

Practical Assessment 2 includes:

Technique #1 - Use of a Burette

Technique #3 - Use of a Volumetric Flask

Technique #7 – Preparation of a Standard Solution

Technique #8 – Titration (Includes Technique #2 – Use of a Pipette)

Student preparation:

Read over Techniques #1, 3, 7, and 8 in the “*Demonstrations of Nine Practical Lab Techniques*” booklet.



CHEM 2204 – Chemical Laboratory Techniques

Demonstrations of
Nine Practical Lab Techniques

Technique #1 – Use of a Burette

Technique #2 – Use of a Pipette

Technique #3 – Use of a Volumetric Flask

Technique #4 – Weighing

Technique #5 – Use of a Bottle-Top Dispenser

Technique #6 - Gravity Filtration, Vacuum Filtration

Technique #7 – Preparation of a Standard Solution

Technique #8 – Titration

Technique #9 – Rotary Evaporator

Come to your assessment at least 5 minutes early and wait outside the lab. Remember to bring:

1. Lab coat
2. Goggle
3. Pen
4. Calculator

You will be asked to draw **two** techniques from a draw box and perform the tasks given. Read over the following marking scheme for each technique so that you are prepared to answer questions related to the techniques, as well as carrying out the techniques to perform the tasks.

During the assessment, be confident and be in control, and be knowledgeable.

Good luck!

Name: _____

Technique #1 – Use of a Burette

Task:

1. Prepare and fill the burette with the solution provided.
2. Record the initial burette reading.
3. Place an Erlenmeyer flask under the burette to receive the solution from the burette.
4. Using the timer provided, open the stopcock for approximately 15 seconds.
5. Record the final burette reading.
6. Determine the volume of the solution delivered into the Erlenmeyer flask.

Datasheet:

1. Final Burette Reading _____

2. Initial Burette Reading _____

3. Volume of solution delivered _____

Assessment Scheme: Maximum score = 15 points

Marking Scheme: (marks in brackets)

U = unsatisfactory (0); S = satisfactory; (1); G = Good (2); E = Excellent (3)

General:

- Does not wear goggles – minus 1 point
- Does not write data directly on the datasheet in pen – minus 1 point
- Does not label glassware – minus 1 point
- You must obtain a minimum of 5 checks. Less than 5 checks means an incomplete technique – minus 1 point

Technique #1 - Use of Burette	U	S	G	E	Comment
Knowledge of keywords: acclimatization, meniscus					
Acclimatize technique					
Check for bubble and filling technique					
Relative position of burette to receiving flask					
Reading burette – eye level, check agreement with student					
Recording data to proper significant figures					

Name: _____

Technique #3 – Use of a Volumetric Flask

Task:

1. You are asked to dilute the stock solution, Solution A, by reaching into the draw box to draw one of the following dilution factors. Each diluted solution has a final volume of 100.0 mL.

The Stock solution, Solution A, is 2.010 M.

Draw Box: In the draw box, place these numbers:

Dilution Factor = 2
Dilution Factor = 5
Dilution Factor = 10

2. Reach your hand into the box and draw a dilution factor.
3. Using the calculated values, prepare 100.0 mL of the dilute stock solution.

Dilution Factor	C_i (M)	C_f (M)	V_i (mL)	V_f (mL)
_____	2.010	_____	_____	100.0

Your Planned action:

To prepare a _____ M (C_f) solution, measure, using a graduated cylinder

_____ mL (V_i) from the 2.010 M stock solution and transfer this quantity into

a 100 mL volumetric flask. Make up to the mark with distilled water and mix thoroughly.

Assessment Scheme: Maximum score = 15 points**Marking Scheme:** (marks in brackets)

U = unsatisfactory (0); S = satisfactory; (1); G = Good (2); E = Excellent (3)

General:

- Does not wear goggles – minus 1 point
- Does not write data directly on the datasheet in pen – minus 1 point
- Does not label glassware – minus 1 point
- You must obtain a minimum of 5 checks. Less than 5 checks means an incomplete technique – minus 1 point

Technique #3 - Use of Volumetric Flask	U	S	G	E	Comment
Knowledge of keywords: meniscus, Pasteur pipette, quantitative transfer					
Check dilution calculation					
Pipette of stock solution using small beaker					
Observe filling the flask to $\frac{1}{2}$ to $\frac{2}{3}$ full and swirl the flask to mix the solution.					
Techniques in bringing level to mark – use of Pasteur pipette, bring mark to eye level					
Uniform mixing of final solution - invert flask repeatedly (~15 times)					

Name: _____

Technique #7 – Preparation of a Standard Solution

Task:

You will be asked to prepare a 50.00 mL standard solution of copper (II) sulfate pentahydrate, $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$.

1. Reach your hand into the box and draw a concentration.

Draw Box: In the draw box, place these numbers:

Standard solution concentration approximately 0.08 M

Standard solution concentration approximately 0.15 M

Standard solution concentration approximately 0.22 M

Standard solution concentration approximately 0.28 M

2. Calculate the mass of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ needed using this equation.

3. a. Concentration of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ standard solution _____

b. Molar mass of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ _____

c. Total volume of solution 50.00 mL

d. Mass of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ to be weighed _____

4. Weigh the $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ sample.

Assessment Scheme: Maximum score = 15 points**Marking Scheme:** (marks in brackets)

U = unsatisfactory (0); S = satisfactory; (1); G = Good (2); E = Excellent (3)

General:

- Does not wear goggles – minus 1 point
- Does not write data directly on the datasheet in pen – minus 1 point
- Does not label glassware – minus 1 point
- You must obtain a minimum of 5 checks. Less than 5 checks means an incomplete technique – minus 1 point

Technique #7 - Prepare a Standard Solution	U	S	G	E	Comment
Knowledge of keywords: standard solution, quantitative transfer, primary standard, three properties of a primary standard					
Correct calculation of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ required for the targeted concentration					
Transfer technique – weigh boat to beaker					
Dissolving $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ in a beaker with $\sim 2/3$					
Technique in quantitative transfer – rinsing at least 3 times					
Transfer technique – beaker to volumetric flask					
Technique in making the solution in the volumetric flask (Technique 3)					
(i) Observe filling the flask to $\frac{1}{2}$ to $\frac{2}{3}$ full and swirl the flask to mix the solution.					
(ii) Techniques in bringing level to mark – use of Pasteur pipette, bring mark to eye level					
(iii) Uniform mixing of final solution - invert flask repeatedly (~15 times)					

Name: _____

Technique #8 – Titration

Task: Carry out an acid-base titration

1. The burette is already acclimatized with the base. Use a clean and dry beaker to obtain a small quantity of acid.
2. Pipette 10.00 mL of the acid into an Erlenmeyer flask.
3. Add a few drops of phenolphthalein.
4. Perform an acid-base titration.

Datasheet for a Titration

Trial 1:

- | | |
|--|-------|
| 1. Final burette reading | _____ |
| 2. Initial burette reading | _____ |
| 3. Volume of titrant used in titration | _____ |

Trial 2:

- | | |
|--|-------|
| 1. Final burette reading | _____ |
| 2. Initial burette reading | _____ |
| 3. Volume of titrant used in titration | _____ |

Assessment Scheme: Maximum score = 15 points**Marking Scheme:** (marks in brackets)

U = unsatisfactory (0); S = satisfactory; (1); G = Good (2); E = Excellent (3)

General:

- Does not wear goggles – minus 1 point
- Does not write data directly on the datasheet in pen – minus 1 point
- Does not label glassware – minus 1 point
- You must obtain a minimum of 5 checks. Less than 5 checks means an incomplete technique – minus 1 point

Technique #8 - Titration	U	S	G	E	Comment
Knowledge of keywords: burette, volumetric pipette, titrant, indicator, phenolphthalein, colour change expected					
Burette height relative to the Erlenmeyer flask					
Obtain acid using a beaker and pipette from the beaker					
Technique in pipetting (Technique 2)					
(i) Use of pipette bulb					
(ii) Acclimatize technique					
(iii) Wiping the outside of the pipette before adjusting to the mark					
(iv) Control of pipette while adjusting the liquid level to the mark – Bring to eye level					
(v) Dispensing technique – draining with tip touching wall of containing and waiting for 10 seconds					
Remember to add phenolphthalein					
Technique in swirling and rinsing					
Control of the stopcock to dispense titrant at various various rate (ie – a stream to drop- wise)					
Ability to hold a partial drop at the tip of the burette and wash the drop into the Erlenmeyer flask					
Acceptable final colour change					
Record of data to proper number of significant figures					
Final burette volume is +/- 0.10 mL					

