RADLEY

Scholarship Examination

# CHEMISTRY

March 2016

Time allowed – 90 minutes for all three science papers

You should spend roughly the same amount of time on each question. You should leave between 5 and 10 minutes at the end for checking your work carefully.

1. The table below shows how the solubility of sodium nitrate ($NaNO_3$) changes with temperature.

| Temperature (°C | 0 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
|---|---|---|---|---|---|---|---|---|
| Solubility (g per 100 g of water) | 74 | 80 | 86 | 94 | 102 | 122 | 148 | 180 |

1) On a piece of graph paper, plot a graph of solubility against temperature (temperature will be on the horizontal axis, the x axis). [5]

2) Describe how solubility changes with temperature. [1]

3) What is the solubility of sodium nitrate at 50°C? [1]

4) What is the solubility of sodium nitrate at 90°C? [1]

5) At what temperature does 130 g of sodium nitrate dissolve in 100 g of water? [1]

6) a) What mass of sodium nitrate dissolves in 100 g of water at 70°C? [3]

b) What is the total mass of this solution? [1]

7) What mass of sodium nitrate would dissolve in 50 g of water 40°C?[3]

8) a) What mass of sodium nitrate dissolves in 1000 g of water at 25°C? [3]

b) What is the total mass of this solution? [1]

9) At what temperature does 80 g of sodium nitrate dissolve in 50 g of water? [2]

10) If you had a solution of 148 g of sodium nitrate dissolved in 100 g of water at 80°C, what do you think might happen if the solution cooled down to room temperature at 20°C? [3]

Total marks: 25