. PROPERTIES & USES

Physical properties:Methanol is a clear ,colorless,highly polar liquid with a mild odor.It is miscible with water , alcohol,ether & most common organic solvents[2].General physical properties of methanol are presented in table 2.

Table 2.Physical properties of methanol[1]

Property	***value***
Freezing pt. °C	-97.68
Boiling pt. °C	64.7
Critical temp.°C	239.43
Critical pressure,kPa	8096
Critical volume,ml/mol	118
Critical compressibility factor z in PV=znRT	0.224
Heat of formation (liquid)at 25°C,kJ/mol	-239.045
Free energy of formation of liquid at 25oC,J'g	-166.81
Heat of fusion,J/g	103
Heat of vaporization at b.p..J/g	1129
Heat of combustion at 25°C,J/g	22662
Flammable limits in air	
Lower,vol%	6.0
Upper,vol	36
Autoignition temperature^{o}C	470
Flash point ^{o}C	12
Surface tension , dyn/cm	22.6
Specific heat	
Of vapor at 25^{o}C,J/gK	1.370
Of liquid at 25^{o}C.J/gK	2.533

Vapor pressure at 25^{o}C, Kpa	16.96
Solubility in water	miscible
Density at 25^{o}C ,g'cm^{3}	0.78663
Refractive index,n	1.3284
Viscosity of liquid,cP	0.541
Dielectric constant at 25^{o}C	32.7
Thermal conductivity at 25^{o}C ,W/mK	0.202

Chemical Properties: Methanol is the simplest aliphatic alcohol. As a typical representative of this class of substances, its reactivity is determined by functional hydroxyl groups.Reactions of methanol take place via cleavage of the C-O or O-H bond & are characterized by the substitution of the –H or –OH group. In contrast to higher aliphatic alcohols however, β-elimination with formation of a multiple bond cannot occur.

Important industrial reactions of methanol include following

a. Dehydrogenation & Oxidative dehydrogenation
b. Carbonylation
c. Esterification with organic or inorganic acids & acid derivatives.
d. Etherification
e. Addition to unsaturated bonds.
f. Replacement of hydroxyl groups

Uses: Fig. 1 gives methanol derivatives & uses.[2]

Other uses: Potentially methanol can be used as a replacement for diesel fuel & gasoline or as a gasoline extender.It can also be used as a clean-burning boiler or turbine fuel to generate electricity .Methanol can also be used to make gasoline in Mobil's MTG(methanol to gasoline) process.

Another large market for methanol is its use in the production of single-cell protein(SCP).Methanol is used as o feedstock to produce olefins,as a reducing-gas source for steel mills,to remove nitrogen from sewage sludge & use in fuel cells[1]