

**GCE**  
**AS and A Level**

# **Chemistry**

**AS exams 2009 onwards**  
**A2 exams 2010 onwards**

## **Unit 3T: ISA** **Specimen mark scheme**

**Version 1.2**





**General Certificate of Education**

**Chemistry 2420**

**CHM3T Investigative Skills Assessment  
(ISA) Centre Assessed Unit**

**Marking Guidelines**

*Specimen Paper*

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. The specimen assessment materials are provided to give centres a reasonable idea of the general shape and character of the planned question papers and mark schemes in advance of the first operational exams.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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**ASSESSMENT OF IMPLEMENTATION**

The following skills are assessed from the **Candidate Results Sheet**:

Recording, precision, concordancy and accuracy

- (a) the **recording** of results
- results recorded clearly and in full in a table 1
- (b) the awareness of **precision**
- at least 2 titrations indicated and with all volumes recorded to  $0.05 \text{ cm}^3$  1
- (ignore zero entries)*
- (c) the **concordancy**
- concordant if two results are within  $0.10 \text{ cm}^3$  of each other 1
- (award the mark for concordancy if the table contains at least **two** concordant results)*
- (e) the **accuracy** of the mean value, measured against a target value for the titration. 5 max
- |   |         |
|---|---------|
| mean titre is within 1% of target value   | 5 marks |
| mean titre is within 1.5% of target value | 4 marks |
| mean titre is within 2% of target value   | 3 marks |
| mean titre is within 2.5% of target value | 2 marks |
| mean titre is within 3% of target value   | 1 mark  |

**Total 8**

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<b>SECTION A</b>	Guidance for Marking	Skill assessed <b>Analysing</b>
<b>1</b>	Ensure results seen to be reproducible	1 mark
<b>2</b>	Calculates a mean titre correctly	1 mark
<b>3</b>	Correctly calculates the molarity of the undiluted acid	1 mark
<b>4</b>	Correctly calculates the molarity of the original acid (ans to part 3 x 10)	1 mark
<b>5</b>	Correctly calculates the $M_r$ of the acid	1 mark
<b>6</b>	unknown acid will be corrosive/irritant	1 mark
	unknown acid may toxic	1 mark
<b>7</b>	Dip-to-Clean	1 mark
		<b>Total 8</b>

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<b>SECTION B</b>	<b>Guidance for Marking</b>	<b>Skill assessed</b>	<b>Analysing</b>
<b>1</b>	49.43% oxygen H <sub>3</sub> SNO <sub>3</sub> or variant		1 mark 1 mark
<b>2</b>	(a) Experiment 3 / 185 cm <sup>3</sup> Result outside pattern		1 mark 1 mark
	(b) 200 cm <sup>3</sup>		1 mark
	(c) PV=nRT		1 mark
	(d) V = 2 x 10 <sup>-4</sup> m <sup>3</sup> and T = 293 8.17 x 10 <sup>-3</sup> mol		1 mark 1 mark
	(e) 2 x answer to part (d)		1 mark
	(f) 97.9		1 mark
	(g) H <sub>3</sub> SNO <sub>3</sub>		1 mark
<b>3</b>	any acceptable structure		1 mark

**Total 12**

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<b>SECTION B</b>	<b>Guidance for Marking</b>	<b>Skill assessed</b>	<b>Evaluating</b>
<b>1</b>	removal of water gives more accurate <u>volume</u> measurement		1 mark
<b>2</b>	gas escaping from flask before bung replaced/ hydrogen slightly soluble		1 mark
	any working method which mixes after apparatus assembled/ allows for solubility in final volume measurement		1 mark
<b>3</b>	molecular formula has to be a simple multiple of the empirical formula so approximate value will distinguish between the options or wtte		1 mark 1 mark
<b>4</b>	chemist use pure substance/ cleaner may contain other acids		1 mark
<b>5</b>	cleaner corrosive/ toxic to wildlife neutralise acid by <u>reaction with base</u> / incinerate		1 mark 1 mark
<b>6</b>	atom economy is $(97.1)/256.2 \times 100 = 37.9\%$		1 mark
<b>7</b>	safer to handle/ easier to store		1 mark
			<b>Total 10</b>