</sup> Now, I quite like boiled cabbage but even I have to admit that such an odor description hints at a relatively restricted range of uses. However, in practice the exact opposite is true. Dimethyl sulfide is potentially one of the most useful raw materials available to flavorists. It has a unique character and is extraordinarily difficult to replace. The closest alternative is dimethyl disulfide (FEMA# 3536, CAS# 624-92-0), which is less volatile but adds a rather dirty note to the cabbage character and has a much more restricted range of useful applications.

Dimethyl sulfide does suffer from two drawbacks. The first is its relative volatility, which means the use level has to be adjusted carefully in flavors intended for applications involving heat. The second, more serious, drawback is the fact that it tends to oxidize on storage into dimethyl disulfide. Even small quantities of dimethyl disulfide severely restrict the levels of

<sup>a</sup>Find suppliers of this and other ingredients in *Allured's Flavor and Fragrance Materials* database; [www.perfumerflavorist.com/ffm](http://www.perfumerflavorist.com/ffm).

the ingredient that can be used without the cabbage note becoming offensive, and this problem is even more pronounced in applications involving heat, where the effect of dimethyl disulfide becomes even more pronounced. The solution is to carefully redistill commercial dimethyl sulfide and then store the purified chemical under refrigeration.

All the levels given in this article assume that pure repurified dimethyl sulfide is used and refer to concentrations of the material in flavors that are used at 0.05% in a ready-to-drink beverage or bouillon.

## Vegetable Flavors

**Sweet corn:** Most sweet corn flavors are essentially based around dimethyl sulfide and very high levels, even up to 10,000 ppm, can be used. Popcorn flavors also utilize this ingredient, although the effect is less pronounced.

**Cabbage:** Similarly high levels work in cooked cabbage and sauerkraut type flavors. Five thousand ppm is a good starting level.

**Tomato:** Dimethyl sulfide is also an essential component of all tomato flavors, being particularly prominent in flavors with the character of cooked tomatoes. Levels of use vary from 1,000–5,000 ppm.

**Onion:** The chemical is much less obvious in cooked onion flavors, where the effect tends to be boiled rather than fried. Five hundred to 1,000 ppm is the optimum range.



**Mushroom:** Subtle levels, around 100 ppm, can be helpful in cooked mushroom flavors and work particularly well in flavors that recreate the character of Italian dried porcini mushrooms. Higher levels can work well to soften very sulfurous truffle flavors.

**Olive:** Olive flavors can be quite difficult to formulate and similarly low levels of this ingredient are quite effective, adding realism and depth.

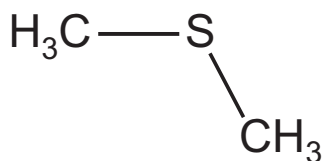
## Fruit Flavors

**Blackcurrant:** The range of use levels in blackcurrant flavors is unusually wide, from 200–5,000 ppm. Higher levels, which demand an absolutely pure quality of dimethyl sulfide, add significantly to the juicy character but tend to push the flavor more in the direction of blackcurrant preserve.

**Raspberry:** Typical levels in raspberry flavors range from 200–1,000 ppm and also demand good quality raw material. The effect is to add depth and juicy character.

Dimethyl sulfide

**F-1**



**Mango:** A wide range of levels can create different effects in mango flavors. Levels around 50 ppm add realism and juicy notes but much higher levels, up to 1,000 ppm, can push the character more in the direction of dried mangoes.

**Lychee:** Dimethyl sulfide is an essential component of lychee flavors, adding juicy notes and depth to a flavor category than can tend to be too light and floral. Five hundred ppm is a useful starting level in flavors.

**Apple:** This ingredient is not commonly used in fresh apple flavors but it can be very helpful where a slightly cooked note is required at levels up to 200 ppm.

**Apricot:** Levels of use here vary from 10–100 ppm, higher levels being more characteristic of dried apricots than the fresh fruit.

**Peach:** The levels of use in peach flavors are a little lower than those in apricot flavors, ranging from 10–50 ppm.

**Strawberry:** Similar levels, from 10–50 ppm, are used to impart a juiciness to strawberry flavors, while higher levels give a more cooked or jammy effect.

**Cherry:** Cherry flavors also gain juicy notes from levels of dimethyl sulfide in the range of 10–50 ppm.

**Blueberry:** Quite low levels, below 10 ppm, can be helpful to add depth, realism and juicy notes to this difficult flavor category.

### Dairy Flavors

**Butter:** High levels of this ingredient are often added to butter flavors, especially those giving the impression of heated or cooked butter. Levels range from 500–3,000 ppm.

**Cheese:** Cheese flavors, depending on the type, can also contain high levels, again up to 3,000 ppm.

**Milk and cream:** Lower levels are used in these dairy flavors, often in the range from 10–80 ppm.

### Brown Flavors

**Malt:** Dimethyl sulfide is not the dominant sulfur note in malt flavors but it plays a very important role. Typical levels of use range from 200–2,000 ppm.

**Molasses:** Levels ranging 200–500 ppm are effective in molasses flavors, while lower levels work in brown sugar flavors.

**Caramel:** Quite low levels, 20–100 ppm, serve to add depth and warmth to caramel and butterscotch flavors.

**Chocolate:** Again, levels ranging 20–100 ppm are very helpful in

chocolate flavors, and higher levels are sometimes used in milk chocolate flavors.

**Coffee:** Similarly, around 50 ppm of dimethyl sulfide adds complexity to the sulfur notes in coffee flavors and increases the impression of realism.

**Black tea:** Approximately 20 ppm can give black tea flavors a similar boost to the depth and realism of the character.

### Fermented Flavors

**Beer:** Dimethyl sulfide is an especially important component of all types of beer flavors. Levels vary, but 200 ppm is typical.

**Wine:** Levels in red wine flavors tend to be higher, around 200 ppm, than those used in white wine flavors, around 20 ppm.

### Seafood and Meat Flavors

**Crab:** This ingredient is especially useful in crab flavors and levels well above 1,000 ppm can be used successfully.

**Shrimp:** Dimethyl sulfide at levels of 200 ppm and higher can be effective in shrimp, scampi and lobster flavors.

**Chicken:** The effect in chicken flavors is less pronounced but additions in the region of 100 ppm are useful.

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