IGCSE Chemistry: **w25 21**

Question 21 (Answer: **C**)

- Compare how much solid is left undissolved in each tube.
- A salt that dissolves completely is soluble; one that leaves most of the solid is insoluble.
- Then match the pattern to the standard solubility rules – all nitrates are soluble, most carbonates are not.

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Question 20 (Answer: **B**)

- Lead(II) chloride is insoluble, so it appears as a precipitate.
- The precipitate is the *residue* on the filter paper – it must be washed and dried.
- Crystallising the filtrate instead would give the soluble by-product, not the salt wanted.

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Question 11 (Answer: **A**)

- A saturated solution holds as much dissolved solute as it possibly can at that temperature.
- So it contains the maximum *concentration* of solute.
- The word "saturated" has a completely different meaning for a hydrocarbon – do not mix the two up.

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3(a)	**M1** $2H_2O$ **M2** state symbols (aq) and (l)
3(b)	neutralisation
3(c)	$0.0100 \times 1000 \div 40 = 0.25(0)$
3(d)	burette
3(e)	**M1** mol H_2SO_4 needed = $0.0100 \div 2 = 0.005(00)$ **M2** vol of H_2SO_4 needed = $0.005(00) \div 0.200 \times 1000 = 25$ (cm^3)
3(f)	**M1** yellow **M2** orange
3(g)	repeat steps 1 and 3 without indicator
3(h)(i)	**M1** (a solution containing the) maximum concentration of a solute dissolved in the solvent **M2** at a specified temperature
3(h)(ii)	solubility decreases as temperature decreases
3(h)(iii)	none

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3(a)	→ $BaSO_4(s)$ + 2NaCl(aq) **M1** 2NaCl (only) **M2** (s) and (aq)
3(b)	**M1** M_r $BaCl_2 = 208$ **M2** $208 \times 0.1 = 20.8$
3(c)	$0.100 \div 1.25$ ($\times 1000$) = 80 (cm^3)
3(d)	white
3(e)	residue
3(f)	**M1** rinsing the residue (with water) **M2** (mass was greater) because (dry) residue contains solid sodium chloride / NaCl adds to the mass (of residue)
3(g)	precipitation
3(h)	**M1** named soluble barium **salt** other than barium chloride e.g. (barium) nitrate **M2** named soluble sulfate **salt** other than sodium sulphate e.g. potassium (sulfate) / ammonium (sulfate) **M3** named insoluble barium **salt** other than barium sulfate e.g. (barium) carbonate

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5(a)(i)	$Pb^{2+}(aq)$ + $SO_4^{2-}(aq)$ → $PbSO_4(s)$ **M1** $PbSO_4$ as the **ONLY** formula on the right **M2 ONLY** Pb^{2+} and SO_4^{2-} on the left **M3** state symbols
5(a)(ii)	lead(II) nitrate
5(a)(iii)	sodium sulfate / potassium sulfate / ammonium sulfate
5(a)(iv)	residue
5(a)(v)	**M1** wash with distilled water **M2** suitable method of drying
5(b)(i)	*any two from*: • good conductor of electricity • soluble salts • basic oxides
5(b)(ii)	*any two from*: • variable oxidation states • coloured compounds • catalyst

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Question 19 (Answer: **A**)

- An insoluble salt is made by precipitation, then filtered, washed and dried.
- Crystallisation is for a *soluble* salt, where the solvent is evaporated to grow crystals.
- So crystallisation is the one process not needed here.

1(a)	14.6
1(b)	(least concentrated solution) potassium carbonate **and** (because) a larger volume of potassium carbonate was used
1(c)	(volumetric) pipette / burette
1(d)	**M1** methyl orange
	M2 yellow to orange
1(e)	swirl / mix (the contents of the flask)
1(f)	**M1** mix / add / combine together 25.0 cm^3 aqueous potassium carbonate and 14.6 cm^3 dilute sulfuric acid (without indicator)
	M2 (place in an evaporating basin) and warm until crystals start to form / warm until crystalising point / warm until saturated / half / most water gone
	M3 cool (solution) (so that crystals form) / leave solution from M2 so that crystals form

Question 24 (Answer: **C**)

- An insoluble salt is made by precipitation, so mix two soluble solutions.
- Filter off the precipitate – evaporating instead would leave the soluble by-product behind too.
- Then wash the residue with distilled water and dry it.