

odor molecule	inhibits % of ORs	activates % of ORs	found in % of fruits	odor quality
acetic acid	4	0	70	Pungent, stinging sour odor, unpleasant when concentrated, less repulsive when diluted below 15% in water (5). pungent, stingingly sour (6).
acetone	21	4	45	Light ethereal-auseating and powerful odor of very poor tenacity. Irritant at high concentration, rather pleasant in dilution (5). light ethereal, auseating (6).
acetophenone	17	21	42	Pungent-sweet odor, in dilution resembling that of hawthorn or a harsh orange-blossom type (5). aromatic, fragrant, almond (7). sweet, floral, wallflower-like (6).
anisole	nd	nd	0	Powerful and harsh, yet very sweet odor, rather chemical and not reminiscent of any natural material, except perhaps remotely of Anise. Its odor is often classified as "anisic", but the author finds that this term would not be used by perfumers (5). chemical, gasoline (solvent), paint (7).
benzaldehyde	17	25	79	Powerful sweet odor, reminiscent of freshly crushed bitter Almonds (5). almond, aromatic, fragrant (7). almond-, wood bark-like (6).
benzyl acetate	nd	nd	39	Powerful but "thin", sweet floral, fresh and light, fruity odor reminiscent of Jasmin, Gardenia, Muguet, Lily and other flowers. Poor tenacity (5). floral, jasmin-, lily-like (6).
2,3-butanediol	17	13	3	chemical, heavy, sickening (7).
1-butanol	8	29	73	Mild "fusel"-like odor, more volatile and more choking than fusel oil itself. Although somewhat winy in character, its odor is really nondescript, rather "chemical" (5). sweet, sickly (6).
2-butanone	8	17	33	Ethereal, slightly auseating odor, not exactly pleasant (5). ethereal (6).
butyl acetate	13	46	61	Very diffusive, ethereal-fruity, pungent odor, reminiscent of many kinds of (ripe and over-ripe) fruit. Very poor tenacity. The odor is often described as resembling that of Pear, Banana, Strawberry, etc. but it may be closer to Pear than to any other single fruit (5). ethereal, fruity, pear-like (6).
butyl butyrate	nd	nd	33	Fresh and sweet-fruity, powerful and rather diffusive odor, reminiscent of Banana (over-ripe) and Pineapple (5). fresh, sweet, fruity (6).
carbon dioxide	nd	nd	0 *	* although carbon dioxide is not a component of fruit odors it is released by all fruits during decomposition
D-carvone	nd	nd	24	Warm-herbaceous, breadlike, spicy and slightly floral odor, reminiscent of Caraway seed or Dill seed (5). (carvone:) minty (peppermint), fragrant, cool (cooling) (7). herbaceous, bread-, dill seed-like (6).

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L-carvone	nd	nd	24	Warm-herbaceous, breadlike, penetrating and diffusive odor, somewhat spicy, in extreme dilution also floral, overall reminiscent of Spearmint oil (rectified) (5). (carvone:) minty (peppermint), fragrant, cool (cooling) (7). herbaceous, bread-, dill seed-like (6).
citral	nd	nd	21	Widely used as a powerful Lemon-fragrance chemical...(5). (geranial:) lemon, fruity (citrus), fragrant (7). intensely lemon-like (6).
cyclohexanol	nd	nd	0	Warm- camphoraceous odor (5). medicinal, etherish (anaesthetic), disinfectant (carbolic) (7).
cyclohexanone	nd	nd	6	Powerful, minty-camphoraceous, "cool" and "solvent-like" odor, generally described as "unpleasant" (by non-professionals) (5). camphoraceous, mint-like (6).
decanal	nd	nd	39	Penetrating and very powerful, sweet-waxy, Orange-peel-like odor. In extreme dilution refreshing, Citrus-peel-like (5). sweet, waxy, orange peel-like (6).
ethanol	0	4	76	The odor is sweet-ethereal, mild (in view of its low boiling point which tempt us to expect a very diffusive odor) and it is perceptible in aqueous solutions down to about 12% alcohol and room temperature (5). sickly, sweet, ethereal (6).
ethyl acetate	0	21	97	Pleasant, ethereal-fruity, Brandy-like odor, somewhat nauseating in high concentration (5). ethereal, fruity, banana-like (6).
ethyl benzene	nd	nd	21	Sweet, but somewhat "gassy" odor. If at all reminiscent of any natural material, it would be a Hyacinth-type of gassy sweetness (5). sweet, gassy (6).
ethyl butyrate	0	46	64	Powerful, ethereal-fruity odor suggestive of Banana and Pineapple, and very diffusive (5). fruity (other than citrus), sweet, fragrant (7). ethereal, fruity, banana-like (6).
2-ethyl fenchol	nd	nd	0	
ethyl hexanoate	25	21	58	Powerful, diffusive, fruity-winey odor, suggestive of Apple, Banana, Pineapple, with a slightly floral undertone (5). fruity, floral, wine-like (6).
eugenol	21	8	39	Powerful, warm-spicy, rather dry and almost sharp odor, drier and harder than that of Clove bud oil, less peppery-woody than that of Clove leaf oil (5). clove, spicy, fragrant (7). warm, spicy, burning (6).
eugenol methyl ether	nd	nd	3	Peculiar musty-tealike, warm and mildly spicy, slightly earthy, tenacious odor. The warm notes are mostly herbaceous, the spicy notes very subdued, and there is an overall resemblance to notes of Ginger and Tea (5).
L-fenchone	nd	nd	6	Warm-camphoraceous, powerful and diffusive, basically sweet odor (5).

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furfural	8	25	55	Pungent, but sweet, bread-like, caramellic, Cinnamon-Almond-like odor of poor tenacity (5). sweet, fragrant, woody (resinous) (7). cold meat, gravy-, coconut-like (6).
geranyl acetate	8	8	6	Sweet, fruity-floral, rosy, somewhat green and remotely Lavender-like odor of moderate tenacity (5).
heptanal	nd	nd	33	Very powerful and diffusive oily-fatty, "rancid" odor. Penetrating and pungent at high concentration, almost fruity, "fermented-fruit"-like in extreme dilution (5). oily (fatty), woody (resinous), sickening (7). powerful diffusive, oily, fatty (6).
heptane	nd	nd	6	Sweet-ethereal, diffusive odor of poor tenacity (5).
1-heptanol	nd	nd	42	Fresh and light, green fatty, winey and sap-like odor of poor tenacity (5). fragrant, aromatic, heavy (7). fresh, light green, nutty (6).
2-heptanone	0	38	52	Penetrating, fruity-spicy light and volatile odor with resemblance to the fresher notes in Cinnamon bark. However, it is generally classified as a rather "chemical" odor, and only in extreme dilution it displays the more attractive spicy fragrance (5). ethereal, fruity, pungent (6).
hexanal	4	17	76	Very powerful, penetrating, fatty green, grassy odor. In extreme dilution more reminiscent of freshly cut grass and unripe fruits (Apple and Plum). The acrid note of the concentrated material resembles that of rancid Butter (5). herbal (green, cut grass), woody (resinous), oily (fatty) (7). fatty green, green grass-like (6).
hexane	nd	nd	9	ethereal, kerosene-like (6)
hexanoic acid	8	4	64	Heavy, acrid-acid, fatty-rancid odor, often described as "sweat-like". (5). sour (vinegar), sickening, sweaty (7). fatty, rancid, sweat-like (6).
1-hexanol	4	67	91	Somewhat "chemical"-winey, slightly fatty and fruity odor, weaker than Amyl alcohol, but resembling that material, except that Hexanol seems fattier and fruitier (5). aromatic, fragrant, woody (resinous) (7). fatty, fruity, wine-like (6).
2-hexanol	nd	nd	15	
3-hexanol	nd	nd	12	alcoholic, etherish (anaesthetic), medicinal (7).
(E)-2-hexenal	4	25	67	Powerful green-fruity, pungent, vegetable-like odor, pungent in high concentrations, almost acrylic-sharp, but pleasant fruity and fresh-green in dilutions below 0.1% (5). sweet, fragrant, almond (7). green, fruity, pungent, vegetable-like (6).
hexyl acetate	17	25	58	Sweet fruity Berry-and-Pear-like odor, milder than Amyl acetate, less natural, slightly floral and green (5). sweet, fruity, berry-, pear-like (6).

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hexyl butyrate	0	13	30	Powerful, fruity, heavy odor, reminiscent not of one particular fruit, but of a "melange" of unripe fruits (5). powerful-fruity (6).
isoamyl acetate	13	42	45	Pronounced fruity-fresh odor, sweet but slightly nauseating. In dilution reminiscent of Pear, Banana, Apple. Very volatile (5). fresh, pear, banana-like (6).
D-limonene	nd	nd	64	Fresh, light and sweet citrusy odor with strong resemblance to Orange peel oil (5). (limonene:) fruity (citrus), lemon, orange (7). sweet citrusy, lemon-like (6).
L-limonene	nd	nd	64	... refreshing, light, very clean odor, not reminiscent of Citrus fruits in particular, and not recalling any specific Pine or Mint (5). (limonene:) fruity (citrus), lemon, orange (7). sweet citrusy, lemon-like (6).
L-linalool	nd	nd	76	Light and refreshing, floral-woody odor with a faintly citrusy note (5). fragrant, light, aromatic (7). refreshing, floral, woody (6).
menthol	nd	nd	3	Odor very similar to that of (L-)Menthol, but somewhat more woody, not quite as sweet, and the cooling sensation is not perceptible at the same low concentration as it is in (L-)Menthol. (L-Menthol: Refreshing, light, diffusive odor with a sweet pungency. Characteristic resemblance to main odor of Peppermint, and a cooling effect upon the mucous membrane...) (5). (menthol:) cool (cooling), minty (peppermint), medicinal (7).
methanol	4	4	39	Very pure Methyl alcohol has only a mild odor, but commercial grade Methyl alcohol will usually display a somewhat pungent-gassy topnote followed by a sweeter ethereal odor of very poor tenacity (5). pungent, ethereal (6).
methyl acetate	13	8	30	Sweet, and extremely diffusive, ethereal-fruity odor of very poor tenacity. In fact, one must hurry to smell it from a perfume blotter before it is completely evaporated (5). sweet, ethereal, diffusive (6).
methyl benzoate	13	13	48	Pungent, heavy-sweet, deep-floral odor of moderate to poor tenacity. Its fruity undertones resemble Prunes and Blackcurrant, while the heavy floral tones recall notes of Tuberose and Longoza (5). pungent, heavy-sweet, floral (6).
1-methylcyclohexanol	nd	nd	0	
methyl hexanoate	21	25	45	Powerful ethereal and diffusive, sweet odor of Pineapple-Apricot type. Poor tenacity (5). pineapple-, apricot-like (6).
methyl salicylate	8	4	39	Pungent-sweet, fruity-rooty odor with burning sensation at high concentration... the ester will obviously have very different odor/flavor descriptions in different countries (5). minty (peppermint), fragrant, aromatic (7). pungent, sweet, fruity (6).
nonanal	nd	nd	48	Very powerful and diffusive fatty-floral, waxy odor of moderate tenacity. In proper dilution, the fatty notes become more pleasant, floral-waxy, more rosy and sweet, fresh as Neroli (5).
octanal	nd	nd	30	Powerful, and in undiluted state harsh-fatty, penetrating odor. In extreme dilution sweet, Orange-like, slightly fatty, Honey-like and of moderate to poor tenacity (5).

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3-octanol	nd	nd	9	Sweet and powerfully herbaceous, oily-nutty and warm odor. Milder and not as harsh as that of 2-Octanol, much warmer than 1-Octanol. Moderate to poor tenacity (5).
2-octanone	nd	nd	21	Description range from "harsh-gassy-metallic" to floral-green-fruity. The author prefers to give a general description of a good commercial grade of the ketone, suitable for perfumery. Pleasant, floral, but bitter-green, slightly musty-herbaceous and "unripe-Apple"-fruity odor of moderate to poor tenacity (5). floral, bitter, green (7).
3-octanone	nd	nd	15	Pungent, herbaceous-fruity, warm odor, somewhat spicy-buttery with distinct resemblance to the topnotes in Lavender oil (5). spicy, butter-, lavender oil-like (6).
1-octen-3-ol	13	38	39	Very powerful, sweet-earthy, almost buttery and fungus- or fermentation-like odor with a strong herbaceous note, suggestive of Lavender-Lavandin-Rose and Hay. Somewhat acrid-chemical undertone which is hardly perceptible at proper (high) dilution (5). musty (earthy, moldy), mushroom, woody (resinous) (7). sweet, ethereal (6).
pentanal	17	17	30	Very powerful and diffusive, penetrating, acrid-pungent odor, in the concentrated form repulsively choking, cough-provoking. In extreme dilution dry-fruity, musty, Nut-like (5). powerful diffusive, choking, penetrating (6).
pentanoic acid	4	4	39	Very powerful and penetrating, diffusive, acid odor, pungent when undiluted, but more unpleasant when diluted. In fact it becomes more animal- and perspiration-like in dilution. Only in extreme dilution the odor becomes again more pleasant, fruity, warm (5). sickening, putrid (foul, decayed), rancid (7). animal perspiration-like (6).
1-pentanol	4	67	82	Somewhat harsh, chemical odor, reminiscent of Fusel oil, but not as heavy, however, more penetrating, nauseating, cough-provoking (5). harsh, fusel oil-like (6).
2-pentanol	4	54	45	Winey-ethereal, rather choking odor, somewhat drier than that of commercial "Amyl alcohol" (5). ethereal, wine-like (6).
pentyl acetate	4	42	39	
(+) alpha-pinene	nd	nd	45	Its odor is warm-resinous, refreshing Pine-like... (5). (pinene:) woody (resinous), light, turpentine (pine oil) (7). floral, resinous, pine-, cedar wood-like (6).
piperonal	nd	nd	3	Very sweet floral, warm slightly spicy and tenacious odor, sometimes described as "Cherry-like" (American type Cherry) (5).
1-propanol	8	17	45	Highly purified Propyl alcohol has only a very faint odor... (5). alcoholic, nauseating (6).
propionic acid	0	0	30	Pungent sour odor reminiscent of sour Milk, Cheese or sour Butter (5). pungent, sour milk-like (6).

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propyl acetate	8	46	30	Diffusive and fresh, ethereal-fruity, Pear-like odor of poor tenacity (5). diffusive, ethereal, pear, raspberry-like (6).
propyl butyrate	nd	nd	18	Heavy-fruity, Pineapple-like ethereal-pungent odor of poor tenacity (5). sour (vinegar), sickening, rancid (7). sweet, fruity, pineapple-like (6).
alpha-terpinene	nd	nd	18	Refreshing, lemony-citrusy odor of poor tenacity (5). refreshing, lemon-, citrus-like (6).
toluene	nd	nd	39	Pure toluene has a sweet-gassy odor, milder than that of Benzene (5). low: light, chemical, woody (resinous); high: light, fragrant, aromatic (7). ethereal (6).
vanillin	nd	nd	33	Intensely sweet and very tenacious creamy Vanilla-like odor... A common remark from laymen, smelling highly diluted Vanillin is "Chocolate"...(5). vanilla, sweet, chocolate (7). intensely sweet, vanilla-like (6).

**Table 2.** Odor characteristics. The percentage of *Drosophila* ORs (from a set of 24 ORs) inhibited or activated by each odor is shown in columns two and three (8). Column four shows in what percentage of fruits (from a set of 33 fruits; see **Table S3**) each odor was found (9). The description of odor quality from three different sources is cited in column 5 (5-7). Only the three most frequently used descriptors out of 146 from the work of Dravnieks are listed here (7).