



# **KS3 Science**

## **Solubility**

### **Mark Scheme**

**Time available: 35 minutes**

**Marks available: 49 marks**

## Mark schemes

1.

- (a) • true false
- |                                     |                                     |
|-------------------------------------|-------------------------------------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/>            |

for **all three** correct boxes ticked, award two marks  
for any **two** correct, award one mark

2 (L6)

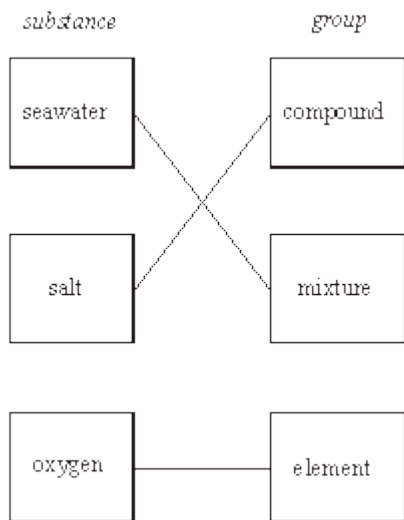
- (b) • evaporate the water **or** evaporation  
accept 'heat it'  
accept 'it goes from liquid to gas'  
accept 'boiling'  
do **not** accept an incorrect use of evaporation,  
e.g. 'she evaporates salt from sand'

1 (L5)

- condense the water vapour **or** condensation  
accept 'it goes from gas to liquid'  
do **not** accept 'it condenses to water vapour'  
  
accept, for two marks, 'distil **or** distillation'  
accept, for one mark, 'condensation then evaporation'

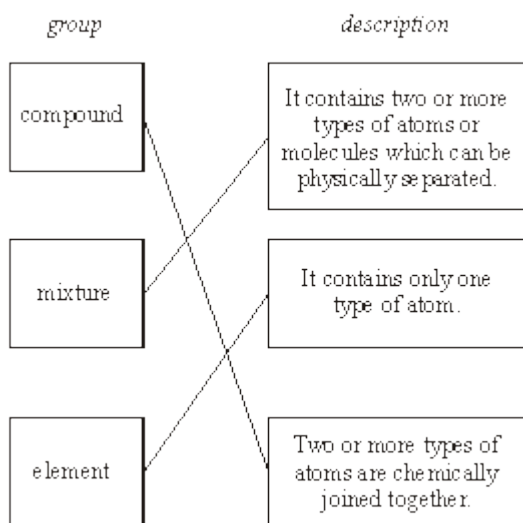
1 (L5)

(c)



all **three** lines are required for one mark  
if more than one line goes from any one box,  
do not award the mark

1 (L5)



*all **three** lines are required for one mark  
if more than one line goes from any one box,  
do not award the mark*

1 (L6)

[6]

2.

- (a) (i) • mass of salt dissolved in water  
*accept 'the mass **or** amount of salt'*  
*'salt' is insufficient*  
*do **not** accept 'the type of salt used'*

1 (L7)

- (ii) • boiling point of salt solution  
*accept 'boiling point'*

1 (L7)

- (iii) any **one** from

- starting temperature of the water
- temperature of the laboratory  
*'temperature' is insufficient*

1 (L7)

- (b) (i) • the boiling point with no salt **or** at the start was 100°C  
*accept 'the water's boiling point was 100°C'*  
*accept 'the boiling point of water is 100°C'*  
*accept 'it boiled at 100°C'*  
**answers must refer to the boiling point**  
*'0 g of salt added' is insufficient*  
*'the graph starts at 100°C' is insufficient*

1 (L7)

(ii) any **one** from

- there is only one point above the line in Neera's graph  
*accept 'most points are below the line in Neera's graph'*
- there should be a similar number of points above and below the line  
*accept 'Tom's goes near more points'*  
*or 'Tom's points are nearer to the line'*  
*accept 'Neera just joined the first and last points'*

1 (L7)

[5]

3.

(a) (i) pale blue yellow red

*answers may be in any order*

**all three** answers are required for the mark  
do **not** accept 'blue' for 'pale blue'

1 (L5)

(ii) 2

because there are two spots on the paper

*accept 'there are two colours from the green ink'*

*accept 'because they are straight up from the green ink'*

*accept 'it has dark blue and yellow'*

*accept 'it shows two'*

**both** the answer and the correct explanation are required  
for the mark

1 (L5)

(iii) pencil

**both** the answer and the correct explanation are  
required for the mark

any **one** from

- because ink from the felt-tip pen is soluble **or**  
will dissolve in water  
*accept 'the ink will also produce colours'*  
*'the pencil has no ink in it' is insufficient*
- because pencil will not spread out **or** dissolve **or** run  
**or** smudge  
*accept 'the ink expands'*

1 (L5)

(b) any **one** from

- the ink would not dissolve in water  
*accept 'the ink was water resistant or permanent or waterproof'*
- the ink would dissolve in ethanol
- ethanol is a solvent for the ink  
*accept 'ethanol is a suitable solvent'*  
*accept 'ethanol can absorb the ink'*  
*accept 'ethanol washes out the ink'*  
*accept 'some substances will dissolve in one solvent but not another'*

1 (L6)

[4]

4.

(a) (i) temperature of water

*accept 'temperature'; do not accept 'heat'*

1 (L3)

(ii)

57	34
40	74
20	144

*award one mark for all three rows of information recorded accurately in the table award one mark for the temperature presented in ascending or descending order*

2 (L4)

(b) any **two** from

- clock or timer or stopwatch
- thermometer or temperature sensor
- measuring cylinder  
*accept 'beaker'*
- balance  
*accept 'scales'*  
*'measuring jug' is insufficient*

2 (L3)

(c) to make the test fair

*accept 'as a control'*

1 (L4)

(d) any **one** from

- it did not use her results
- she did not describe the relationship between temperature and dissolving  
*accept 'it did not describe what she has found out'*  
*accept 'she has not given the pattern in her results'*  
*'she did not explain in detail' is insufficient answers referring to her evaluation of her investigation*  
**or** *method are insufficient*  
*accept 'she did not say if changing the temperature affected the time'*  
*accept 'she did not say what the result showed'*  
*'she did not say what the results were' is insufficient*

1 (L4)

(e) any **one** from

- the hotter the water the quicker it dissolves  
*accept 'the hottest dissolved quickest'*  
*accept the converse*
- the higher the temperature the less time is taken for the cold cure to dissolve  
*accept 'when the water is cold it takes longer to dissolve'*  
*accept 'when the water is hot it dissolves quickly'*  
*accept 'temperature does affect the time to dissolve'*  
*the conclusion should refer to the independent and dependent variable*

1 (L4)

[8]

5.

(a) (i) the water **or** it went blue

*accept 'it got darker'; 'it changed colour';*  
*'there were fewer crystals'; 'some of the crystals*  
**or** *copper sulphate disappeared'*

1 (L3)

(ii) any **one** from

- stir it
- heat it
- use hotter water  
*accept 'use warm water'*
- grind up **or** crush the crystals

1 (L3)

- (b) any **one** from
- crystals
  - copper sulphate  
*accept 'solid'*
- 1 (L4)

- (c) (i) 10
- 1 (L4)

- (ii) Q
- 1 (L4)

- (iii) P and Q
- answers may be in either order*  
*both answers are required for the mark*
- 1 (L4)

[6]

6.

- (a) any **one** from
- size of pieces of tablet  
*accept 'size of tablet'*  
*accept 'whether the tablet is whole **or** crushed'*
  - surface area of the tablet  
*accept 'form of the tablet'*  
*accept 'particle size'*  
*accept 'mass of each piece'*  
*accept 'number of pieces'*  
*do **not** accept 'mass of tablet'*
- 1 (L5)

- (b) any **one** from
- crushed tablets will dissolve more quickly than whole tablets
  - a whole tablet will take longer to dissolve  
*accept 'the finer the tablet the quicker it dissolves'*  
*accept 'the smaller the pieces the faster it dissolves'*
  - the bigger the surface **or** area the faster it dissolves  
**answers must include a comparison**  
*award a mark for an answer in the past tense*  
*if a comparison is included*
- 1 (L5)

- (c) temperature of the water  
*accept 'temperature'*
- 1 (L5)

(d) any **one** from

- the higher the temperature the quicker the tablet dissolves
- the lower the temperature the longer it takes to dissolve

**answers must include a comparison**

*'at the lowest temperature it takes a long time to dissolve'  
is insufficient*

*'at the highest temperature it dissolves quickly' is insufficient*

1 (L5)

(e) 40

*accept a temperature from 38 to 44*

1 (L6)

[5]

7.

(a) any **one** from

- it describes how they will carry out their investigation
- it has more information **or** detail
- it includes a fair test
- it includes measurement

*accept a description which identifies a factor to be kept constant*

*accept 'the second plan includes apparatus to be used  
**or** a measurement **or** a comparison'*

*accept the converse of any marking point*

*accept a statement referring to any of the points in the second plan*

*accept answers which describe a consequence of the test not being  
fair*

1 (L4)



(b) to avoid scalding **or** burning themselves  
*accept 'it is very hot'*  
*accept 'to avoid spilling'*  
*credit may be given for answers which,*  
*although not accurate,*  
*imply that the water is at a high temperature*  
*eg 'it is nearly boiling'*

1 (L4)

(c) any **one** from

- it allowed them to compare the times for different tea bags
- it told them when the measurement was completed
- so they knew when to stop

*accept 'as soon as it has gone they stopped timing'*  
*accept 'so they know how long it takes'*  
*accept 'the cross let them see when the*  
*tea produced by the 3 bags was the same'*  
*accept 'so they could stop at the right time'*  
*accept 'it tells them when they have dissolved the same'*  
*answers must indicate that the cross shows when the teas*  
*are the same colour **or** allows a measurement to be made*  
*'it made it fair' is insufficient*

1 (L3)

(d) (i) results ✓  
*if more than one box is ticked, award no mark*

1 (L4)

(ii) triangle circle square  
*accept a drawing of a triangle, a circle and a square*  
**all three** answers are required in the correct order

1 (L3)

[5]

8.

(a) E D A B C  
**all five** letters must be in the correct order

1 (L3)

(b) to measure volume  
*accept 'to make sure they used the same volume*  
*of water in each beaker'*  
*accept 'to measure amount of water'*  
*accept 'to measure the volume of salt **or** sugar'*  
*'to measure salt **or** sugar' is insufficient*

1 (L3)

(c) any **one** from

- they used the same volume of water

*accept 'they used the same amount of water'*  
*accept 'they stirred the same number of times'*  
*accept 'they stirred at the same speed'*  
*accept 'they stirred for the same time'*  
*'they stirred it' is insufficient*

1 (L4)

(d) (i) any **one** from

- you might not get the same mass each time

*accept 'you might not get the same amount of salt **or** sugar'*

- you will not know how much was added

*accept 'it is not precise **or** a measurement'*  
*accept answers which suggest that using a spatula is not a precise measurement*

1 (L4)

(ii) any **one** from

- measure the mass

*accept 'measure weight' **or** 'weigh it'*  
*accept 'use a balance or scales'*

- measure the number of grams

*accept 'use grams'*  
*accept 'use a measuring cylinder'*  
*accept 'level it with a knife'*

1 (L4)

(e) from 1 – 31 inclusive

1 (L3)

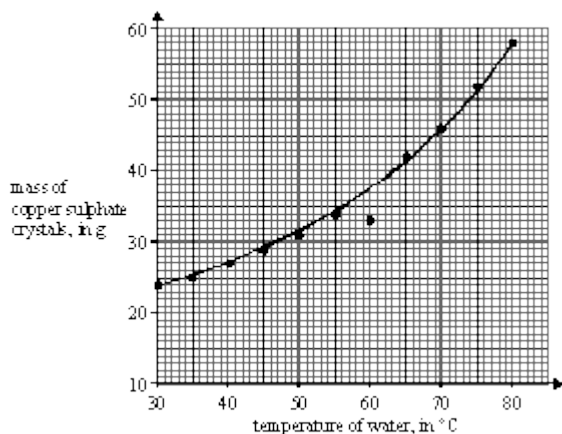
[6]

9.

(a) (i) the point at ( 60,33) circled

1 (L6)

- (ii) a smooth curve touching all points except the anomalous point at 60 °C



*accept a reasonable smooth curve  
the curve must be near to  
or touching all points except the anomalous point  
do **not** accept a dot to dot drawing  
do **not** accept lines which are thicker than the points  
if the points are not visible the lines are too thick*

1 (L6)

- (iii) 38

*accept answers from 37 to 39*

1 (L6)

- (b) any **one** from

- they measured mass **or** temperature inaccurately
- they failed to make sure the solution was saturated
- the solution had cooled

*accept 'they counted the mass wrong'  
accept 'not enough time to dissolve'  
accept 'they did not stir the solution properly'  
accept 'they did not use enough water'  
do **not** accept 'carelessness' **or** 'measured it wrong'  
do **not** accept 'it was not a fair test'  
do **not** accept 'they measured in wrong units'  
do **not** accept 'they wrote it down wrong'*

1 (L6)

[4]