1,4-Butanediol (BDO)

Description:

1,4-Butanediol is a colorless, high-boiling liquid with a low odor of toxicity. 1,4-butanediol is completely soluble in water, most alcohol, esters, ketones, glycol ethers and acetates, but may be immiscible or partially miscible in common aliphatic and aromatic/ chlorinated hydrocarbons.1,4-butanediol is a versatile chemical intermediate because of its terminal, primary hydroxyl groups and its hydrophilic and chemical resistant nature. Polymers produced upon reaction with diacids or diisocyanates are the basis for many commercial polyurethane and polyester applications.

Specification:

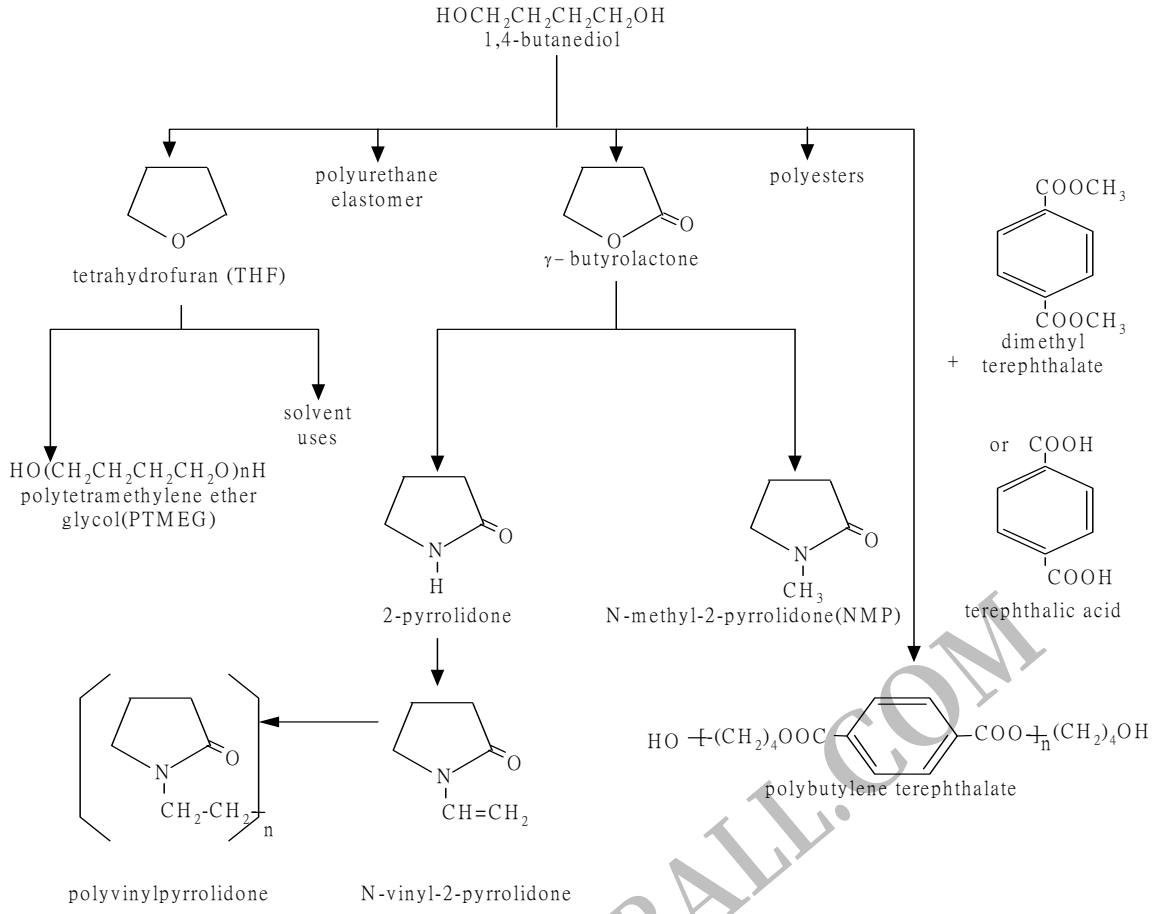
SPECIFICATION OF 1,4-BUTANEDIOL		
ITEMS		SPECIFICATION
1.Assay	wt %	99.5 min.
2.Water	wt %	0.05 max.
3.Carbonyl	mg KOH/g	0.5 max.
4.Color	APHA	10 max.
5.Appearance*(above 20^{o}C)*		Clear & Free of Suspended Matter

Physical Properties:

Boiling Point (760 torr)	228℃
Freezing Point	19~20℃
Specific Gravity (20℃/20℃)	1.015
Hydroxyl Value	1245
Flash Point (Cleveland Open Cup)	155℃
Ignition Temperature	370℃

Applications:

The following flowchart summarizes the major applications of 1,4-butanediol.



Tetrahydrofuran & PTMEG. Tetrahydrofuran is the largest use for 1,4-butanediol and approximately 79% of THF consumption is for the production of polytetramethylene ether glycol(PTMEG), which in turn is used in the manufacture of cast and thermoplastic urethane elastomers, polyurethane fibers (spandex) and high-performance copolyester-ether elastomers. The remaining 21% of THF consumption is for use as a solvent in the manufacture of polyvinyl chloride cements and coatings, in precision magnetic tape and as a reaction solvent in the production of pharmaceuticals.

γ-Butyrolactone (GBL). 1,4-Butanediol is used as raw material for the manufacture of GBL. About 65% of GBL consumption is for the manufacture of N-methyl-2-pyrrolidone (NMP), which in turn is used as a solvent in lube oil extraction, electronics applications, paint strippers, magnetic wire coatings and engineering resins. About 25% of GBL consumption is used in the manufacture of 2-pyrrolidone/N-vinyl-2-pyrrolidone/polyvinylpyrrolidone, which in turn is used in the production of copolymers; in consumer and pharmaceutical applications, including cosmetics, hair sprays, germicides and tablet binders; in the paper, textile and agricultural industries; and in miscellaneous applications, such as process aids in beverage clarification. The remaining 10% of GBL is consumed primarily as an agricultural solvent and

for lithographic use in photography.

Thermoplastic Polyesters. 1,4-Butanediol is used to manufacture polybutylene terephthalate (PBT). PBT's high strength, excellent thermal stability and good durability lead to its many uses in the automotive, electrical and appliance industries. PBT is also compatible with several other thermoplastics with several other thermoplastics which enables a compounder to tailor a polymer alloy to an end user's specifications.

Polyesters. In polyurethane applications, 1,4-butanediol is primarily used as a component of polyesters or as a chain extender. For example, polyesters such as poly (butylene adipate) diols are formulated into urethane elastomers with excellent oil, chemical and UV resistance. In addition, these materials have good mechanical properties over a broad temperature range, as well as good flex and abrasion resistance.

Polyester Plasticizers. 1,4-Butanediol based polyester plasticizers impart superior compatibility with vinyl polymers while providing non-migrating characteristics. In addition, polyesters based upon 1,4-butanediol have excellent oxidation resistance and good low temperature flexibility.

As a chain extender with MDI systems, 1,4-butanediol provides a good balance between hardness and low temperature flexibility. On comparison to other diols, 1,4-butanediol combines the best attributes of hydroxyl reactivity, linearity and overall system compatibility to build in the proper crystallinity required in the polyurethane hard segment. Also, the 1,4-butanediol/MDI systems provide a lower exposure hazard than MOCA/TDI systems.

1,4-Butanediol is used as a chain extender for thermoplastic urethane elastomers. 1,4-butanediol yields crystalline urethane domains which readily melt and flow at elevated temperatures but phase separate at ambient temperatures in order to yield tough elastometric networks.

Cast urethane elastomers continue to be a major end use of 1,4-butanediol because of overall consistency and reliability.

Urethane RIM elastomers using 1,4-butanediol allow design freedom and parts consolidation with large, complex shapes.

Current applications of 1,4-butanediol based urethane elastomers include automotive front and rear end fascia, bumpers, fenders and spoilers. Non-automotive applications include footwear, electrical enclosures, recreation equipment, appliances and furniture.

Copolyester Hot Melt and Solvent Borne Adhesives. 1,4-Butanediol is a key component of copolyesters of isophthalic acid and terephthalic acid used in hot melt adhesive applications. 1,4-butanediol yields polyesters with excellent adhesive and cohesive strength.

Storage and Handling:

In the presence of strong acids, 1,4-butanediol is dehydrated to tetrahydrofuran. Keep away from heat, sparks, and flame. Since 1,4-butanediol solidifies at temperatures below 19℃, appropriate storage temperatures are required; however, reliquidation does not alter its properties. 1,4-butanediol can be shipped and stored in mild steel; however, coated tanks or stainless steel will prolong.