Analytical Chemistry

Chapter 2

by
Wan Norfazilah Wan Ismail
Faculty of Industrial Sciences & Technology
norfazilah@ump.edu.my

Chapter Name
by Main Author's Name
http://ocw.ump.edu.my/course/view.php?id=467

Activity 3

1. A batch of nuclear fuel pellets was weighed to determine if they fell within control guidelines. The weights were 127.2, 128.4, 127.1, 129.0 and 128.1 g. Calculate:
   a. mean
   b. median
   c. range

2. Calculate the absolute error and relative error in percent and in parts per thousand for the following:

	Measured Value	Accepted Value
a.	22.62 g	22.57 g
b.	45.02 mL	45.31 mL
c.	2.68%	2.71%
d.	85.6 cm	85.0 cm

Chapter Name
by Main Author's Name
http://ocw.ump.edu.my/course/view.php?id=467

Activity 3

3. The tin and zinc contents of a brass sample are analysed with the following results. Calculate the standard deviation and the coefficient of variation for each analysis.

Zn (%)	Sn (%)
33.27	0.022
33.37	0.025
33.34	0.026

4. Replicate water samples are analysed for water hardness with the following results; 102.2, 102.8, 103.1 and 102.3 ppm CaCO3. Calculate:
   a. the standard deviation
   b. the relative standard deviation
   c. the standard deviation of the mean
   d. the relative standard deviation of the mean

Chapter Name
by Main Author's Name
http://ocw.ump.edu.my/course/view.php?id=467

Activity 3

5. Replicate samples of a silver alloy are analysed and determined to contain 95.67, 95.61, 95.71 and 95.60% Ag. Calculate:
   a. the standard deviation
   b. the standard deviation of the mean
   c. the relative standard deviation of the mean (in percent) of the individual results.

6. Calculate the uncertainty in the answers of the following:
   a. $(128 \pm 2) + (1025 \pm 8) - (636 \pm 4)$
   b. $(16.25 \pm 0.06) - (9.43 \pm 0.03)$
   c. $(46.1 \pm 0.4) + (935 \pm 1)$

Chapter Name
by Main Author's Name
http://ocw.ump.edu.my/course/view.php?id=467

Activity 3

7. Calculate the absolute uncertainty in the answers of the following:
   a. $(2.78 \pm 0.04)(0.00506 \pm 0.00006)$
   b. $(36.2 \pm 0.4) / (27.1 \pm 0.6)$
   c. $[(50.23 \pm 0.07)(27.86 \pm 0.05)] / (0.1167 \pm 0.0003)$

8. The following molarities were calculated from replicate standardization of a solution: 0.5026, 0.5029, 0.5023, 0.5031, 0.5025, 0.5032, 0.5027 and 0.5026 M. Assuming no determinate errors, within what range are you 95% certain that the true mean value of the molarity falls?

Chapter Name
by Main Author's Name
http://ocw.ump.edu.my/course/view.php?id=467

Activity 3

9. Determination of the sodium level in separate portions of a blood sample by ion-selective electrode measurement gave the following results: 139.2, 139.8, 140.1 and 139.4 µg/L. What is the range within which the true value falls at the following confidence level? Assuming no determinate error.
   a. 90% confidence level
   b. 95% confidence level
   c. 99% confidence level

10. The standard deviation established for the determination of blood chloride by coulometric titration is 0.5 µg/L. What is the 95% confidence limit for a triplicate determination?

Chapter Name
by Main Author's Name
http://ocw.ump.edu.my/course/view.php?id=467

Author Information

Wan Norfazilah Wan Ismail

Industrial Chemistry Programme
Faculty of Industrial Sciences & Technology
Universiti Malaysia Pahang

Chapter Name
by Main Author's Name
http://ocw.ump.edu.my/course/view.php?id=467