

IGCSE (EDEXCEL) Chemistry : Solubility answers

Q1.

(a) C 1 and 3 only

(b). Any five from:

M1 filter

M2 heat / boil (the solution)

M3 to evaporate some of the water

M4 leave / cool (to crystallise)

M5 pour off excess liquid OR filter (to obtain crystals)

M6 suitable method of drying the crystals

(c). any one from:

to make sure the silver nitrate and sodium chloride fully reacted

to make sure the products only contained silver chloride and sodium nitrate

to ensure the highest possible yield

Q2. (i). (solute is) the substance / solid that dissolves (in a solvent) OWTTE

(ii). (solvent is) the substance / liquid the solute/solid/substance dissolves in OWTTE

(iii).

M1 (saturated solution) contains as much dissolved solute / solid / substance as possible

M2 at a particular temperature

Q3. A description that refers to the following three points

M1 filter

M2 wash the precipitate / solid / lead(II) bromide / residue (with distilled water)

M3 dry with filter paper / in a (warm) oven

Q4. An explanation that links the following four points

M1 (magnesium) has delocalised electrons

M2 electrons can move

M3 (magnesium chloride) can only conduct when molten/in solution OR

(magnesium chloride) cannot conduct when solid

M4 ions are free to move

Q5. (i) M1 heat (use hot water)

M2 stir / mix (grind / crush the solid mixture)

(ii) A description that refers to four of the following points:

M1 heat / boil (the solution)

M2 evaporate some of the water

M3 leave / cool (the solution to crystallise) M4 pour off excess liquid OR filter (to obtain crystals)

M5 suitable method of drying the crystals e.g. place in an oven / leave to dry /use filter paper / kitchen towel / desiccator / heat to dryness

Q6. Any six from:

- M1 add barium carbonate (one spatula at a time) to the acid
- M2 until the barium carbonate is in excess (until no bubbles / effervesces)
- M3 filter off the excess barium carbonate
- M4 heat solution to evaporate some of the water (until crystals form)
- M5 cool or leave to crystallise
- M6 filter the crystals (from the solution)
- M7 leave crystals in a warm place to dry
(on filter paper / in a desiccator / in a warm oven)

Q7.

(a)

- (i) M1 working shown on graph M2 56 (°C)
- (ii) M1 31-13 M2 18 (g)

(b)

- (i) 5.1 (g)
- (ii) 15 (g)
- (iii) M1 $5.1 \div 15$ OR 0.34 (g) OR answer to (i) \div answer to (ii)
M2 34 (g) OR answer to $M1 \times 100$
- (iv) Any one from
M1 (hydrated) copper(II) sulfate would become anhydrous copper sulfate
M2 (hydrated) copper(II) sulfate would lose water

Q8.

- (a) (i) (volumetric) pipette/burette
- (ii) (water / solution) would be heated too quickly OR (water / solution) might spit out or be lost OWTTE
- (iii) repeat (and find the mean temperature)
- (iv) M1 4.5 (g solid in 10 g water)
M2 (so solubility = 4.5×10) = 45 (g per 100 g of water)
- (b) (i) 71 (°C)
- (ii) M1 (from curve) 124 g of solid B dissolves in 100 g water
M2 (so 124×2.5) = 310 (g dissolves in 250 g water)
- (iii) some water may have been lost/evaporated OWTTE

Q9. (i) neutralisation

(ii) acid donates proton(s)/base accepts proton(s)

(b) description including

M1 appropriate use of at least three named pieces of apparatus

AND any four of the following points

M2 add copper(II) carbonate to (dilute sulfuric) acid (a spatula / little at a time and stir after each addition)

M3 until no more effervescence

M4 filter (to remove excess copper(II) carbonate / to obtain (copper(II) sulfate) solution)

M5 heat/warm filtrate / (copper(II) sulfate) solution until crystals start to appear (solution saturated) OWTTE

M6 filter to obtain (the saturated) solution

Q10.

(a) (i) M1 Mg^{2+} M2 NO_3^-

(ii) Part 1 making magnesium nitrate solution - a description linking any three of the following points

M1 warm / heat the acid (in a beaker/flask)

M2 add magnesium oxide (to acid a little at a time) until in excess / no more dissolves

M3 stir

M4 filter to remove excess magnesium oxide/excess solid

Part 2 using (magnesium nitrate) solution / filtrate - a description linking any three of the following points

M5 heat / boil (magnesium nitrate solution / filtrate)

M6 until crystals form in a cooled sample/on glass rod

M7 leave the solution to cool/crystallise

M8 filter (to remove crystals)

M9 suitable method to dry the crystals eg using filter paper/using paper towel/in warm oven/in a desiccator

Q11. A description that makes reference to the following five points

M1 dissolve each of the solids in water / make a solution of each of the solids

M2 mix / add (the two solutions together)

M3 filter (the mixture)

M4 wash the precipitate / solid / barium sulfate / salt / residue (with water)

M5 suitable method of drying the solid

Q12.

(i) An explanation that links together the following two points:

M1 the water vapour / steam condenses

M2 because it is cooled (by the mixture of ice and water)

(ii) A description that links together the following two 2 points:

M1 white (anhydrous copper (II) sulfate)

M2 turns blue (in the presence of water)

(iii) An explanation that links together the following three points:

M1 the limewater turns milky

M2 (because) carbon dioxide / CO_2 (is present)

M3 (and) calcium carbonate / $CaCO_3$ / an insoluble substance is formed

Q13. Any six from:

- M1 add copper carbonate (one spatula at a time) to the acid
- M2 until the copper carbonate is in excess (until no bubbles / effervesces)
- M3 filter off the excess copper carbonate
- M4 heat solution to evaporate some of the water (until crystals form)
- M5 cool or leave to crystallise
- M6 filter the crystals (from the solution)
- M7 leave crystals in a warm place to dry
(on filter paper / in a desiccator / in a warm oven)

Q14. (b). Any five from:

- M1 filter
- M2 heat / boil (the solution)
- M3 to evaporate some of the water
- M4 leave / cool (to crystallise)
- M5 pour off excess liquid OR filter (to obtain crystals)
- M6 suitable method of drying the crystals

Q15.

(a) (i) M1 Ca^{2+} M2 NO_3^-

(ii) Part 1 making calcium nitrate solution - a description linking any three of the following points

- M1 warm / heat the acid (in a beaker/flask)
- M2 add magnesium oxide (to acid a little at a time) until in excess / no more dissolves
- M3 stir
- M4 filter to remove excess calcium oxide / excess solid

Part 2 using (calcium nitrate) solution / filtrate - a description linking any three of the following points

- M5 heat / boil (calcium nitrate solution / filtrate)
- M6 until crystals form in a cooled sample / on glass rod
- M7 leave the solution to cool / crystallise
- M8 filter (to remove crystals)
- M9 suitable method to dry the crystals eg using filter paper/using paper towel / in warm oven/in a desiccator

Q11. A description that makes reference to the following five points

- M1 dissolve each of the solids in water / make a solution of each of the solids
- M2 mix / add (the two solutions together)
- M3 filter (the mixture)
- M4 wash the precipitate / solid / calcium sulfate / salt / residue (with water)
- M5 suitable method of drying the solid