PROPERTIES & USES

PHYSICAL PROPERTIES:

Under ordinary conditions, ethyl benzene is a clear, colorless liquid with a characteristic aromatic odor. Ethyl benzene is an irritant to the skin and eyes and is moderately toxic by ingestion, inhalation, and skin adsorption. The physical properties of ethyl benzene are as follows[3]:

Density	at 15^0C	0.87139 g/cm^3
	At 20^0C	0.8669 g/cm^3
	At 25^0C	0.86262 g/m^3
mp		-94.949^0C
bp	at 101.3 kPa	136.186^0C
Refractive index	at 20^0C	1.49588
	at 25^0C	1.49320
Critical pressure		3609 kPa (36.09 bar)
Critical temperature		344.02^0C
Flash point (closed cup)		15^0C
Auto ignition temperature		460^0
Flammability limit	lower	1.0%
	Upper	-
Latent heat fusion		86.3 J/g
Vaporization		335 J/g
Heating value	gross	42999 J/g
	Net	40928 J/g
Kinematic viscosity	at 37.8^0C	$0.6428x10^{-6}m^2/s$
	At 98.9^0C	$0.390x10^{-6}$ m^2/s
Surface tension		28.48 mN/m
Specific heat capacity		
Ideal gas , 25^0C		1169 J kg^{-1} K^{-1}
Liquid, 25^0C		1752 J kg^{-1} k^{-1}

Critical compressibility 0.264

CHEMICAL PROPERTIES

The most important commercial reaction of ethyl benzene is its dehydrogenation to styrene. The reaction is carried out at high temperature (600-660^{0}C). Usually over an iron oxide catalyst. Steam is used as a diluent. Commercially, selectivity's to styrene range from 89 to 96% with per-pass conversions of 65-70%. Side reactions involve mainly the dealkylation of ethyl benzene to benzene and toluene.

Another reaction of commercial importance is the oxidation of ethyl benzene by air to the hydro peroxide, $C_6H_5CH(OOH)CH_3$[3071-32-7]. The reaction takes place in the liquid phase, with no catalyst required. However, because hydroperoxides are unstable compounds, exposure to high temperature must be minimized to reduce the rate of decomposition. the production by products is reduced if the temperature is gradually lowered during the course of the reaction. The hydroperoxide is subsequently reacted with propene in a process that yields styrene and propylene oxide as co products.

With suitable catalyst, ethyl benzene can be converted to xylenes. Commercially processes for isomerizing xylenes usually involve the catalytic isomerization or dealkylkylation of ethyl benzene. Like toluene, ethyl benzene may be dealkylated catalytically or thermally to benzene. Ehtylbenzene also undergoes other reaction typical of alkylaromatic compounds.

USES

Essentially all commercial ethylbenzene production is captively consumed for the manufacture of styrene monomer. Styrene is used in the production of polystyrene and a wide variety of other plastics (→ Styrene).

Of the minor uses, the most significant is in the paint industry as a solvent, which accounts for <1% of production capacity. Even smaller volumes go toward the production of acetophenone diethyl benzene, and ethyl anthraquinone [2].