The Biodiesel Specifications and Biodiesel Industry in China

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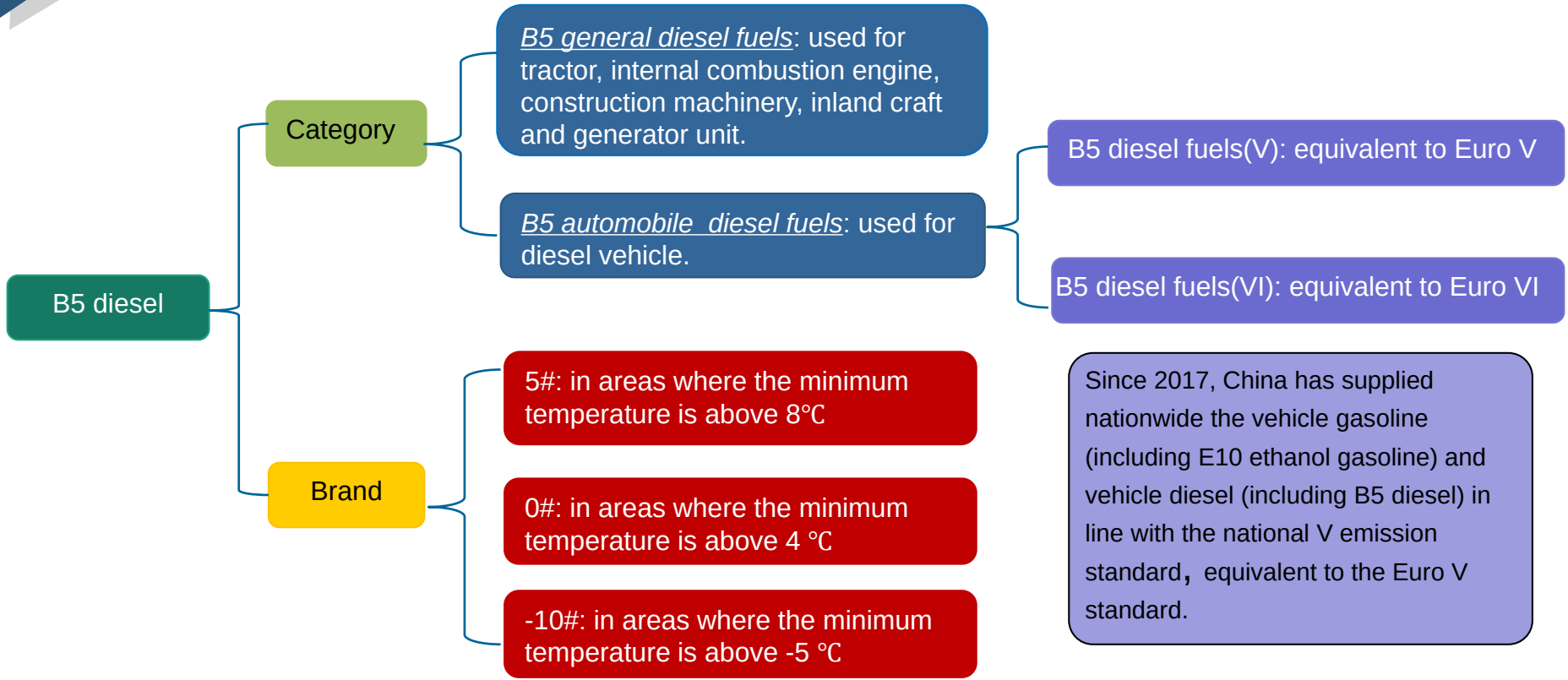
Content

- Biodiesel specifications
- Popularization and application
- Policy and promotions
- Prospects

Biodiesel specifications

- 2 biodiesel specifications in China: B5 and BD100.
- B5: blend fuels of BD 100 biodiesel with volume fraction of 1% - 5% and petrodiesel with volume fraction of 95% - 99%.
- BD100: 100% biodiesel, used as blending components of biodiesel fuel, and divided into BD100 (S50) and BD100 (S10) according to the sulfur content.

Biodiesel specifications



Biodiesel specifications

Item		Quality index		
		B5 general diesel fuels		
		5#	0#	-10#
Chromaticity	≤	3.5		
Oxidation stability (mg/100ml)	≤	**2.5**		
Sulfur content (mg/kg)	≤	*10*		
Acid value (KOH, mg/g)	≤	**0.09**		
Carbon residue on 10% residuum (mass fraction, %)	≤	0.3		
Ash content (mass fraction, %)	≤	0.01		
Copper corrosion (50℃, 3h, grade)	≤	1		
Water content (mass fraction,%)	≤	0.030		
Mechanical impurities		No		
Kinematic viscosity (20℃, mm^2/s)		3.0~8.0		

Biodiesel specifications

Item		Quality index		
		B5 general diesel fuels		
		5#	0#	-10#
Flash point (closed, ℃)	≥	60		
Cold filter plugging point (℃)	≤	8	4	-5
Freezing point (℃)	≤	5	0	-10
16 alkane value	≥	45		
Density (20℃, kg/m^3)		Report		
Distillation range 50% recovery (℃) 90% recovery (℃) 95% recovery (℃)	 ≤ ≤ ≤	 300 355 365		
Lubricity (corrected wear scar diameter, 60℃, μm)	≤	460		
Fatty acid methyl esters content (volume fraction, %)		**＞1.0 ≤5.0**		

Biodiesel specifications

Item	Quality index					
	B5 automobile diesel fuel s(V)			B5 automobile diesel fuel s(VI)		
	5#	0#	-10#	5#	0#	-10#
Oxidation stability (mg/100ml) ≤	**2.5**			**2.5**		
Sulfur content (mg/kg) ≤	*10*			*10*		
Acid value (KOH, mg/g) ≤	**0.09**			**0.09**		
Carbon residue on 10% residuum (mass fraction, %) ≤	0.3			0.3		
Ash content (mass fraction, %) ≤	0.01			0.01		
Copper corrosion (50℃, 3h, grade) ≤	1			1		
Water content (mass fraction,%) ≤	0.030			0.030		
Mechanical impurities (V)/ total pollutant (VI, mg/kg)	——			24		
Kinematic viscosity (20℃, mm^2/s)	2.5~8.0			2.5~8.0		
Flash point (closed, ℃) ≥	60			60		

Biodiesel specifications

Item		Quality index					
		B5 automobile diesel fuels(VI)			B5 automobile diesel fuel s(VI)		
		5#	0#	-10#	5#	0#	-10#
Cold filter plugging point (℃)	≤	8	4	-5	8	4	-5
Freezing point (℃)	≤	5	0	-10	5	0	-10
16 alkane value	≥	51			51		
Density (20℃, kg/m³)		810~850			810~845		
Distillation range 50% recovery (℃) 90% recovery (℃) 95% recovery (℃)	 ≤ ≤ ≤	 300 355 365			 300 355 365		
Lubricity (corrected wear scar diameter, 60℃, μm)	≤	460			460		
Fatty acid methyl esters content (volume fraction, %)		＞1.0 ≤5.0			＞1.0 ≤5.0		
PAHs content (mass fraction, %)	≤	11			7		

Biodiesel specifications

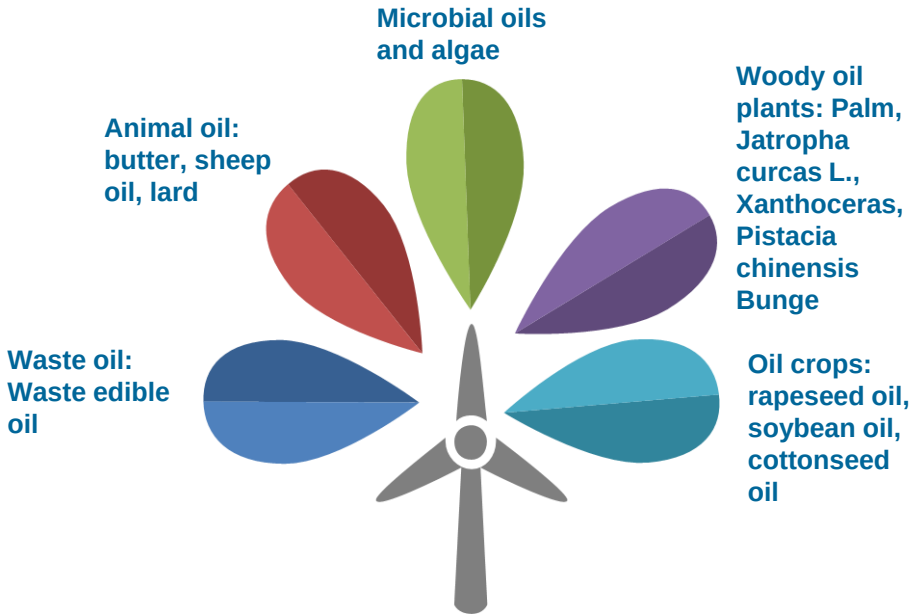
Item		Quality index	
		BD100 biodiesel fuels	
		S50	S10
Density (20℃, kg/m^3)		820~900	
Kinematic viscosity (40℃, mm^2/s)		1.9~6.0	
Flash point (closed, ℃)	≥	130	
Cold filter plugging point (℃)		Report	
Sulfur content (mg/kg)	≤	50	10
Carbon residue (mass fraction, %)	≤	0.050	
Sulphated ash (mass fraction, %)	≤	0.020	
Water content (mg/kg)	≤	500	
Mechanical impurities		No	
Copper corrosion (50℃, 3h, grade)	≤	1	

Biodiesel specifications

Item		Quality index	
		BD100 biodiesel fuels	
		S50	S10
16 alkane value	≥	49	51
Oxidation stability (110℃,h)	≥	6.0	
Acid value (KOH, mg/g)	≤	0.50	
Free glycerin content (mass fraction, %)	≤	0.020	
Monoglyceride content (mass fraction, %)	≤	0.80	
Total glycerin content (mass fraction, %)	≤	0.240	
Monovalent metal (Na+K) content (mg/kg)	≤	5	
Bivalent metal (Ca+Mg) content (mg/kg)	≤	5	
Fatty acid methyl esters content (mass fraction, %)	≥	96.5	
Phosphorus content (mg/kg)	≤	10.0	

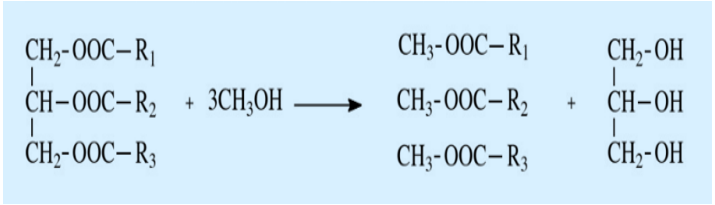
Popularization and application

- Raw materials
  - ✓ Waste oil
  - ✓ Animal oil
  - ✓ Woody oil plants
  - ✓ Oil crops
  - ✓ Microbial oils

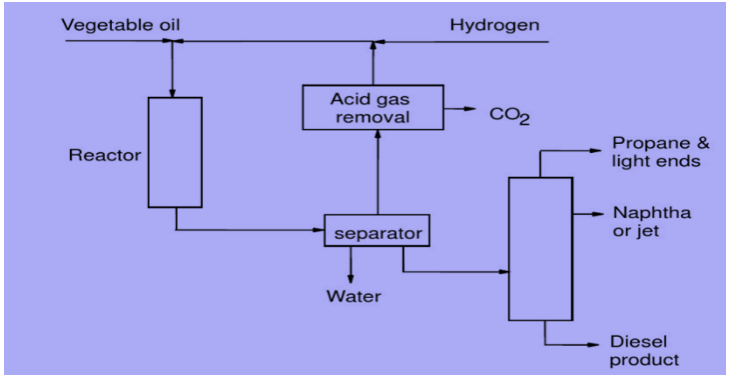


Popularization and application

- Production process
  - ✓ Ester exchange method
  - ✓ Hydrofining method
  - ✓ Biomass gasification and extraction of microbial oil (in research)



triglycerides methanol FAME glycerin



Popularization and application

- In 2010, there were more than 150 biodiesel manufacturers with capacity of 3.5 million tons per year in China, and the production is more than 1 million tons.

- At present, there are only 40 or 50 biodiesel manufacturers that keep running, and the biodiesel production is about 500-800 thousand tons per year.

- The biggest biodiesel manufacturer with capacity of 200 thousand tons per year, was put into operation in 2014, in Hainan province, the south of China.

Popularization and application

- The strategy of developing biodiesel in China is "not competing with people for grain, not competing with grain for land.“
- The main raw material of biodiesel in China is wasted animal and vegetable oils and fats.
- China is also actively developing woody oil crops, providing the raw material for the long-term development of biodiesel industry. But woody oil crops need longer cultivation periods.
- The insufficiency and high price of raw materials is the main reason of output decline.

Popularization and application

- In China, 50% of the biodiesel fuels are used in industrial enterprises, 20% are used in agricultural machinery and ships, and the remaining 30% are used in transportation.
- There are no mandatory policies to oblige to use the biodiesel fuels in China.

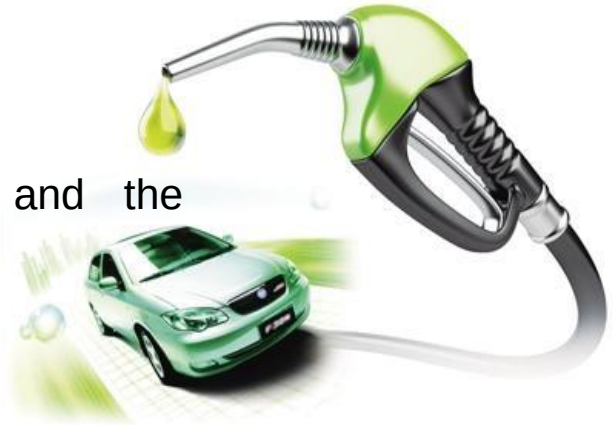
✓It is encouraged to promote the use of biodiesel in such areas as Beijing, Tianjin, Hebei province, Yangtze River Delta and Pearl River Delta region.

✓Priority should be given to the use of biodiesel blended fuels for vehicles managed by the government, such as public transport, sanitation and so on.

✓Since 2010, in Hainan, Yunnan provinces and Shanghai, the B5 diesel fuels have been sold at the filling stations.

Popularization and application

- It is difficult for biodiesel blending fuel to enter the automobile fuel market.
  - ✓ Adequate petrodiesel fuels supply in domestic market
  - ✓ Production shortfall due to the insufficiency of raw materials
  - ✓ Lower price competitiveness due to the low oil price
  - ✓ Lack of trust in safety and reliability by customers
  - ✓ Unsmooth cooperation between the producers and the retailers
  - ✓ Shortage of supporting policies



Policy and promotions

- Standards
  - ✓ Biodiesel blend stock(BD100) for diesel engine fuels 2007 → 2014 → 2015
  - ✓ Biodiesel fuel blends (B5) 2010 → 2014 → 2015
  - ✓ B5 diesel fuels 2017 (inclusive of BD100)
- Tax incentives
  - ✓ Exempt from consumption tax
  - ✓ Return of 70% of value added tax

Policy and promotions

Industrial access control

Product yield	Energy consumption	By-product
Biodiesel product yield (in terms of convertible matter) reached more than 90%.	Methanol consumption per ton of biodiesel is not higher than 125 kg, fresh water is not higher than 0.35 cubic meters, comprehensive energy consumption is not higher than 150 kg of standard coal.	By-product glycerin should be recycled, separated and purified, and the discharge of waste gas, waste water and waste residue should conform to the standard.

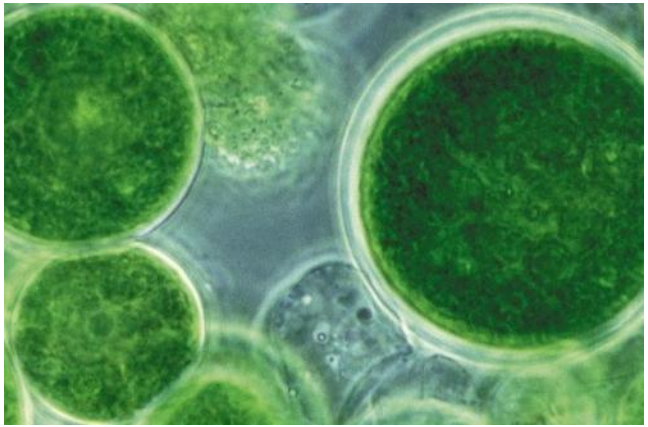
Policy and promotions

- Technical priority

  ✓ Due to the shortage of the existing raw materials, more efforts have been made to produce biodiesel with microalgae.

  Developing continuous and large-scale microalgae cultivation technology with low water consumption.

  ✓ Developing oil extraction technology with low cost and low energy consumption.



Prospects

Government objective

In the year 2020 and 2030 the proportion of non fossil energy in primary energy consumption reached 15% and 20%, respectively.

By 2020, the annual utilization of all renewable energy will be 7.3 tons of standard coal.

Among them, commercial renewable energy utilization amounted to 5.8 tons of standard coal.

The amount of biodiesel utilization will reach 2 million tons.

Prospects

- Government efforts
  - ✓Establish a sustainable raw materials supply system suitable for China's national conditions (the raw materials include waste oils, inedible woody oil plants and microalgae resources)
  - ✓Set up a complete supply and marketing system of biodiesel blending fuel by relying on the existing vehicle fuel sales network
  - ✓Develop storage, distribution and transportation standards or regulations for biodiesel blending fuels
  - ✓Implement responsibility management system to achieve restricted targets of sales volume or market share and encouraging enclosed sales of biodiesel blending

Prospects

- Government efforts

✓Since 2000, ethanol gasoline (E10) has been sold compulsively in enclosed area of 6 provinces and 31 cities in China. The fuel ethanol consumption is more than 2 million tons per year.

In September 2017, the Chinese government announced that by 2020, the use of ethanol gasoline for vehicles would be popularized throughout the whole country.

The similar policy applied to biodiesel fuels is being discussed and may be implemented in the future.


THANK YOU