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## LABORATORY WORK NO. 4

### FILTRATION AND DECANTATION

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■ **PRINCIPLE:** **Filtration** is a method of separating solid substances from liquid substances or gases on a porous partition barrier – filter. In a laboratory, we mostly separate liquids from the solids (suspension, the precipitate from the mother liquor). The mostly used filters in laboratory chemistry are the following: filter paper, frit (porous glass or porcelain material), activated charcoal, glass wool and cloth. Filter paper is distinguished according to the speed at which fluid flows through it. Sparse filter paper has fast speed and is suitable for the filtration of coarse precipitates. Finer suspensions are filtered more slowly on denser paper. Ashless filters are used for analytical purposes, they leave a small amount of ashes after combustion.

#### Marking of filter papers:

- black – sparse
- red – medium sparse
- white - medium dense
- yellow - medium dense, deprived of organic compounds in dissolving agents
- blue – fine

Simple filters are used for filtration, they have to be moistened with water after insertion into the funnel in order to adhere to the glass. Folded filters don't have to be moistened.

**Ways of carrying out filtration:** cold, hot, under reduced pressure (vacuum filtration).

**Decantation** is a simple method of separating the solid phase of suspension from the liquid phase by making use of different density of materials. The solid is allowed to settle at the bottom of the container and the clear liquid is carefully decanted, possibly suction straw is used. You cannot achieve complete separation of substances like in case of filtration.

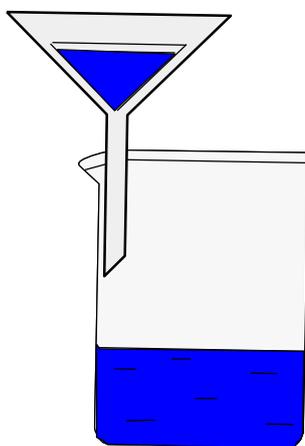
#### TASK NO. 1: SEPARATION OF A MIXTURE OF COPPER SULFATE AND SAND

- **CHEMICALS:** mixture of  $\text{Cu}(\text{SO}_4) \cdot 5 \text{H}_2\text{O}$  and sand, distilled water
- **AIDS:** 2 beakers (250ml), scales, weighing boats, teaspoon, 50 ml graduated cylinder, rod, funnel, filter paper, burner, net, evaporating dish, wash bottle.

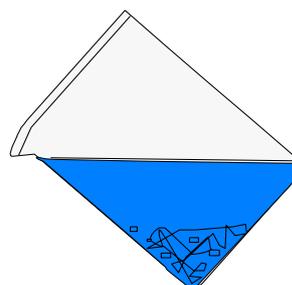
## ■ PROCEDURE:

1. Weigh on the weighing boat cca. 5 g of mixture of copper sulfate and sand (to three decimal places). Pour the mixture into a beaker, add 30 ml of distilled water and heat over the burner to dissolve copper sulfate.
2. Let the sand settle, pour the liquid through a filter with smooth red tape.
3. In the rest of the sand perform decantation through a filter again with about 30 ml of water (don't overdillute the solution). Use a wash bottle to convert the rest of sulfate and sand on the filter and close the filtration.
4. Thicken the obtained copper sulfate filtrate carefully in the evaporating dish over a burner until it forms a coating on the surface (a crust). Leave the final filtrate crystallize till the next laboratory exercise.
5. Weigh the dry sand and the crystals of  $\text{Cu}(\text{SO}_4) \cdot 5 \text{H}_2\text{O}$  – and you will get a real yield (Real YV) in g.
6. Calculate the relative yields (Relative Y) of the copper sulfate and sand in %. The theoretical yield (TY) consists of the portion of the mixture in g.

### Apparatus drawing: Filtration



### Decantation



■ CALCULATIONS : 
$$\text{Relative Y} = \frac{\text{Real Y}}{\text{TY}} \cdot 100\%$$

where: Relative Y = relative yield in %

Real Y = real yield in g

TY = theoretical yield in g.

## ■ CONCLUSION:

Indicate the obtained amount of  $\text{Cu}(\text{SO}_4) \cdot 5 \text{H}_2\text{O}$ , sand and the relative yield of the substance in mixture in %.



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**TASK NO. 2: ISOLATION OF POTATO STARCH BY DECANTATION**

■ **CHEMICALS:** potato, distilled water

■ **AIDS:** fine grater, gauze, two 250 ml beakers, knife, rod, filter paper, 50 ml graduated cylinder, funnel, wash bottle

■ **PROCEDURE:**

1. Grate a cleanly washed and peeled potato on fine grater, so that mash is created (5 - 10 g of substance). Add 50 ml of distilled water and mix well.
2. Filter the mixture through gauze into a beaker. Give the filtrate time to settle.
3. Separate the upper layer from the starch suspension by decantation.
4. Add 50ml of water and repeat the decantation until the water is not turbid and the sedimented starch is completely white and clean.
5. Assemble the filtration apparatus as shown in the picture above? Pour carefully the mixture of starch and water on the rod. The liquid may reach up to 1 cm at max below the rim of the filter paper. Finally rinse the rest of starch with water from a wash bottle and convert it quantitatively on the filter.
6. After the filtration is ended, remove the filter paper with starch, unpack and let it dry out.

■ **CONCLUSION:** Evaluate the result of the experiment.

**TASK NO. 3: ADSORPTION OF COLOURED AGENTS FROM SOLUTION UNDER THE INFLUENCE OF ACTIVATED CARBON**

■ **CHEMICALS:** methyl red, medicinal (activated) charcoal, distilled water

■ **AIDS:** 2 beakers (250ml), mortar and pestle, rod, filter paper, funnel

■ **PROCEDURE :**

1. Pour 25 ml of water into the beaker and add 2 drops of methyl red. In the mortar, mash 1 tablet of activated charcoal to fine powder, then add it to the coloured water and mix carefully with a rod.
2. Assemble the filtering apparatus and filtrate the contents of the beaker. Observe the colouring of the filtrate.

■ **CONCLUSION:** Describe the appearance of the filtrate and properties of medicinal charcoal.

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## STUDENT'S SHEET No.4

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### FILTRATION AND DECANTATION

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#### 1) Matching words

Match correctly words to their translations:

- |                              |                  |
|------------------------------|------------------|
| 1. activated carbon/charcoal | A. látka/činidlo |
| 2. rod                       | B. aktivní uhlí  |
| 3. agent                     | C. tkanina       |
| 4. cloth                     | D. gáza          |
| 5. scales                    | E. váhy          |
| 6. gauze                     | F. tyčinka       |
| 7.                           |                  |

#### 2) Correct spelling – filling in the text

1. \_\_\_\_\_ is a simple method of separating the solid phase of suspension from the liquid phase by making use of different density of materials.

- a) demolition b) decanting c) decantation d) decent e) decention

2. \_\_\_\_\_ are chemistry supplies used to grind and mix substances, including chemicals in a laboratory and also food in the kitchen.

- a) motor and pestle b) mortar and pastel c) mordor and pasta d) mortar and pestle

3) \_\_\_\_\_ is a piece of laboratory equipment used to measure the volume of liquid.

- a) graduated cylinder b) graduating cylinder c) graded cube d) graduated liquider



## INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

4) A \_\_\_\_\_ is a squeeze bottle with a nozzle, used to rinse various pieces of laboratory equipment, such as test tubes etc..

- a) squezzze bottle    b) squirttle    c) wash bottle    d) squeeze squirtle

5) A \_\_\_\_\_ is an insulating material made from fibres of glass arranged into a texture similar to wool.

- a) glass wool    b) wool glass    c) gllas wol    d) glass wool

**6) Word search**

1. SPIONSUPSEN .....
2. PPARTUASA .....
3. RETLIF ERPAP .....
4. PERCOP FATESUL .....
5. REKBEA .....
6. RADGTAUED DERCYLIN .....

**7) Easy crossword – Fill in the missing verbs:**

Navlhčit:

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Zředit:

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Uschnout: (2 words)

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Propláchnout

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Sestavit (např. aparaturu):

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### 8) Spelling/Word search:

1. ASH\_\_\_\_ P\_\_ER      bezpopelný papír
2. D\_\_S\_      hustý
3. E\_A\_P\_R\_T\_NG \_IS\_      odpařovací miska
4. \_\_ADU\_\_ED C\_L\_\_DE\_      odměrný válec
5. CO\_R\_\_      hrubý
6. GL\_\_ W\_\_L      skelná vata
7. P\_\_\_\_O S\_\_\_\_CH      bramborový škrob
8. TU\_B\_\_      zakalený