**Question 1**

| | | |
|---|---|---|
| 1(e) | sodium chloride | **1** |

**Question 2**

| | | |
|---|---|---|
| 2(b) | 3rd box down ticked (silver chloride) | **1** |

**Question 3**

| | | |
|---|---|---|
| 3(c)(i) | (substance) chemically combined with water | **1** |

**Question 4**

| | | |
|---|---|---|
| 4(d)(i) | (substance that is) chemically combined with water | **1** |
| 4(d)(ii) | heat | **1** |

**Question 5**

| | | |
|---|---|---|
| 5(c) | 4th box down ticked (sodium nitrate) | **1** |

**Question 6**

| | | |
|---|---|---|
| 6(c) | sodium sulfate | **1** |

**Question 7**

| | | |
|---|---|---|
| 7(b) | ammonium sulfate (3rd box ticked) | **1** |

**Question 8**

| | | |
|---|---|---|
| 8(c)(i) | $H_2SO_4$ | **1** |
| 8(c)(ii) | fertiliser | **1** |

| | | |
|---|---|---|
| 8(c)(iii) | **M1** $M_r$ of $(NH_4)_2SO_4$ = 132 (1)<br>**M2** $2 \times 14 = 28$ and %N = $100 \times 28 / 132 = 21.2\%$ (1) | **2** |

**Question 9**

| | | |
|---|---|---|
| 9(d)(i) | water(s) of crystallisation | **1** |
| 9(d)(ii) | blue | **1** |
| 9(d)(iii) | $CuSO_4 \cdot 5H_2O$<br>**M1** $CuSO_4$ (1)<br>**M2** $\cdot 5H_2O$ (1) | **2** |

**Question 10**

| | | |
|---|---|---|
| 10(g)(i) | sodium propanoate | **1** |
| 10(g)(ii) | $CH_3CH_2COO^-$ | **1** |

**Question 11**

| | | |
|---|---|---|
| 11(b) | A | **1** |

**Question 12**

| | | |
|---|---|---|
| 12(e) | formulae | 1 |
| | state symbols, $Ag^+(aq) + Cl^-(aq) \rightarrow AgCl(s)$ | 1 |

**Question 13**

| | | |
|---|---|---|
| 13(b)(i) | no more fizzing | 1 |
| | ($ZnCO_3$) stops dissolving **OR** a (white) solid remains | 1 |
| 13(b)(ii) | to use up all the acid / $H^+$ ions | 1 |
| 13(b)(iii) | a solution that can hold no more solute | 1 |
| | at the specified temperature | 1 |
| 13(b)(iv) | zinc oxide **OR** zinc hydroxide | 1 |
| 13(b)(v) | barium sulfate is insoluble | 1 |

**Question 14**

| | | |
|---|---|---|
| 14(d)(i) | hydrochloric (acid) | 1 |
| 14(d)(ii) | neutralisation | 1 |
| 14(d)(iii) | titration | 1 |
| 14(e)(i) | white | 1 |
| 14(e)(ii) | silver chloride | 1 |
| 14(e)(iii) | $Ag^+(aq) + Cl^-(aq) \rightarrow AgCl(s)$<br>**M1** AgCl (as *only* product) (1)<br>**M2** $Ag^+$ and $Cl^-$ (as *only* reactants) (1)<br>**M3** state symbols (1) | 3 |

**Question 15**

| | | |
|---|---|---|
| 15(a) | $CaCO_3 + 2HNO_3 \rightarrow Ca(NO_3)_2 + H_2O + CO_2$<br>**M1** $H_2O$ and $CO_2$ as product (1)<br>**M2** rest of equation correct (1) | 2 |
| 15(b) | **M1** fizzing / effervescence (1)<br>**M2** solid disappears / dissolves (1) | 2 |
| 15(c) | filtrate | 1 |
| 15(d)(i) | **M1** a solution that can contain no more solute (1)<br>**M2** at a given temperature (1) | 2 |
| 15(d)(ii) | cool the solution | 1 |
| 15(e)(i) | anhydrous | 1 |
| 15(e)(ii) | **M1** $M_r$ $Ca(NO_3)_2$ = 164 (1)<br>**M2** mol $Ca(NO_3)_2$ = 2.46 / 164 = 0.015(00) (1)<br>**M3** 0.015(00) / 0.015(00) = 1<br>0.0600 / 0.015(00) = 4 and x = 4 (1) | 3 |

| | | |
|---|---|---|
| 15(f) | $2NaNO_3 \rightarrow 2NaNO_2 + O_2$<br>**M1** $NaNO_2$ on the right-hand side<br>**M2** equation completely correct | 2 |