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NPTEL (https://swayam.gov.in/explorer?ncCode=NPTEL) » Quantitative Methods in Chemistry (course)

Announcements (announcements) About the Course (https://swayam.gov.in/nd1_noc20_cy02/preview)

Ask a Question (forum) Progress (student/home) Mentor (student/mentor)

Unit 6 - Week 3

Course outline

How does an NPTEL online course work?

Week 0

MATLAB

Week 1

Week 2

Week 3

- Classification of errors (unit? unit=36&lesson=37)
- A look at uncertainties in a measurement taking an example (unit? unit=36&lesson=38)
- A comprehensive and step-wise look at an experimental protocol towards understanding systematic

Assignment 3

The due date for submitting this assignment has passed. Due on 2020-02-19, 23:59 IST. As per our records you have not submitted this assignment.

This detail given below is for questions 1 through 5. An experiment is performed to obtain density of water by pipetting 1 mL of water into a weighing glass container at $25^{o}C(\rho_{water}=0.997)$. The experimenter obtains the following values of weight obtained with the use of three different weighing balances "A", "B", "C" and "D". Pick the statement that is true from the following:

Volume (mL): 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

Set A (g): 1.884, 3.878, 5.872, 7.866, 9.860, 11.854, 13.848, 15.842, 17.836, 19.830

Set B (g): 1.994, 3.988, 5.982, 7.976, 9.970, 11.964, 13.958, 15.952, 17.946, 19.940

Set C (g): 2.014, 4.028, 6.042, 8.056, 10.070, 12.084, 14.098, 16.112, 18.125, 20.139

Set D (g): 1.994, 4.008, 6.022, 8.036, 10.050, 12.064, 14.078, 16.092, 18.105, 20.119

1) From the measurements provided above for different weighing balances, what do you think is **1 point** the precision of each of the balance used, assumed the

above values are provided appropriately

- 10 g
- 1 g
- 0.1 g
- 0.01 g
- 0.001 g
- 0.0001 q
- cannot be assessed with provided data

No, the answer is incorrect.

Score: 0

Accepted Answers:

0.001 g

errors in an	2) Set A displayer	1 point
experiment	2) Set A displays:	i point
(unit?	ono error	
unit=36&lesson=39)	onstant error	
O Quiz :	proportional error	
Assignment 3 (assessment?	both constant and proportional error	
name=40)	cannot be assessed from the data given above	
QuantitativeMethods in	No, the answer is incorrect. Score: 0	
Chemistry:	Accepted Answers:	
Week 3	constant error	
Feedback Form (unit?	3) Set B displays:	1 point
unit=36&lesson=44)	ono error	
Assignment 3	onstant error	
solutions (unit?	proportional error	
unit=36&lesson=136)	both constant and proportional error	
Week 4	cannot be assessed from the data given above	
Week 5	No, the answer is incorrect. Score: 0	
Week 6	Accepted Answers: no error	
Week 7	4) Set C displays:	1 point
Week 8	no error	
	onstant error	
Week 9	proportional error	
Wook 40	both constant and proportional error	
Week 10	cannot be assessed from the data given above	
Week 11	No, the answer is incorrect. Score: 0	
	Accepted Answers:	
Week 12	proportional error	
Download Videos	5) Set D displays	1 point
Text Transcripts	ono error	
TOXE TRAINOPHPE	onstant error	
	proportional error	
	both constant and proportional error	
	cannot be assessed from the data given above	
	No, the answer is incorrect. Score: 0	
	Accepted Answers: both constant and proportional error	
	6) An experimenter is trying to estimate the amount of calcium present in a given bone sample. In order to perform the same, the researcher resorts to two	1 point

independent techniques, one that involves dissolving bone in water using chemical treatment

that from method B. Pick all possible scenarios that could result in such an observation:

directly from powdered bone (method B). The values obtained from method B were validated to be

(method A) following by EDTA chelation. Another determines it

correct, with method A always yielding higher values than

The chemical treatment did not completely dissolve the entire bone			
Hard water might have been used to dissolve the bone sample			
Pure water might have been used to dissolve the bone sample			
Likely presence of other cations that bind EDTA			
Aqueous solution methods tend to always have more error than solid phase methods			
☐ Small amount of scandium might have gotten converted to calcium during the chemical processing			
step			
EDTA might have not been standardized before the start of the experiment			
Some amount of solid might have been lost during the solution preparation			
No, the answer is incorrect. Score: 0			
Accepted Answers: Hard water might have been used to dissolve the bone sample			
Likely presence of other cations that bind EDTA			
EDTA might have not been standardized before the start of the experiment			
7) In the fluorimeter estimation of critical micelle concentration of sodium dodecyl sulfate **experiment explained in the lecture, an experimenter observes**			
that for a cuvette containing given concentration of the dye results in varying values that fluctuates			
significantly from the mean value. Pick all the statements that			
could possibly be reason for such an observation			
☐ The lamp might require longer time equilibration			
☐ The dye used in this study could be unstable (i.e. might be getting photo- bleached easily)			
☐ Voltage fluctuations might be causing such an effect			
☐ The instrument might have been miscalibrated			
☐ The solution might be evolving a gas that results in bubbles			
☐ The sample probed might be heterogeneous such that it might require stirring for homogenization			
☐ Temperature of the solution might be fluctuating			
None of the above			
No, the answer is incorrect. Score: 0			
Accepted Answers:			
The lamp might require longer time equilibration			
The dye used in this study could be unstable (i.e. might be getting photo- bleached easily)			
Voltage fluctuations might be causing such an effect The instrument might have been miscalibrated			
The solution might be evolving a gas that results in bubbles			
The sample probed might be heterogeneous such that it might require stirring for homogenization			
Temperature of the solution might be fluctuating			
8) Method errors can be minimized 1 point			
by following a new method every time the experiment is performed			
by following a comprehensive protocol			
without deviating from a known working protocol			
by deviating from a known working protocol			
by altering the protocol after the experiment has begun			
by calibrating required instruments before usage			
when the experiment is performed in the day time			
No, the answer is incorrect. Score: 0			
Accepted Answers:			

by following a comprehensive protocol without deviating from a known working protocol by calibrating required instruments before usa	
9) Personal errors can be minimized	1 point
the experiment is performed in the day tire there is no bias from prior knowledge of the outcome of the experiments are completed within a second when the instruments are calibrated beform. No, the answer is incorrect. Score: 0 Accepted Answers:	he outcome of the experiment of the experiment hort period of time re measurements begin
there is no bias from prior knowledge of the or 10)n the United States of America, breathalyze alcohol content in blood of motorists suspected of influence. The equipment made by a certa who were marked as under influence but did not Pick which of the scenarios could have re	r tests are performed to evaluate the blood 1 point of driving under ain company resulted in "false positives", i.e. motorists have alcohol.
poor accuracy resulting from lack of enough poor precision due to lack of proper calibration protocols lack of rigorous validation of results all of the above none of the above No, the answer is incorrect. Score: 0	gh training datasets
Accepted Answers: all of the above	