

**Multiple Choice Answers**

Q20: D

Q21: C

Q22: A

**Multiple Choice Answers**

Q22: D

|      |                                                                                                                                                                                                                                                                                                                       |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3(a) | $\rightarrow \text{BaSO}_4(\text{s}) + 2\text{NaCl}(\text{aq})$<br><b>M1</b> 2NaCl (only)<br><b>M2</b> (s) and (aq)                                                                                                                                                                                                   |
| 3(b) | <b>M1</b> $M_r \text{BaCl}_2 = 208$<br><b>M2</b> $208 \times 0.1 = 20.8$                                                                                                                                                                                                                                              |
| 3(c) | $0.100 \div 1.25 (\times 1000) = 80 \text{ (cm}^3\text{)}$                                                                                                                                                                                                                                                            |
| 3(d) | white                                                                                                                                                                                                                                                                                                                 |
| 3(e) | residue                                                                                                                                                                                                                                                                                                               |
| 3(f) | <b>M1</b> rinsing the residue (with water)<br><b>M2</b> (mass was greater) because (dry) residue contains solid sodium chloride / NaCl adds to the mass (of residue)                                                                                                                                                  |
| 3(g) | precipitation                                                                                                                                                                                                                                                                                                         |
| 3(h) | <b>M1</b> named soluble barium <b>salt</b> other than barium chloride e.g. (barium) nitrate<br><b>M2</b> named soluble sulfate <b>salt</b> other than sodium sulphate e.g. potassium (sulfate) / ammonium (sulfate)<br><b>M3</b> named insoluble barium <b>salt</b> other than barium sulfate e.g. (barium) carbonate |

|           |                                                                                                                                                |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------|
| 3(a)(i)   | aluminium oxide                                                                                                                                |
| 3(a)(ii)  | cryolite                                                                                                                                       |
| 3(a)(iii) | carbon                                                                                                                                         |
| 3(a)(iv)  | $Al^{3+} + 3e^{-} \rightarrow Al$<br><b>M1</b> only $Al^{3+} + 3e^{-}$ on the left<br><b>M2</b> equation completely correct                    |
| 3(b)(i)   | unreactive coating of aluminium oxide                                                                                                          |
| 3(b)(ii)  | $2Al + 3Zn^{2+} \rightarrow 2Al^{3+} + 3Zn$                                                                                                    |
| 3(b)(iii) | <b>M1</b> $Zn^{2+} = +2$<br><b>M2</b> $Zn = 0$ / zero                                                                                          |
| 3(b)(iv)  | decrease in oxidation number                                                                                                                   |
| 3(c)(i)   | enthalpy change (of reaction)                                                                                                                  |
| 3(c)(ii)  | (forward) reaction is exothermic                                                                                                               |
| 3(d)      | oxides that react with acids <b>AND</b> with bases to produce a salt and water                                                                 |
| 3(e)      | $2NaOH + Ga_2O_3 \rightarrow 2NaGaO_2 + H_2O$<br><b>M1</b> $NaGaO_2$ on the right-hand side of an equation<br><b>M2</b> equation fully correct |
| 3(f)      | <b>M1</b> $GaBr_3$<br><b>M2</b> $Ga_2(SO_4)_3$                                                                                                 |

### Multiple Choice Answers

Q19: C