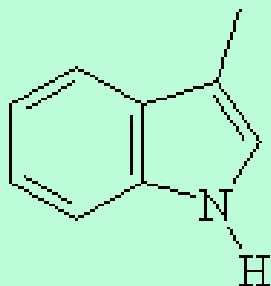


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# SKATOLE

## The smell of human excrement

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Molecule of the Month April 2006  
Also available: [JSMol](#) version.

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### What's that?

The smell of human excrement.

### Phew, how disgusting.

Actually, skatole is an important molecule, and crops up in some surprising places.

### Such as?

Ice cream, would you believe?

### You've just put me off ice-cream for life.

It is used in very small amounts as a flavouring material in ice cream. The skatole put in ice-cream is man-made. No, let me rephrase that. The skatole put in ice-cream is synthetic, it has no human connections.

### How can it be used in ice-cream?

The odour of skatole depends on its concentration. At low concentrations, skatole actually has a rather nice, sweet smell; it crops up in orange blossom and jasmine in small amounts. It's also used by *Zantedeschia aethiopica*.

### What's that?

It's an Arum lily, (photo, right), which makes skatole attractive to pollinating insects. It has flowers on the central part (the *spadix*) in male and female zones. The faint scent attracts crawling insects and bees which pollinate the flowers.



### All the same, though...

It's used in perfume too.

### How's that?

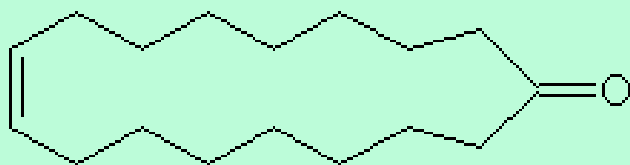
It is used as a fixative in perfumes.

### What does that mean?

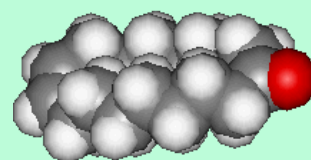
Perfumes are mixtures of molecules, generally with Molecular Mass below 300, of varying volatilities. Their "top note" is made of volatile substances with instant impact; once this disappears, the "middle note" is longer lived, whilst the "base note" which may linger for days or weeks, and may make up 50% of the perfume, are deep odours that may not be smelt for some time. The fixative is a molecule with a deep odour that has a low volatility and which helps to reduce evaporation of the more volatile components (like musk). This means that the perfume keeps longer.

### How did that use come about?

Civet cats (photo, right), mainly found in Africa and India, produce an oily substance called "civet" from the perineal glands in their abdomen; it is used to mark their territory. Civet has a strong smell, due partly to skatole, and also to *civetone* (9(Z)-cycloheptadecenone). When diluted, its smell becomes more musky (and less objectionable); demand from the perfume industry for civet has been met by a synthetic version. Chinese civet cats attracted publicity recently as they were [\(incorrectly\) linked with SARS outbreaks](#).



Civetone



...and its spacefill representation

### Just how smelly is skatole?

It is supposed to be more unpleasant than mercaptans, with a threshold for detection of  $1.7 \times 10^7$  molecules per  $\text{cm}^3$ . This sounds a lot, but it is over two orders of magnitude less than pyridine, which itself is pretty objectionable.

### What does skatole look like?

Pure skatole is a white crystalline material, believe it or not.

### And the word *skatole*?

It is derived from the Greek σκωτ or σκατ (skat), meaning dung. It gives meaning to the adjective scatological, meaning filthy or obscene.

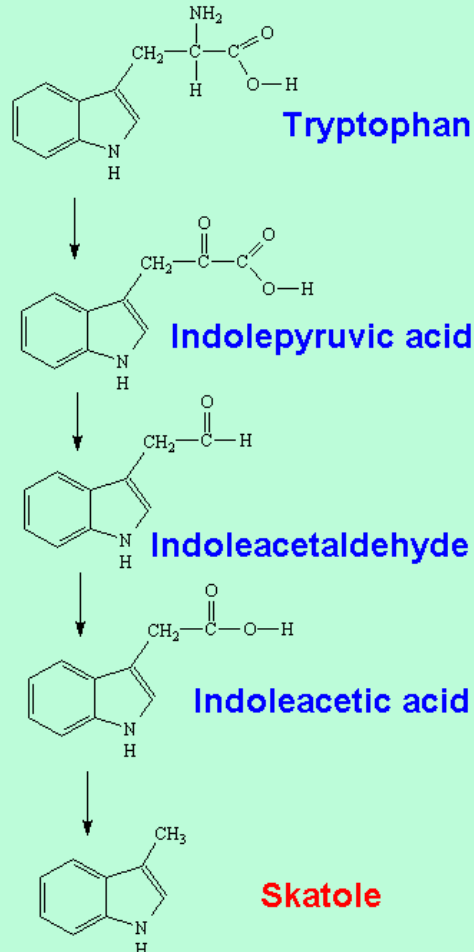
### So lots of animals produce skatole, not just humans?

Skatole produced by male pigs can cause "boar taint", which makes pork from these sources unattractive as food.

### How is skatole formed?

It is produced in the digestive tract by bacterial breakdown of the amino acid tryptophan.





One last thing; does it have any connections with **ska music** or the **Skatman**?

No.

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