545/3 CHEMISTRY
SCORING GUIDE

BASIS	BASIS CODE	DESCRIPTOR	EXPECTED RESPONSE	WEIGHT SCORE
AIM	A2	States aim of the experiment with both key words	To determine the volume of Solution Q required to react with a 25.0 cm^3 sample of industrial wastewater (BA1)	A=05
	A1	States aim of the experiment with both key words		A=03
	No aim or incorrect aim			A=0
HYPOTHESIS	H2	States relevant hypothesis with both key words	If the volume of solution Q used to reach the endpoint is **greater than 20.00 cm^3**, then the iron(II) levels in the wastewater are **above safe limits** and the water is **unsafe**.	H=6
	H1	States a partially correct hypothesis with one key word		H=5
	No or wrong hypothesis			H=0
VARIABLES	V3	States clearly all the three variables	**Independent variable:** Volume of solution Q added. **Dependent variable:** Volume of Solution Q required for complete reaction (titration endpoint) **Control variables:** Volume of wastewater sample used by pipeting 25.0 cm^3 of the solution for every titration.	V=6
	V2	States clearly only two variables		V=5
	V1	States clearly only one variable		V=4

	No variable(s)			V=0
PROCEDURE AND RELEVANT MATERIALS	P3	states relevant coherent procedure with relevant materials	1. The burette was rinsed with a small amount of Solution Q and filled with the same solution. 2. Using a 50.0cm^3 measuring cylinder, 25.0cm^3 of BA1 was measured into a clean conical flask. 3. Solution BA1 was titrated with solution Q slowly from the burette while swirling until a permanent faint pink colour appeared (endpoint). 4. The final burette reading was recorded. 5. The titration was repeated atleast three times to obtain consistent results. 6. The results were recorded in the table below.	P=5
	P2	states relevant incoherent procedure with relevant materials		P=4
	P1	Lists relevant materials		P=1
	No relevant materials or relevant procedure			P=0
RISK AND MITIGATION	R	Identifies **one** possible risk of the experiment and its mitigation	Glass breakeage was mitigated by handling all glass ware with care.	R=3
		No mitigation of any possible risk identified in the experiment		R=0
DATA PRESENTATION	D2	Appropriately presents 2/3 of the required sets of data. **Data must be in a table and all variables present with units.**	**Table 1**	D=5

Final burette reading (cm^3)	13.40	26.90	23.40
Initial burette reading (cm^3)	0.00	13.40	10.00
Volume of solution **Q** used(cm^3)	13.40	13.50	13.40

	D1	Appropriately presents less than 2/3 of the required sets of data.	fv and IV = 2dp = DR2 = D=05 DR1 = D=04 DR = D=00	D=4
DATA RECORDING	DR2	Appropriately records data within the error margin(±3) for values in the table with 2dps each .		D=5
	DR1	Appropriately records data to 2dps each but outside the error margin. ±5		D=4
DATA INTERPRETATION AND ANALYSIS	I2	Uses appropriate and accurate method to process data(correct method to analyse data)	Average volume of solution Q used= $\frac{13.40+13.40}{2} = 13.40cm^3$ The average volume of Solution Q required is **13.40 cm³**, which is below the **20.00 cm³** regulatory limit. $I_2 = I = 06$	I=6
	I1	uses appropriate but partially accurate method to process data.	$I_1 = I = 05$ $I = 00$	I=5
CONCLUSION AND RECOMMENDATION	C2	Draws a conclusion with advice or recommendation basing on data interpretation.	**Conclusion:** The wastewater sample **complies** with environmental safety standards since the volume of Solution Q used (13.40 cm³) is below the 20.00 cm³ limit. **Advice:** The wastewater iron(II) levels are **safe** for treatment. cc, ca $cc+ca = C_2 = C = 06$ $cc/ca = C_1 = C = 05$	C=6
	C1	Draws a conclusion basing on data interpretation without advice or recommendation		C=5

TOTAL WEIGHT=47

NO $C_c/C_a = C = 00$