FREE PASS FOR A LATE LAB

CAN BE USED ONLY ONCE!!!

Bearer's Name: Farez Wali

Bearer's Student Number: 6606522

Bearer's Partner's Name and Student Number:
Sarivaly 6589619

Normal Due Date and Time: Wed ~~Morning~~ noon ~~1:00pm~~ 12:30 Oct 17, 2012

Extended to: Thursday ~~Morning~~ Oct. 18/2012 @ 12:30

Signed by Dr. RV: R. Venkatesan

(directions for use below)

FREE PASS FOR A LATE LAB

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This pass entitles the bearer of this pass to submit one late lab (up to 24 hours late) without ANY penalty IF it is signed by Dr. Venkateswaran and is attached to the front of the lab report. Once the sheet has been signed, the entire report MUST BE emailed (scan this sheet and any others that are not e-documents) WITHIN 24 hours of the bearer's normal lab deadline to the TA. THEN, the paper copy of the report should be placed in the TA's box in MRN 301. IF the bearer is unable to obtain Dr. Rashmi's signature, fill the form and follow the directions above ANYWAY and then EMAIL a request to Dr. Rashmi. She will do her best to approve the request by email. MAKE SURE to provide her with your name, your student number, your partner's name, his/her student number (if possible) and, most importantly, your TA's name as well. You MUST also specify the NORMAL deadline for your lab.

Student Name: Fares Wali

Student Number: 6606522

Partner's Name and Student #: Sarinaly 6889619

Demonstrator's Name: Evans

PLEASE NOTE: If ANY of the above information is UNCLEAR or not provided, your grade will NOT be recorded!!

Lab Day (circle): Tues aft Tues night (Wed) Thurs aft Thurs night Fri

Lab Week (circle): 1 (2)

Laboratory Report Cover Page

Experiment 3.

Enthalpy of Various Reactions

Checklist:

- Raw Data Sheet written in pen, signed by TA and attached
- 8 curves (4-8 sheets of mmxmm graph paper ONLY) [2 for metal; 2 for acid 1; 2 for acid 2; 2 for salt] attached
- Completed formal report typed (or written NEATLY in PEN) and attached

Student's Initials _____

Faras Wali. Lab 3
66006522

Partner: Sarina Ly
6889619

EM

Salt B
HCl

Cu	15.13g	13.925g
Calor. mass	7.88g	7.89
	20ml	20.05
	27.18g	26.91
	100°C	100°C

Temp	30s	60	90	120	150	180s
1)	21.7	22.9	22.4	22.6	22.6	22.7
2)	22.3	22.3	22.3	22.3	22.4	22.3

Time mixing	20	40	60	80	100	120	140	160	180	200	220	240
1) 3:47	22.1	22.1	21.8	22.1	22.2	22.2	22.2	22.2	22.3	22.3	22.3	-
2) 3:45	24.2	23.9	23.6	23.9	23.9	24.2	24.4	24.2	24.3	[illegible]	[illegible]	[illegible]

Acid	①	②
Volume	50.00 mL	50.00 mL
concentration	1.1 M	1.1 M
Volume	50.00 mL	50.00 mL
Conc NaOH	1.0 M	1.0 M

Temp NaOH	30	60	90	120	150	180
	23.9	23.8	23.8	23.8	23.7	23.6
	23	23	23	23	23	23

Time mixing

3:37	20	40	60	80	100	120	140	160	180	200	220	240		
①	[illegible]	28.5	28.3	28.2	28	28	27.9	27.9	27.9	27.9	27.8	27.6	27.5	27.5
3:22	27.9	27.9	27.8	27.6	27.5	27.4	27.3	26.9	26.8	26.7	26.7	26.6	26.6	
②														

Mass of cal + lid + sol	①	②
	108.75	

① 27.5 27.5 27.3 27.3
② 26.6 26.5 26.5 26.5

Solution Sat B

	mass	empty calo meter
①	1.5292	7.6120
②	1.5152	7.5363

Water tap

	30	60	90	120	150	180	210	240	270
①	21.9	21.9	21.9	21.9	21.9	21.9			
②	22.1	22.1	22.1	22.1	22.1	22.1			

mixing

	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300
5:05 ①	20.0	18.5	19.1	19.2	19.1	18.6	18.6	19.1	19.2	19.3	19.3	19.2	19.2	19.1	19
3:52 ②	20.6	19.3	19.3	19.2	19.2	18.3	18.5	19.1	19.0	19.5	19.5	19.6	19.6	19.7	19.7

	320	340	360	380	400
①	19.0	19.1	19.1	19.1	19.1
②	19.7	19.7	19.7	19.7	19.7

Acid #2 HNO_3 1.1

	①	②
Volume	50.00 ml	50.00 mL
conc.	1.1 M	1.1 M
Volume NaOH	50.00 ml	50.00 ml
Conc NaOH	1.0 M	10 M

Trial	NaOH	30	60	90	120	150	180
①	22.1	22.1	22.1	22.1	22.1	22.1	22.1
②	21.9	21.9	21.9	21.9	21.9	21.9	21.9

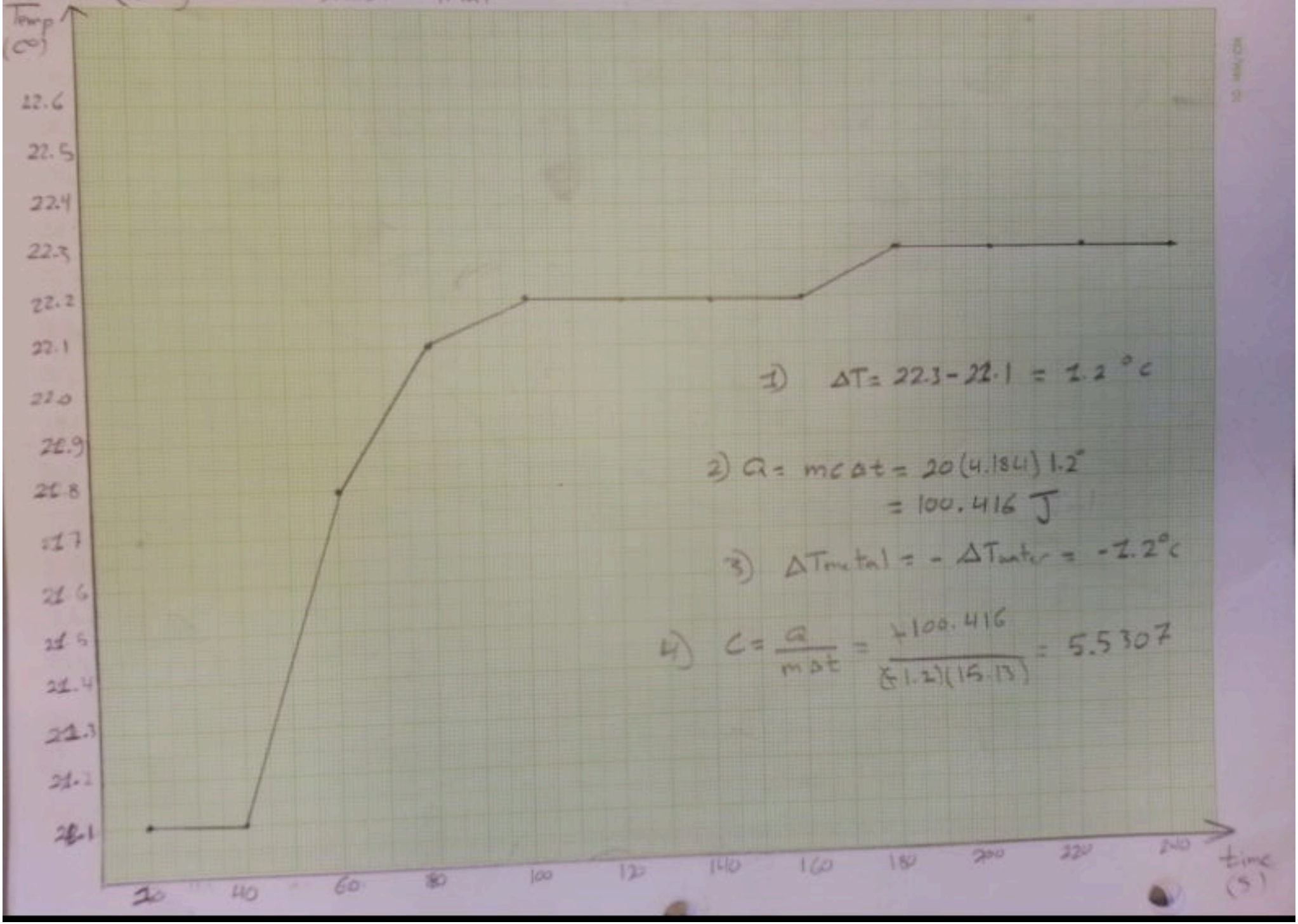
Mixing	20	40	60	80	100	120	140	160	180	200	220	240
① 3:25	26.1	25.9	25.5	25.8	25.9	25.9	25.9	25.8	25.7	25.6	25.6	25.6
② 3:15	25.8	25.5	25.5	25.5	25.3	25.8	25.7	25.7	26.7	26.2	26.1	26.1

	260	280	300
①	25.5	25.5	25.5
②	26.0	26.0	26.0

Tin

mass	①	②
	108.2145 g	108.3038 g

(Cu) metal "first trial"



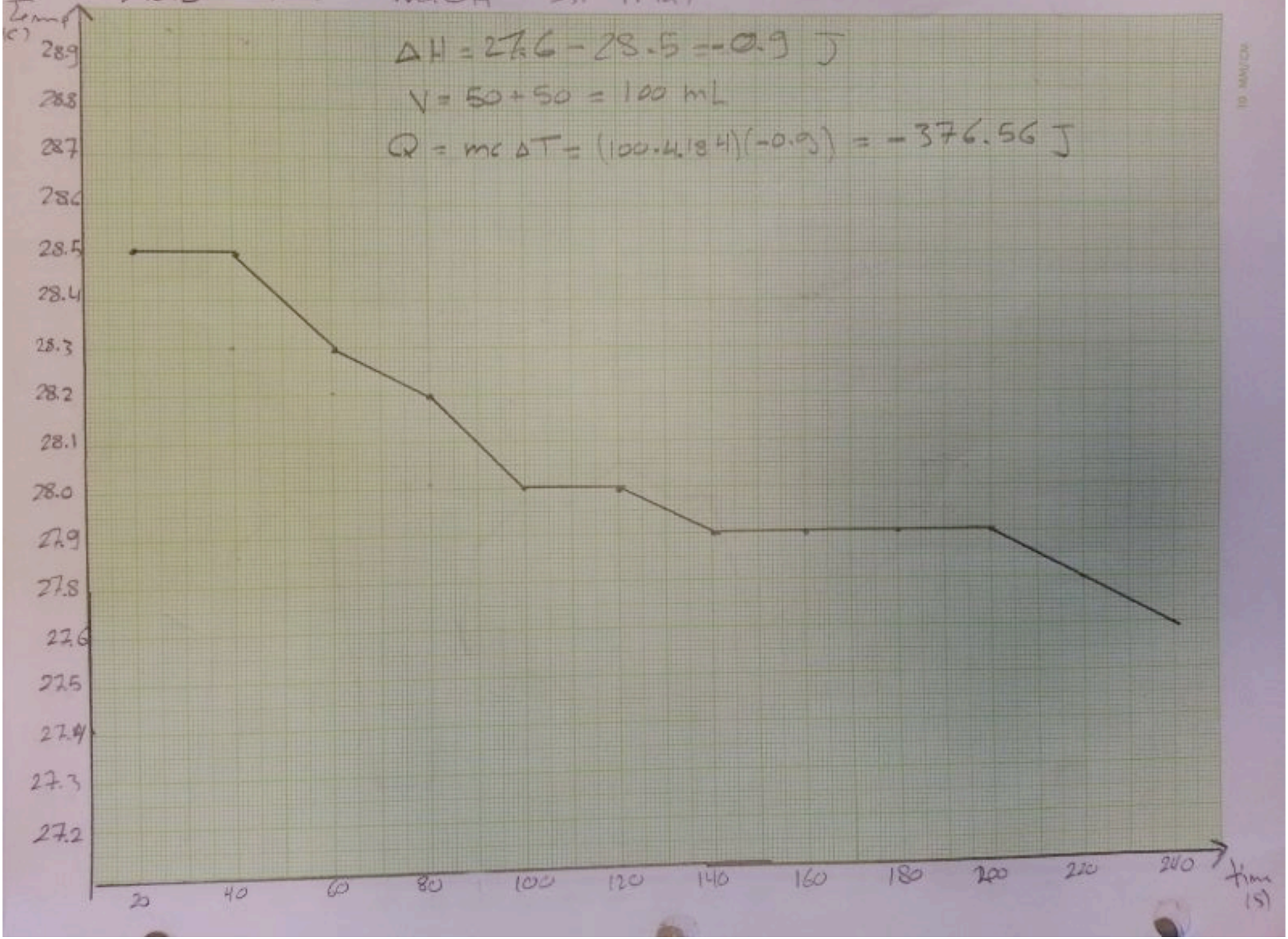
1) $\Delta T = 22.3 - 22.1 = 1.2\ ^\circ C$

2) $Q = mc\Delta t = 20(4.184)1.2^\circ$
$= 100.416\ J$

3) $\Delta T_{metal} = -\Delta T_{water} = -1.2^\circ C$

4) $C = \frac{Q}{m\Delta t} = \frac{+100.416}{(+1.2)(15.13)} = 5.5307$

Acid HCl + NaOH 1st Trial

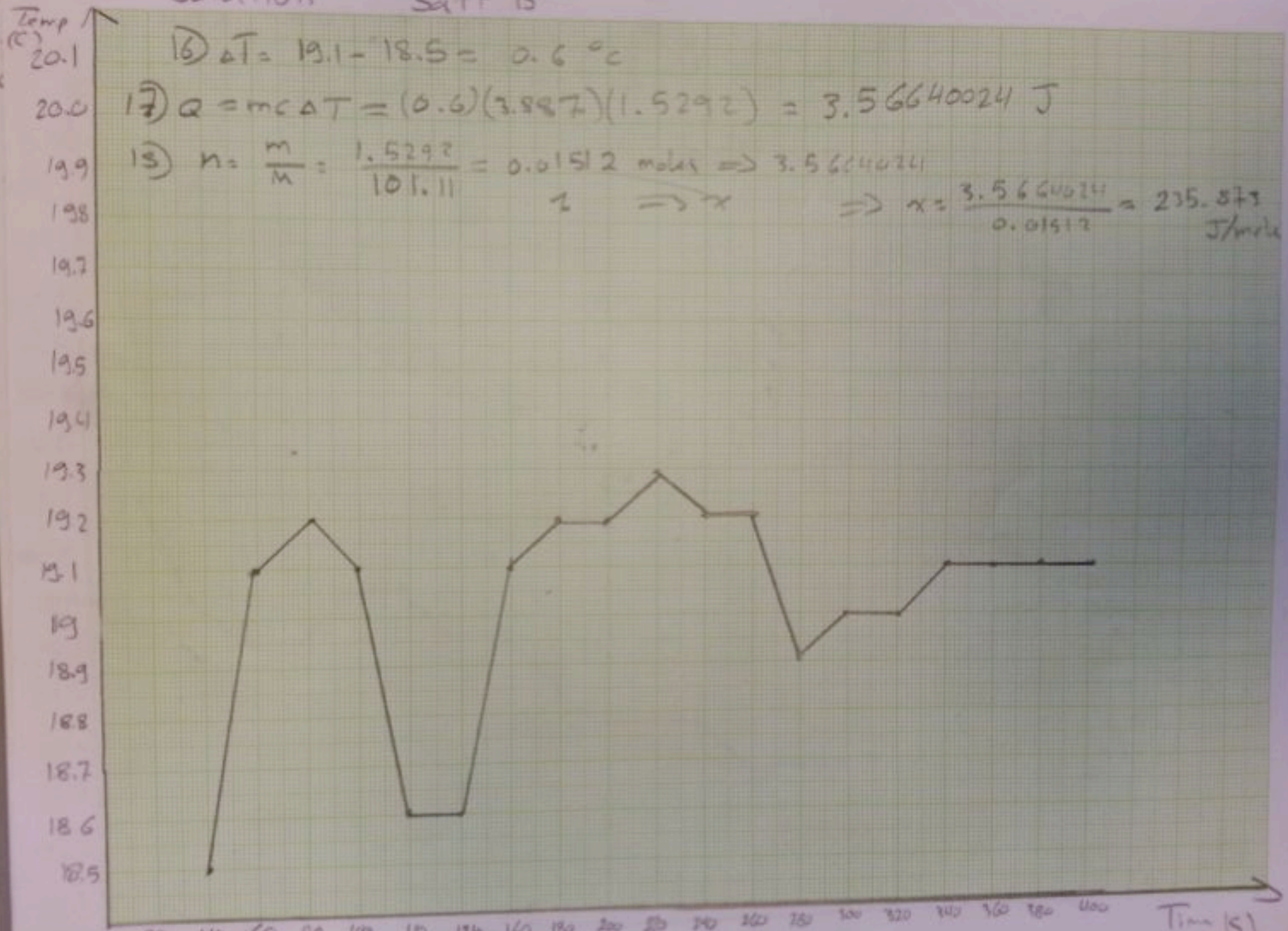


$\Delta H = 27.6 - 28.5 = -0.9$ J

$V = 50 + 50 = 100$ mL

$Q = mc\Delta T = (100.4.184)(-0.9) = -376.56$ J

Solution "Salt B"



⑯ $\Delta T = 19.1 - 18.5 = 0.6\ ^\circ C$

⑰ $Q = mc\Delta T = (0.6)(3.887)(1.5292) = 3.566400241\ J$

⑱ $n = \frac{m}{M} = \frac{1.5292}{101.11} = 0.01512$ moles $\Rightarrow 3.566400241$

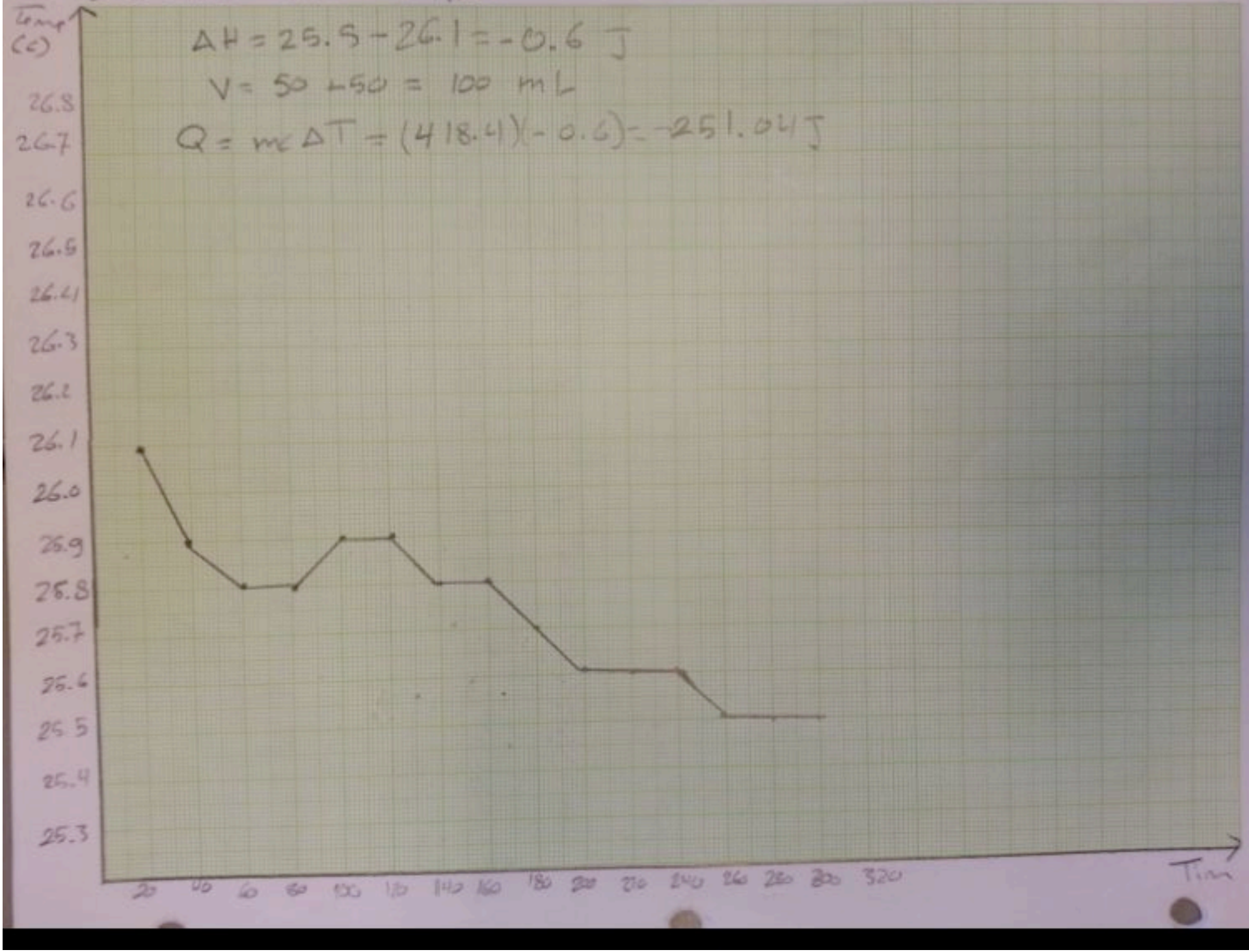
$1 \Rightarrow x \Rightarrow x = \frac{3.566400241}{0.01512} = 235.873$ J/mole

2nd acid HNO_3 & $NaOH$

$\Delta H = 25.5 - 26.1 = -0.6$ J

$V = 50 + 50 = 100$ mL

$Q = mc\Delta T = (418.4)(-0.6) = -251.04$ J

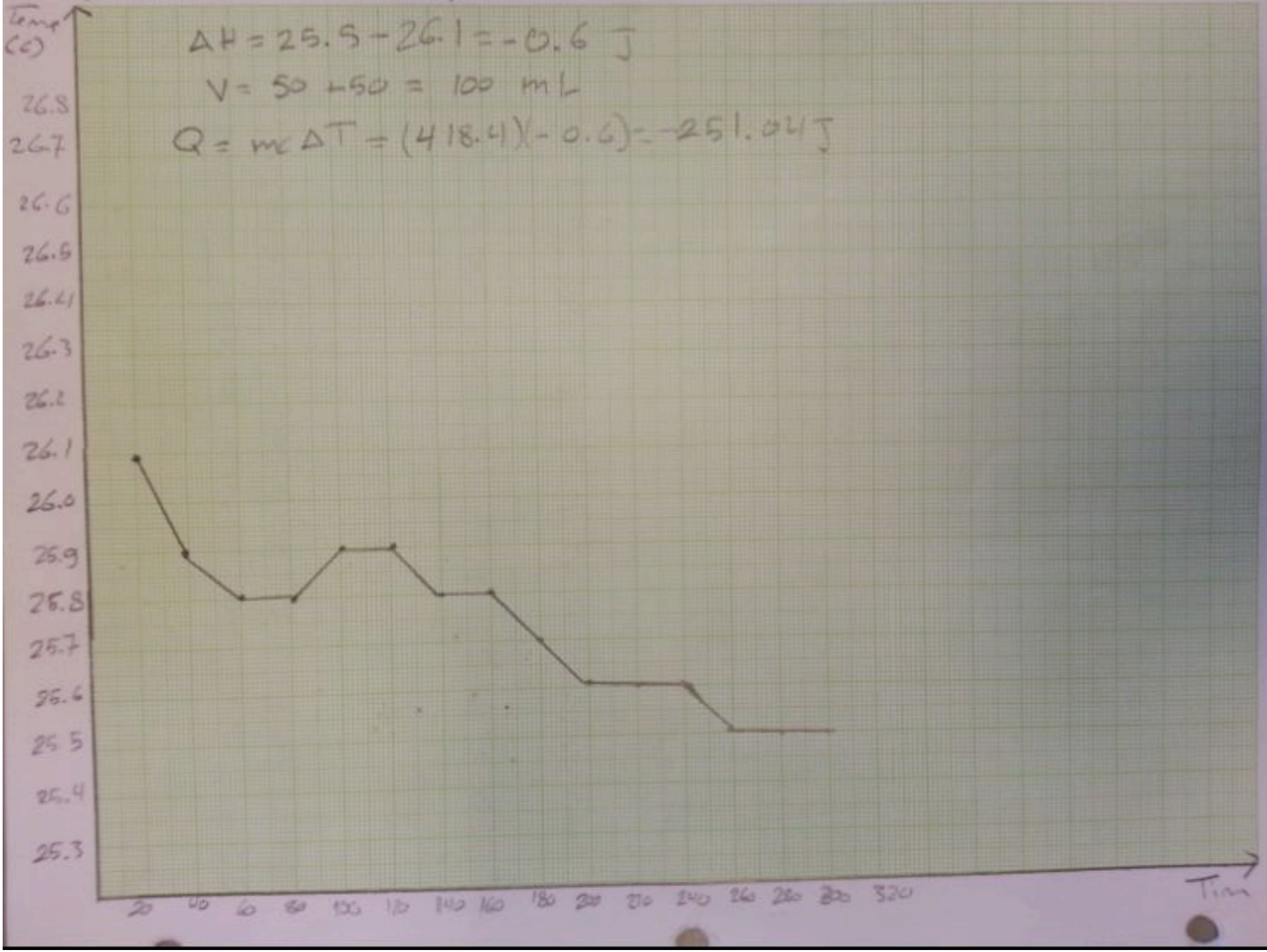


☆ Notes:

- Graph axes are switched because I needed more space for time & less space for temperature.
- could not calculate error.

☆ Observations: there is a slow change in temperature in every trial & every type of reaction.

2nd acid HNO3 & NaOH



$\Delta H = 25.5 - 26.1 = -0.6$ J

$V = 50 + 50 = 100$ mL

$Q = mc\Delta T = (418.4)(-0.6) = -251.04$ J

☆ Notes:

- Graph axes are switched because I needed more space for time & less space for temperature.
- could not calculate error.

☆ Observations: there is a slow change in temperature in every trial & every type of reaction.

★ Discussion:

Errors: error occurs due to many factors. one of the factors is the stirring of contents created a bigger surface are of solution (or water) with the air inside the calorimeter. which resulted in innacurate measurings & testing.

another factor is the quantities used of metals, salts, and acids.

Also the thermometer was not responding fast and accurately which made data recording harder.

★ Conclusion: a calorimeter test can be used on small specimens of materials that will be used later in a bigger scale because the specific heat capacity of the material can be calculated from that test

- Neutralization is exothermic (+ve ΔH)
- Dissolution is endothermic (-ve ΔH)