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Determination of Tidal Volume and Vital Capacity

Experiment 11 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To measure resting tidal volume and slow vital capacity with an approved spirometer or supplied trace.

Principle

Tidal volume is the volume of a quiet breath. Vital capacity is the maximal volume moved between maximal inspiration and maximal expiration; VC = IRV + tidal volume + ERV. Simple spirometry does not directly measure residual volume.

Requirements

- Instructor-operated calibrated spirometer, manufacturer-approved filter/mouthpiece and recording software or supplied traces.
- Consenting suitable volunteer, chair, nose clip when prescribed and record sheet.

Procedure

1. Check suitability

The trained operator reviews suitability and relevant precautions before testing. Use supplied traces when the participant is unsuitable or declines.

2. Set up

Verify the device checks, units, calibration-verification status and infection-control setup. Fit the assigned mouthpiece and explain a comfortable sealed lip position.

3. Quiet breathing

Allow stable normal breaths and record several tidal excursions without coaching deeper breaths. Calculate the average of valid resting breaths.

4. Slow vital capacity

The instructor coaches a complete comfortable maximal inspiration and slow maximal expiration according to the spirometer protocol, or the corresponding permitted sequence. Record an acceptable trace.

5. Repeat appropriately

Obtain repeat traces with recovery under the trained operator. Follow the device and laboratory acceptability/repeatability criteria rather than forcing a dizzy participant to continue.

6. Report

Record valid tidal volumes, selected slow VC, method and any correction supplied by the instrument. Do not call slow VC FVC or infer residual volume from it.

Observations and Record

Trace	Volume / units	Quality / observation
Quiet breath 1 / 2 / 3	_____	_____
Slow VC attempts	_____	_____
Selected valid VC	_____	_____

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Resting breaths 0.45, 0.50 and 0.55 L give a mean tidal volume of 0.50 L.
- Illustrative components IRV 2.5 L, tidal volume 0.5 L and ERV 1.0 L give VC = 4.0 L. These are assumed teaching values, not a universal normal.

Result

Record the observed outcome and calculated value, with units. State whether the stated laboratory specification was met; do not copy the worked example as your result.

Precautions

- Testing is supervised; stop on chest pain, marked breathlessness, dizziness or participant request.
- Use the approved individual mouthpiece/filter and operator infection-control procedure.
- Clinical interpretation needs age, height and appropriate prediction standards; simple spirometry cannot measure TLC or residual volume directly.

Viva Questions and Answers

1. What distinguishes VC from tidal volume?

VC spans maximal inspiration to maximal expiration; tidal volume is a quiet breath.

2. Can ordinary spirometry measure residual volume?

No.

3. Why inspect the trace?

Leaks, incomplete effort and unstable breathing can invalidate a volume reading.

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