



# Equipment III

## Filters and Centrifuges

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### Course Objectives

1. Describe the purpose and function of filtration equipment.
2. Describe typical applications of filtration equipment in chemical processing.
3. Distinguish between the different types of liquid filtration equipment.
4. Distinguish between the different types of gas filtration equipment.
5. Identify typical operating parameters associated with controlling filtration equipment.
6. Describe common performance issues related to filtration equipment and their causes and indicators.



### Key Terms (Define the following)

cake - \_\_\_\_\_  
\_\_\_\_\_

filter aid - \_\_\_\_\_  
\_\_\_\_\_

filtrate - \_\_\_\_\_  
\_\_\_\_\_

pre-coat - \_\_\_\_\_  
\_\_\_\_\_

polish filtering - \_\_\_\_\_  
\_\_\_\_\_

permeate - \_\_\_\_\_  
\_\_\_\_\_

retentate - \_\_\_\_\_  
\_\_\_\_\_



## Questions

1. Describe some common filter media.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. Explain the difference between surface (cake) filtration and depth filtration.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. What are the advantages of pre-coating?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. List three applications for liquid-solid filtration in chemical processing.

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_

5. Describe the components of a vacuum drum filter.

\_\_\_\_\_  
\_\_\_\_\_

6. Describe the application(s) for each of the following:

liquid bag filter - \_\_\_\_\_  
\_\_\_\_\_

liquid cartridge filter - \_\_\_\_\_  
\_\_\_\_\_

pressure Nutsche filter - \_\_\_\_\_  
\_\_\_\_\_

candle filter - \_\_\_\_\_  
\_\_\_\_\_

belt filter - \_\_\_\_\_  
\_\_\_\_\_

7. Which vacuum filters are continuous processes?

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8. Describe the steps for batch filtering in a candle filter.

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9. Describe how a filter press works.

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10. Describe how solids are removed from a perforated basket centrifuge.

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11. What is the advantage of a centrifuge that does not have a filter cloth?

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12. Which centrifuges described in this module are continuous processes?

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13. Membrane separation is used to remove impurities that are smaller than \_\_\_\_\_.

14. In a spiral wound membrane filter, filter membranes are layered between a \_\_\_\_\_ layer and a \_\_\_\_\_ layer.

15. List common operating parameters associated with a centrifuge.

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16. What is the purpose of measuring the pressure difference from the inlet and outlet to a filter?

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17. List common problems in a filter that are caused by solids.

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18. List three applications for gas filtering.

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_

19. Describe how the cake is dislodged from the bags in a dust collector.

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20. List common parameters associate with a gas filtering system.

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_____	_____
_____	_____
_____	_____

21. List three causes of gas leaks in dust collectors.

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_

22. What are explosion prevention and minimization measures important to dust collecting operations?

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23. List five methods used to prevent or minimize a dust explosion in a dust collector.

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_
- 4) \_\_\_\_\_
- 5) \_\_\_\_\_