

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.

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.

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.

3(a)	M1 2H ₂ O 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 ₂ SO ₄ needed = $0.0100 \div 2 = 0.005(00)$ M2 vol of H ₂ SO ₄ needed = $0.005(00) \div 0.200 \times 1000 = 25 \text{ (cm}^3\text{)}$
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

3(a)	$\rightarrow \text{BaSO}_4(\text{s}) + 2\text{NaCl}(\text{aq})$ M1 2NaCl (only) M2 (s) and (aq)
3(b)	M1 $M_r \text{BaCl}_2 = 208$ M2 $208 \times 0.1 = 20.8$
3(c)	$0.100 \div 1.25 (\times 1000) = 80 (\text{cm}^3)$
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

5(a)(i)	$\text{Pb}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{PbSO}_4(\text{s})$ 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)	<i>any two from:</i> • good conductor of electricity • soluble salts • basic oxides
5(b)(ii)	<i>any two from:</i> • variable oxidation states • coloured compounds • catalyst

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 crystallising 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.