Bottlenecks in Bacterial Production of Fuel Butanol

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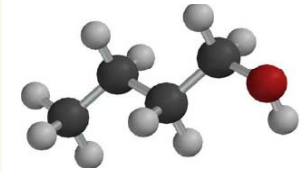
Butanol belongs to bulk chemicals which could be produced via fermentation. Nowadays it attracts a special attention because of its quite good properties as a fuel. From main advantages over ethanol the following are worth mentioning :

1. Modification of engine is much simpler or even not necessary – depending on the type of engine [**Alasfour, 1997**]
2. Butanol can be burned in both internal combustion engines and spark-ignition engines
3. Butanol has higher flash point: 35 ^{0}C (ethanol: 13 ^{0}C)
4. Butanol has lower vapor pressure and is less miscible with water
5. Butanol is less corrosive and safer to handle
6. Higher energy content than ethanol.
7. Not as corrosive as ethanol.
8. Uses an air/fuel ratio which is close to that of gasoline. Ethanol does not.
9. Can be shipped through existing fuel pipelines where ethanol must be transported via rail, barge or truck.
10. Can replace gasoline any percentage up to 100%. Ethanol can only be used up to 85%.
11. Gives better mileage than ethanol.
12. Safer to handle than ethanol.
13. Will also assist in the conversion of vegetable oils into biodiesel.



The main disadvantages of butanol comparing with other fuels are

a) Lower octane number rating
b) Higher viscosity

Following table shows the most important technological parameters

Table I Comparison of some fuels and fuel additives [Ladisch, 1991]

Fuel	Energy density MJ/L	Air/fuel ratio	Specific energy MJ/kg air	Heat of vaporization MJ/kg	RON	MON
Gasoline	32	14.6	2.9	0.36	91 - 99	81 - 89
Butanol	29.1	11.2	3.2	0.43	96	78
Ethanol	19.6	9.0	3.0	0.92	129	102
Methanol	16	6.5	3.1	1.2	136	104

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