Core practical: insoluble salt preparation

Student activity • staff demonstration

YEAR 10 / LESSON 57 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

The question

Why is the precipitate kept, washed and dried?

Apply shared-core solubility rules to ionic compounds. Chemistry-only learners then observe a staff-operated lead(II) sulfate preparation; learners do not handle lead compounds. Observation is not recorded as a completed pupil practical.

Equipment

- All learners: booklet and solubility-rule reference. Chemistry-only observers: eye protection at the designated distance.
- Staff-only demonstration: pre-prepared dilute lead(II) nitrate and sodium sulfate solutions, small beaker, separate graduated pipettes
- Staff-only supported filter/funnel, deionised-water wash bottle, labelled dish and dedicated lead-waste containers

Lead compounds are hazardous. Pupils observe only; staff prevent contact, dust and aerosols. Wear eye protection. Every reagent, filter, product, filtrate and washing stays in the designated lead-waste system; nothing goes down the sink.

Course coverage: Shared core: 2.34 solubility rules, question 1 and step 1. Chemistry-only extension: 2.41C/2.43C, steps 2–7 and questions 2–6; staff lead(II) sulfate demonstration, not learner hands-on completion.

Plan, model or apparatus sketch

Sketch the observed filter setup without handling the apparatus.

Method and reasoning

Read the whole sequence before starting

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1. Shared core: predict the solubility of NaCl, KNO_3, $CaCO_3$, $PbSO_4$, AgCl and NaOH using the reference rules. Explain each choice. Double Award learners complete question 1 and improve a solubility-rule summary; the remaining demonstration and questions are Chemistry-only.

2. Chemistry only: Put on eye protection and stay in the designated viewing area. Only staff handle reagents, apparatus and the final lead-containing solid. Do not touch or pass around the product.

3. Observe the staff member combine the two labelled aqueous reactants and stir gently. Record the actual appearance and distinguish a precipitate from gas bubbles.

4. Sketch the filtration arrangement. Identify where the insoluble product collects and where the dissolved substances go.

5. Observe the washing stage or a labelled recording of it. Explain why small portions of deionised water remove soluble contamination while minimising product loss.

6. At the later follow-up, observe the dried product only in its closed labelled container. Mark a previously prepared sample as such; do not imply it dried instantly.

7. Write the balanced full and net ionic equations. Explain the different purposes of filtration, washing and drying, and why all lead-contaminated waste is retained by staff.

Cleanup

- Learners return booklets and viewing eye protection without handling the apparatus.
- Staff retain product and collect all lead-contaminated solids/liquids; wet-clean the tray under the approved procedure and wash hands.

Record your evidence

Blank spaces are for your own work

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Reference and task data

Shared rules: common sodium, potassium and ammonium salts and all nitrates are soluble. Common chlorides are soluble except $AgCl/PbCl_2$; common sulfates except $BaSO_4/CaSO_4/PbSO_4$. Common carbonates are insoluble except sodium/potassium/ammonium; common hydroxides except NaOH/KOH and slightly soluble $Ca(OH)_2$. Chemistry-only reference: $Pb(NO_3)_2(aq) + Na_2SO_4(aq) \rightarrow PbSO_4(s) + 2NaNO_3(aq)$. White $PbSO_4$ is expected, not an observation to copy. Insoluble does not mean harmless or zero solubility.

Stage	Actual observation / source	Explanation
Mixing		
Filtration		
Washing		
Drying / follow-up		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. Shared core: classify NaCl, KNO_3, $CaCO_3$, $PbSO_4$, AgCl and NaOH as soluble or insoluble using the syllabus rules. Explain each answer.

2. Chemistry only: Write the net ionic equation, with charges and state symbols, and identify spectator ions.

3. Chemistry only: Which part of the filtration contains the desired product? Contrast this with the first filtration in copper sulfate preparation.

4. Chemistry only: Why is washing with small portions of deionised water important?

5. Chemistry only: Why must drying and product observation be managed by staff, even though the salt is described as insoluble?

6. Chemistry only: Explain why the filtrate and washings must also be collected as lead waste rather than put down the sink.