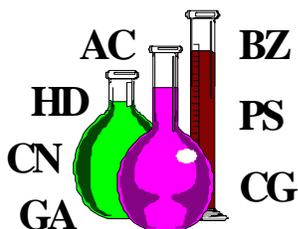


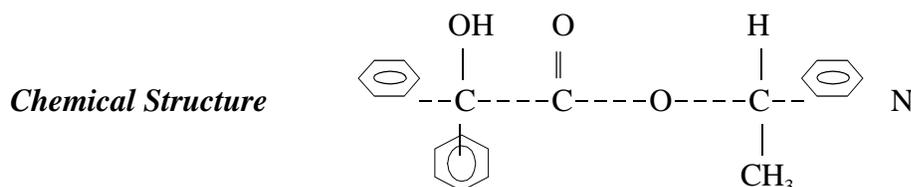
U.S. Army Center for Health Promotion and Preventive Medicine



*Detailed Facts About Psychedelic Agent 3 -
Quinuclidinyl Benzilate
(BZ)*

218-16-1096

Physical Properties of 3-Quinuclidinyl Benzilate



Chemical Formula

$C_{21} H_{23} NO_3$

Description

An odorless white crystalline solid.

Molecular Weight

337.4

Boiling Point

320°C

Vapor Pressure (mm Hg)

Negligible; about 0.5 m/m³ @ 70°C

Melting Point

167.5°C

Density

Solid = 1.33
Vapor = 11.6

Solubility

Slightly soluble in water; soluble in dilute acids, trichloroethylene, warm dimethylformamide, and most organic solvents, such as alcohol and chloroform; insoluble in aqueous alkali.

Flash Point

246°C

Volatility Negligible; about 0.5 mg/m³ @ 70°C.

Toxicity Values
ICt₅₀ = 101 mg-min/m³ (15 l/min)
LCt₅₀ = 200,000 mg-min/m³ (estimated)

Exposure Limits

Workplace Time-Weighted Average - 0.004 mg/m³
General Population Limits - 0.0001 mg/m³

Toxic Properties of 3-Quinuclidinyl Benzilate

The chemical BZ, also known as “agent buzz” was produced at Pine Bluff Arsenal between 1962 and 1965. It was dropped from the chemical arsenal because its effects on enemy front-line troops would be varied and unpredictable.

BZ is usually disseminated as an aerosol with the primary route of entry into the body through the respiratory system; the secondary route is through the digestive tract. BZ blocks the action of acetylcholine in both the peripheral and central nervous systems. As such, it lessens the degree and extent of the transmission of impulses from one nerve fiber to another through their connecting synaptic junctions. It stimulates the action of noradrenaline (norepinephrine) in the brain, much as do amphetamines and cocaine. Thus, it may induce vivid hallucinations as it sedates the victim. Toxic delirium is very common.

Overexposure Effects

BZ is a very potent psychoactive chemical affecting the central nervous system as well as the organs of circulation, digestion, salivation, sweating, and vision. Its pharmacological action is similar to that of other anticholinergic drugs (e.g., atropine, scopolamine, etc.), but longer lasting. Acute exposure produces increased heart and respiratory rates; mydriasis; mouth, skin, and lip dryness; cycloplegia; high temperature; ataxia; flushing of face and neck; hallucinations; stupor; forgetfulness; and confusion. The initial symptoms after ½ to 4 hours of exposure include: dizziness, mouth dryness, and increased heart rate; secondary symptoms, after 3-5 hours of exposure, include: restlessness, involuntary muscular movements, rear vision impairment, and total incapacitation; final symptoms, after 6-10 hours of exposure are psychotropic in nature. After 3-4 days, full recovery from BZ intoxication is expected.

Emergency and First Aid Procedures

Inhalation: remove individual from exposure immediately; start resuscitation and administer oxygen if breathing is irregular or has stopped; seek medical attention immediately.

Eye Contact: flush eyes with water for at least 15 minutes; do not rub eyes; seek medical attention immediately.

Skin Contact: wash from skin and clothing with water; remove any contaminated clothing; seek medical attention immediately.

Ingestion: do not induce vomiting; seek medical attention immediately.

Protective Equipment

Protective Gloves: Wear Butyl (M3 or M4) or Neoprene gloves.

Eye Protection: Wear protective eye glass (goggles with hooded ventilation) as a minimum.

Other: Wear maximum protection for non-lab operations consisting of M9 mask and hood, M3 butyl rubber suit, M2A1 butyl boots, M3 or M4 gloves, unimpregnated underwear; or demilitarization protective ensemble (DPE). For specific BZ operations, the local safety office will determine the required level of protective clothing; it will be specified in the local standing operating procedures. Wear lab coats and impervious gloves for lab operations; have masks readily available.

Reactivity Data

Stability: Stable in storage and glass containers. Resistance to air oxidation at ambient temperature (t_{1/2} at 25°C and pH 7 - 3-4 weeks). Stable in 0.1N H₂SO₄. Thermally stable in solution (t_{1/2} > 2 hours at 235°C for pure sample).

Conditions to Avoid: BZ lightly attacks aluminum and anodized aluminum after 3 months at 71°C. No effects on steel or stainless steel after 3 months.

Hazardous Decomposition: Pyrolysis occurs at 170°C after prolonged periods yielding CO, CO₂, benzophenone and benzhydrol; appreciable hydrolysis in acidic or basic solutions occurs yielding 3-quinuclidinol and benzoic acid; BZ is oxidized by hypochlorite at a pH of 1-13.

Hazardous Polymerization: Will not occur.

Persistence No available information.

References

1. Department of the Army Field Manual (DA FM) 3-9, *Potential Military Chemical/ Biological Agents and Compounds*, 1990.

2. Department of the Army Technical Manual (DA TM) 3-250, *Storage, Shipment, Handling and Disposal of Chemical Agents and Hazardous Chemical*, 1969.
3. *The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, Eleventh Edition*, Merck & Co., Inc., Rahway, New Jersey, 1989.
4. U.S. Department of the Army, Edgewood Research Development and Engineering Center (ERDEC), *Material Safety Data Sheet*, 1995.
5. U.S. Army Chemical Command Materiel Destruction Agency, *Site Monitoring Concept Study*, 15 September 1993.

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