



**Science Revised Syllabus
Junior Certificate
Higher Level**

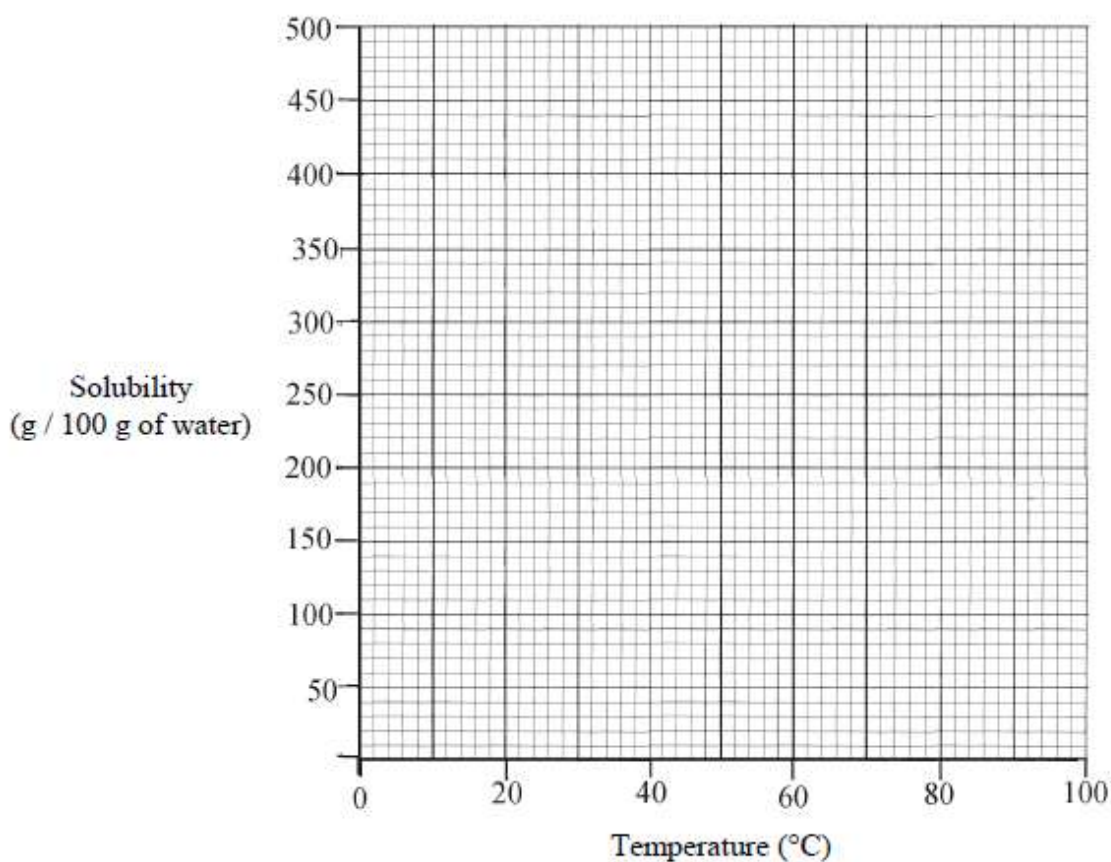
**Past Exam Questions on
C Solutions**

Q5 Part (a) 2013

- (a) A science student investigated the solubility of two common substances, sugar and salt, in water for a range of temperatures. The data for sugar are given in the table. Salt maintained a constant solubility of 40 g / 100 g of water for the temperature range investigated, 0 °C to 100 °C.

Sugar (g / 100 g of water)	175	200	240	290	370	480
Temperature (°C)	0	20	40	60	80	100

- (i) Draw a graph of the effect of temperature on the solubility of sugar in the grid below. (9)



- (ii) Use the graph to estimate the increase in the solubility of sugar if the temperature of the solution is raised from 50 °C to 70 °C. (9)

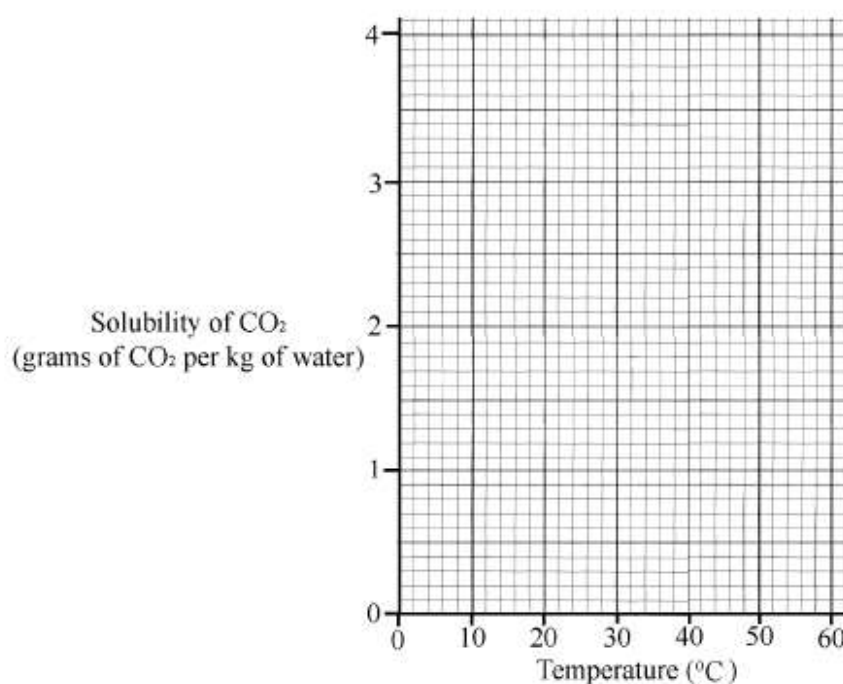
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- (iii) Using the same grid, draw a graph of the effect of temperature on the solubility of salt. (3)

Q5 Part (a) 2012

- (a) An experiment was performed to investigate the effect of temperature on the solubility of carbon dioxide in water. The data obtained from this experiment is given in the table below.

Solubility of CO ₂ (grams of CO ₂ per kg of water)	3.4	2.5	1.7	1.4	1.0	0.8	0.6
Temperature (°C)	0	10	20	30	40	50	60

- (i) Draw a graph of solubility against temperature in the grid below using the data from the table. A smooth curve is required. (9)



- (ii) Usually the solubility of a solid increases with increasing temperature. The solubility of a gas decreases as the temperature increases. Suggest a reason why this decrease happens. (3)

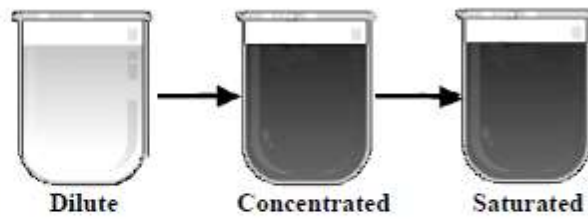
Suggest _____

- (iii) From the graph estimate the temperature at which the solubility of CO₂ is 2 g per kg of water. (3)

Q4 Part (e) 2011

- (e) The diagram shows three solutions of copper sulfate.

Starting with a dilute solution state how to make it more concentrated.



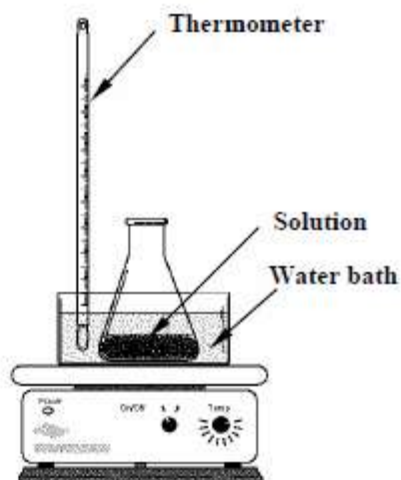
State _____

How do you know when a saturated solution has been produced?

How? _____

Q5 Part (a) and (b) 2010

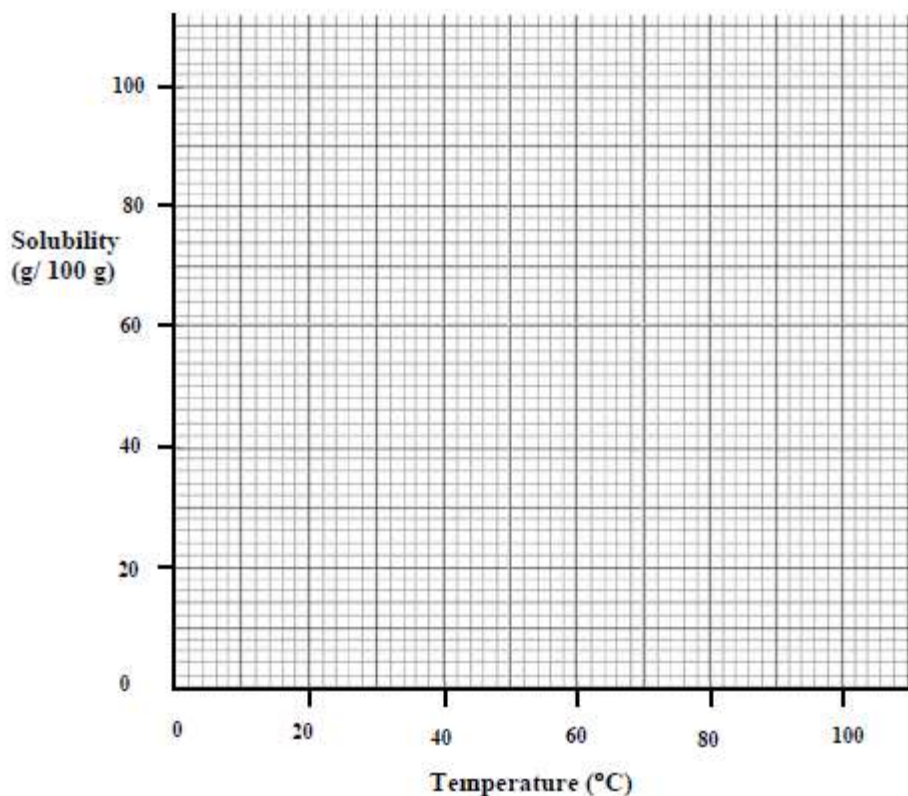
- (a) A pupil used the apparatus shown in the diagram to quantitatively investigate the effect of temperature on the solubility of copper sulfate crystals in water. 100 g of water in the conical flask was brought to the required temperature using the water bath. Copper sulfate crystals were added to the water until no more would dissolve. The mass of the copper sulfate crystals that dissolved was noted.



The data was recorded and is given the table.

Temperature (°C)	0	20	40	60	80	100
Mass of copper sulfate crystals dissolved (g/ 100 g)	14	21	29	40	55	75

- (i) Draw a *graph* of mass of copper sulfate crystals dissolved (solubility) against temperature in the grid below. A *smooth curve* through the plotted points is required. (9)



- (ii) Use your graph to *estimate the solubility* of copper sulfate crystals at 10 °C. (3)

- (iii) Describe, using an appropriate labelled diagram in the box provided, how to *grow and collect crystals* of copper sulfate from the solution produced at 100 °C. (12)

- (b) (i) What is the *pH scale*? How can *pH* be measured? (9)

What? _____

How? _____

- (ii) Look at the table and name a *strong acid* and a *weak alkali* from it. (6)

Substance	Pure water	Household ammonia	Urine	Gastric juice (stomach)	Blood
Ph	7	12	6	1.4	7.4

Strong acid _____

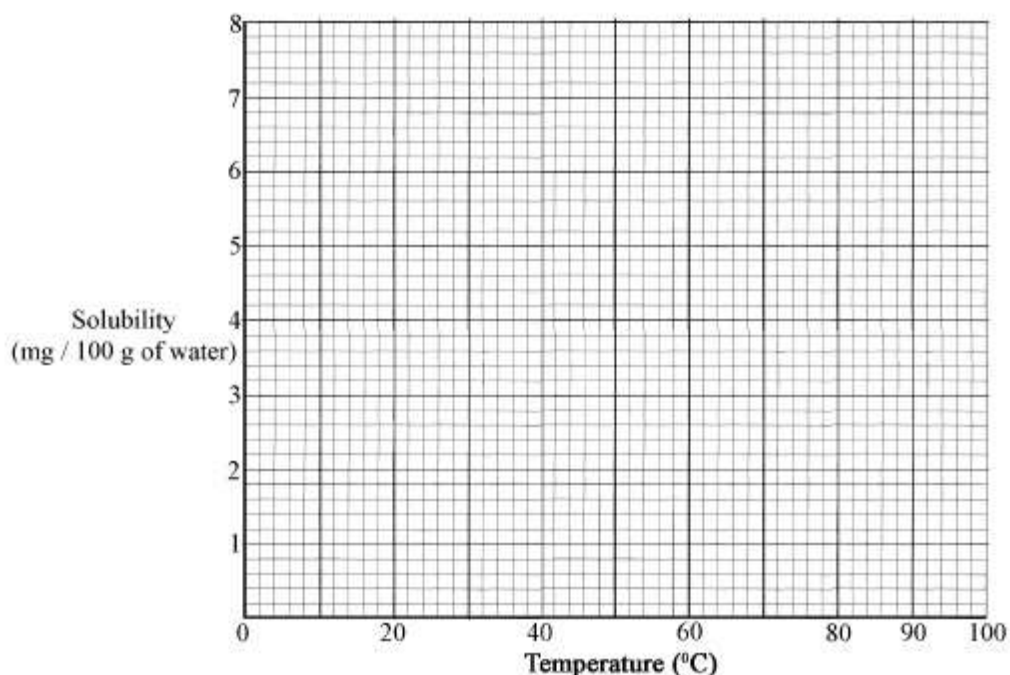
Weak alkali _____

Q5 Part (a) 2008

- (a) The *limit of solubility* (maximum solubility) of oxygen gas (O_2) in water was measured, in mg of oxygen per 100 g of water, at a number of different temperatures. These measurements are given in the table.

Solubility (mg / 100 g water)	7.0	4.3	3.0	2.3	1.4	0.8	0.0
Temperature ($^{\circ}C$)	0	20	40	60	80	90	100

- (i) Draw a graph of *solubility* (*y-axis*) against *temperature* (*x-axis*) in the grid provided below. (6)



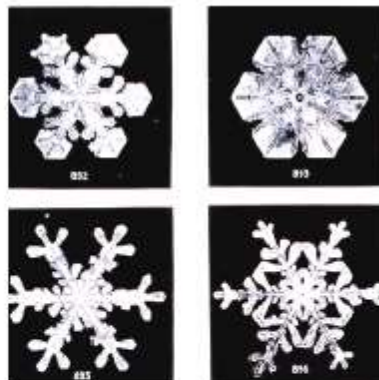
- (ii) Use the graph to *estimate the solubility* of oxygen at $30^{\circ}C$. (3)

- (iii) What *effect has temperature* on the *solubility* of oxygen in water? (6)

- (iv) Global warming has many implications. What *implication*, which could be inferred (concluded) from the information in the graph, might *global warming* have for animals that live in water e.g. fish? (6)

Q4 Part (f) 2007

- (f) The photographs are of four snowflakes. The photographs were taken by Wilson Bentley (1865-1931). He photographed 5000 snowflakes and never found two that were identical. Snowflakes are crystals of water.



Name a *substance*, other than water, that *forms crystals*.

Name _____

Give **one difference** between crystalline and non-crystalline solids.

Difference _____

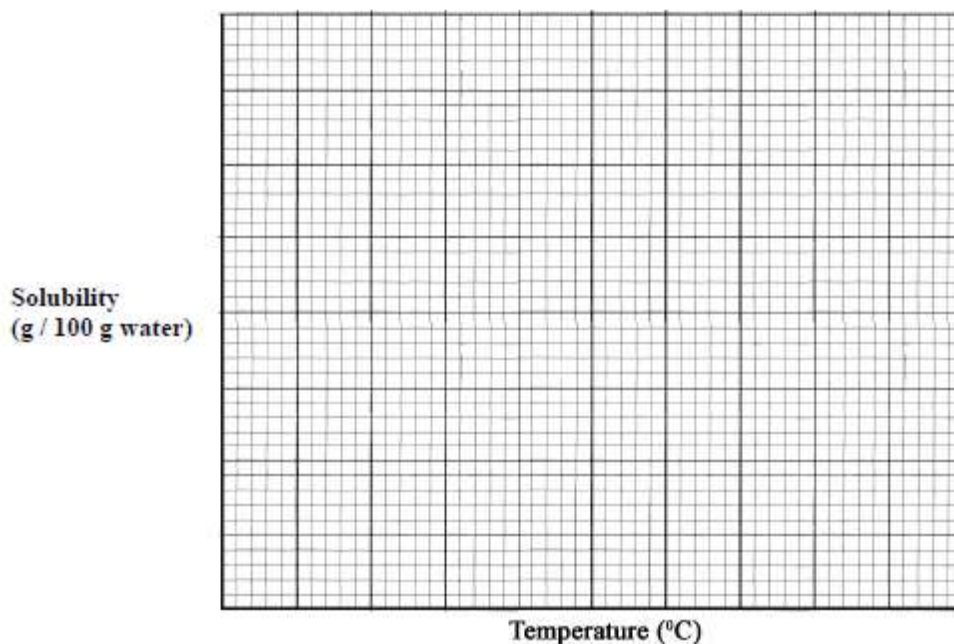
Q5 Part (a) 2007

(a) Distinguish between a *concentrated* and a *dilute* solution? (3)

A pupil investigated the *effect of temperature on the solubility* of the salt ammonium chloride in water. She determined the maximum mass, in grams, of the salt that would dissolve in 100 g of water at various temperatures. The data from this experiment are given in the table.

Solubility (g / 100 g water)	29	37	46	55	66	77
Temperature (°C)	0	20	40	60	80	100

Plot a graph of solubility against temperature in the grid below. (9)



Use the graph to *estimate the solubility* of ammonium chloride at 70 °C. (3)

Solubility _____

What *conclusion* about the solubility of ammonium chloride can be drawn from analysis of the graph? (3)

Conclusion _____