



**57A Lead salts: halides, nitrate(V) and sulfate(VI)****(See also 56 & 57B)**

Lead(II) bromide		PbBr <sub>2</sub>
Lead(II) chloride		PbCl <sub>2</sub>
Lead(II) iodide		PbI <sub>2</sub>
Lead(II) nitrate(V)		Pb(NO <sub>3</sub> ) <sub>2</sub>
Lead(II) sulfate(VI)		PbSO <sub>4</sub>
<b>Toxic</b>		R61: May cause harm to the unborn child. Category 1 teratogens. R62: Possible risk of impaired fertility. R20/22: Harmful by inhalation and if swallowed. R50/53: Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Solutions equal to or stronger than 0.01 mol dm <sup>-3</sup> should be labelled TOXIC. Solutions less than 0.01 mol dm <sup>-3</sup> are LOW HAZARD. <b>WEL (mg m<sup>-3</sup>):</b> 0.15 (LTEL), 0.45 (STEL) as lead.
<b>Dangerous for the environment</b>		
<b>Store:</b> T		<b>Disposal:</b> W1, W2

**Emergencies: see standard procedures on *Hazard E*, BUT ALSO:**

<b>If a solid is spilt in the laboratory:</b>	Wear eye protection and chemical-resistant gloves. Scoop up as much solid as possible into a bucket. Rinse the area with water and clear up, washing water down a foul-water drain and diluting further. Keep the solid for disposal using a licensed waste contractor.
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Lead salts may be of concern to those who are pregnant. In schools, however, they are used in tiny quantities compared with their use in industry. There is little risk from simply using the chemicals. Inhalation is a remote possibility if significant amounts of dust become airborne, hence care should be taken to avoid this. Swallowing is unlikely if eating and drinking are totally banned in the laboratories/prep room and hands are washed after handling these substances.

**57A Lead salts: halides, nitrate(V) and sulfate(VI)****Model risk assessments**

Activity	User	Control measures	Experimental points
Use of lead(II) nitrate(V) solutions	Y7	Wear eye protection. Wash hands thoroughly after use.	Solutions of concentrations less than $0.01 \text{ mol dm}^{-3}$ are suitable for simple precipitation reactions with carbonates, iodides and sulfates(VI). More-concentrated solutions may have to be used to precipitate the bromide and chloride.
Formula of lead(II) bromide	Y9	Wear eye protection. Wash hands thoroughly after use.	Use about 2-3 g of lead(II) bromide suspended in hot water in a beaker to which about 0.3 g of aluminium powder (an excess) is added. A spongy ball of lead forms on stirring, which can be filtered, dried and weighed.
Heating lead(II) nitrate(V)	Y9	Wear eye protection. Wash hands thoroughly after use. If pupils heat more than 1 g at a time, a fume cupboard <b>must</b> be used. Otherwise, the room should be well ventilated.	Lead(II) nitrate(V) decomposes on heating to form nitrogen dioxide and oxygen. The reaction is liable to eject hot particles as the crystals decompose; a loose plug of mineral wool will stop these particles but allow the gases through. After the investigation, test tubes will have been weakened by lead(II) oxide; they should be allowed to cool, wrapped in paper and placed in the normal refuse.
Preparation of lead(IV) chloride	Y12	Wear eye protection. Wear disposable nitrile gloves.	Add 0.5 g of lead(IV) oxide to $10 \text{ cm}^3$ of cold concentrated hydrochloric acid. Decant off the acidic solution of lead(IV) chloride.
Electrolysis of molten salts: lead bromide, chloride or iodide	TT	Wear eye protection. Use a fume cupboard.	These salts are appreciably volatile at melting temperatures. Impure lead(II) bromide may give off some bromine on melting as well as during electrolysis and the pure iodide starts to decompose just above the melting point. Consider using anhydrous zinc chloride as a safer alternative; consult L195, <i>Safer Chemicals, Safer Procedures and Handbook</i> 11.4.