InkChemistry

QUESTION WORKBOOK

Measurement, uncertainty and significant figures in chemistry

Working in the laboratory · Unit C00

AQA MS 1.1, MS 1.3; 8 (practical skills) · OCR A 1.1.3, 1.1.4

15 questions · 47 marks

NAVY SCREEN EDITION

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SECTION A · Short, 1 to 2 marks

A1 MU-Q11

Suggest what effect a thermometer that reads 1.5 °C too high at every temperature has on a measured temperature rise, and why. [2]

A2 MU-Q15

Give two sources of random error in a titration. [2]

SECTION B · Standard, 3 to 5 marks

B1 MU-Q2

Calculate the titre and its percentage uncertainty when a student's initial burette reading is 1.20 cm³ and her final reading is 23.70 cm³, each reading being uncertain by ±0.05 cm³. [4]

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B2 MU-Q12 Compare random errors with systematic errors, giving an example of each from a titration. [4]

B3 MU-Q14 Describe how a burette reading should be taken and recorded, and identify which of these recorded readings is wrong: 0.00 cm^3, 12.35 cm^3, 24.7 cm^3, 36.05 cm^3. [4]

B4 MU-Q18 Suggest two causes of a titre that is 0.40 cm^3 larger than the three concordant titres in its set, and explain why it is left out of the mean rather than averaged with the others. [4]

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B5 MU-Q1 State the uncertainty of a single reading on each of: a 50 cm^3 burette marked every 0.10 cm^3, a balance whose display reads to 0.01 g, and a thermometer marked every 1 °C. [3]

B6 MU-Q3 Calculate the amount, in mol, of sodium hydroxide in 22.40 cm^3 of a 0.125 mol dm^{-3} solution, and give the answer in standard form. [3]

B7 MU-Q4 Calculate the percentage uncertainty in the mass of solid transferred when a weighing bottle and solid weigh 14.73 g and the bottle weighs 12.28 g after the solid has been tipped out. The balance display reads to 0.01 g. [3]

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B8 MU-Q6 Calculate the percentage uncertainty in a temperature rise when the starting temperature is 21.0 °C and the highest temperature is 27.5 °C, both read on a thermometer with an uncertainty of ±0.5 °C per reading. [3]

B9 MU-Q7 Explain why repeating a titration several times does not remove a systematic error, using the example of a burette rinsed with water instead of the acid it holds. [3]

B10 MU-Q8 Explain why a titration designed to give a titre of about 25 cm^3 gives a more reliable result than one giving a titre of about 10 cm^3. [3]

B11 MU-Q9 Explain how many significant figures a concentration should be given to when a calculator shows 0.0827519 mol dm^{-3} from a mass of 1.06 g, a titre of 24.15 cm^3 and a 25.0 cm^3 pipette, and give the answer. [3]

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B12
MU-Q10

Suggest two changes that would reduce the percentage uncertainty in the mass of a 0.12 g piece of magnesium ribbon weighed by difference on a balance whose display reads to 0.01 g, and show how large that uncertainty is at present. [3]

B13
MU-Q19

Show that, in a titration using a 25.0 cm^3 pipette with an uncertainty of ±0.06 cm^3 and a burette read to ±0.05 cm^3, a titre of 20.00 cm^3 carries a larger percentage uncertainty than the pipette volume does. [3]

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