



>>Entry Name: Lead titanium oxide (PbTiO₃), 9CI

Synonym(s): Lead titanate (PbTiO₃). Lead metatitanate. C.I. Pigment Yellow 47

CAS Registry Number: 12060-00-3

PbTiO₃

Molecular Formula: O₃PbTi

Molecular Weight: 303.078

Accurate Mass: 303.909319

Percentage Composition: O 15.84%; Pb 68.37%; Ti 15.80%

Source/Synthesis: Synth. by calcining an equimol. mixt. of PbO and TiO₂. Rare-earth (e.g. Sm³⁽⁺⁾) doped thin films produced by sol-gel technique

Use/Importance: Pigment used in ceramic ferroelectric-piezoelectric compositions. Rare-earth doped materials have potential applications in piezoelectric pyroelectric and electrooptic devices

Physical Description: Ferroelectric pale yellow solid. Forms tetragonal cryst. below 490° and cubic cryst. above 490°

Solubility: Insol. H₂O

Other Data: Ferroelectric material with one of the highest recorded spontaneous polarisation values; doping with rare-earth sp. improves processing and device (electrical) characteristics

Hazard & Toxicity: Toxic. LD₅₀ (rat, ipr) 2000 mg/kg

Aldrich: 21580-5

Other: Gelest PBL6465

References:

Robertson, D.W., *Ind. Eng. Chem.*, 1936, **28**, 216, (*synth, props*)

Christensen, A.N. *et al.*, *Acta Chem. Scand.*, 1963, **17**, 845, (*synth*)

Fetiveau, M. *et al.*, *Bull. Soc. Chim. Fr.*, 1965, 450, (*phase transition*)

Frey, R.A., *Adv. Raman Spectrosc.*, 1972, **1**, 181, (*Raman*)

Glazer, A.M. *et al.*, *Acta Cryst. B*, 1978, **34**, 1065, (*cryst struct*)

Kirk-Othmer Encycl. Chem. Technol., 3rd edn., Wiley, 1978, **14**, 174

Nelmes, R.J. *et al.*, *Solid State Commun.*, 1985, **54**, 1721, (*cryst struct*)

Suzuki, M. *et al.*, *Ceram. Trans.*, 1988, **1**, 163, (*synth*)

Calzada, M.L. *et al.*, *J. Mater. Chem.*, 1998, **8**, 111-118, (*Sm³⁽⁺⁾-doped material, synth, powder struct, sem, tga, dta, tem, ferroelectric props*)

Lewis, R.J., *Sax's Dangerous Properties of Industrial Materials*, 8th edn., Van Nostrand Reinhold, 1992, LED000