Questions from the "PAL Prüfungsbuch"

Separating and cleaning up substances, basic laboratory techniques

186: Which operation does ***not*** lead to a weighing error on an analysis balance?

1) Weighing of propanone in a 50 mL beaker glass
2) Weighing of ice cold water in a closed weighing glas
3) Weighing of benzoic acid in an electrostatically charged polyethylene cup
4) Weighing of dried sodium chloride in a weighing scoop
5) Weighing of sugar in a 800 mL beaker glass

187: A sample is to be prepared for further processing. Which of the mentioned operations does ***not*** belong to this?

1) Synthezising
2) Dissolving
3) Homogenizing
4) Grinding
5) Aliquoting

188: In preparation for analysis contaminants are to be removed by extraction. What statement is correct?

1) The analyte must be equally soluble in the first (raffinate phase) and the second (extraction phase) solvent.
2) The solvents must be miscible with each other
3) The solvents should have the same density
4) The solvents should seperate from each other as quickly as possible
5) When adding the second sovent (extraction phase) the analyte must precipitate

189: What is understood by Classifying?

1) Mechanical disassembly of a solid compound mixture into particles with equal chemical characteristics
2) Mechanical disassembly of a solid compound mixture into particles of equal particle size ranges
3) Separation of iron from a mixture by using a magnet
4) Chemical disassembly of a mixture by decomposition
5) Thermal treatment of wastes

190: For which of the named salts temperature has the *least* influence on the solubility in water?

1) KNO_3
2) NaCl
3) KCl
4) $NaNO_3$
5) $CaCl_2$

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197: Which statement about organic solvents is *wrong*?

1) Organic solvents can develop vapours whose density is lower than the density of air
2) Organic solvents can have a fat solving effect
3) Organic solvents can be flammable
4) Organic solvents can be absorbed through the skin
5) Organic solvents can have an anesthetic effect

198: Which of the five answers shows the correct order of the solvents regarding their increasing polarity (left to right)?

1) Pentane, methanol, trichloromethane, water
2) Methanol, water, pentane, trichloromethane
3) Pentane, trichloromethane, methanol, water
4) Trichloromethane, pentane, water, methanol
5) Water, methanol, pentane, trichloro-methane

203: What can trigger the crystallisation of a substance?

1) Centrifugation
2) Seeding
3) Decantation
4) Extraction
5) Absorbing

204: On which of the named answers the sedimentation velocity in a centrifuge does *not* depend?

1) Rotational speed of the rotor
2) Diameter of the rotor
3) Relative centrifugal acceleration (RCF = relative centrifugal force)
4) Dimeter of the centrifugal tube
5) Difference of the densities of the substances that are to be seperated

205: Which statement about filtration methods (techniques) is *wrong*?

1) Filtrations can be performed at normal pressure, excess pressure and reduced pressure
2) In gravimetric determination methods specialty papers are used which ash does not influence the analytical results
3) In suction filters and filter crucibles the cake layer has to be mechanically removed (e.g. with a spatula from the inside of the filter crucibles)
4) Negative pressure is applied when sucking off with the help of nutsch filters and frits
5) Filter aids support the creation of a firm filter cake by the formation of capillaries and therewith promote filtration performance

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206: The filtration performance of a suction filter is to be raised. Which method is *not* appropriate?

1) Enlargement of the filter surface area
2) Increasing the pressure difference
3) Usage of a filter medium with a smaller pore size
4) Lowering the viscosity of the liquid
5) Increasing the size of the particulate matters in the suspension

207: A very finely dispersed solid matter with a density of $> 1\ g/cm^3$ is to be separated from the aqueous phase. Which method is most appropriate?

1) Centrifugation
2) Suction filtration with a paper filter
3) Simple filtration
4) Suction filtration with a glass or ceramic frit
5) Pressure filtration

208: Which circumstance does *not* increase the filtration velocity of a suction filter?

1) There is a high liquid layer above the filter cake
2) The vacuum in the receiving flask is very good
3) The liquid to be sucked off has a very low viscosity
4) There is a very thick layer of filter cake on the filtration medium
5) A large pored filter is used

209: Which of the named requirements must a solvent amongst others have that is used for solid matter extraction?

1) Low density
2) Good dissolving capacity
3) Low vapour pressure
4) High viscosity
5) High boiling temperature

210: Which separation process *cannot* be applied for the separation of homogeneous liquid mixtures?

1) Rectification
2) Extraction
3) Filtration
4) Steam destillation
5) Vacuum destillation

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216: Which drying method is chemically effective?

1) Drying with silica gel
2) Drying with phosphorus(V)-oxide
3) Drying with aluminium oxide
4) Drying with molecular sieves
5) Drying by freeze out

217: Which of the named devices is able to dry a moist solid matter the fastest?

1) Desiccator
2) Vacuum desiccator
3) Water bath
4) Drying oven
5) Vacuum drying oven

219: Which statement about laboratory heat sources is *wrong*?

1) Heating plates are not absolutely safe because flammable vapours may be inflamed by them
2) Water baths serve to heat liquids that are not allowed to be heated by an open flame
3) Oil baths serve to ensure an even heat transfer mostly at temperatures above 90°C
4) Gas burners incinerate fuel gas with air, the maximum cumbustion temperature is approx. 500°C
5) Muffle furnaces reach temperatures of more than 1000°C

246: Image A. Which part of the outlined apparatus is named *incorrectly*?

1) Part 1: Three-neck round-bottom flask
2) Part 2: Paddle mixer
3) Part 3: Bearing bushing/ Stirrer guide
4) Part 4: Resistance thermometer
5) Part 5: Dropping funnel

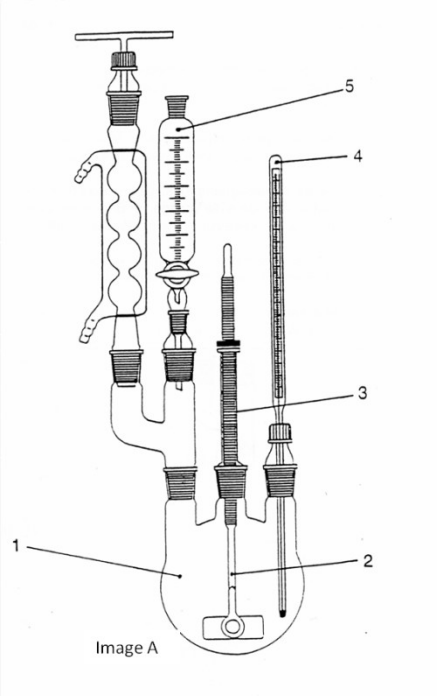

Image A

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247: What is the principle of rectification?

1) The cooling water that is fed into the heat exchanger runs against the steam that is to be condensed
2) It is a distillation that is operated with an electric circuit controller to maintain a constant temperature
3) The condensate that is formed in the column runs against the upward flowing steam
4) It is based on the fact that liquids under vacuum can be destilled at a lower temperature than at normal pressure
5) In rectification the forming steam cannot be immediately discharged, so that an opposing dynamic pressure develops

250: Which statement about steam distillation is correct?

1) This distillation method is suitable only for matters that are not or only very little soluble in water
2) In steam distillation only matters that possess a boiling point below 100°C will distil over
3) In steam distillation it has to be made sure that even before starting the distillation process the receiver is filled with water circa half-full
4) In steam distillation substance and water always condense in a mass ratio of 1:1
5) It is only possible to distill substances with steam that dissolve well in water

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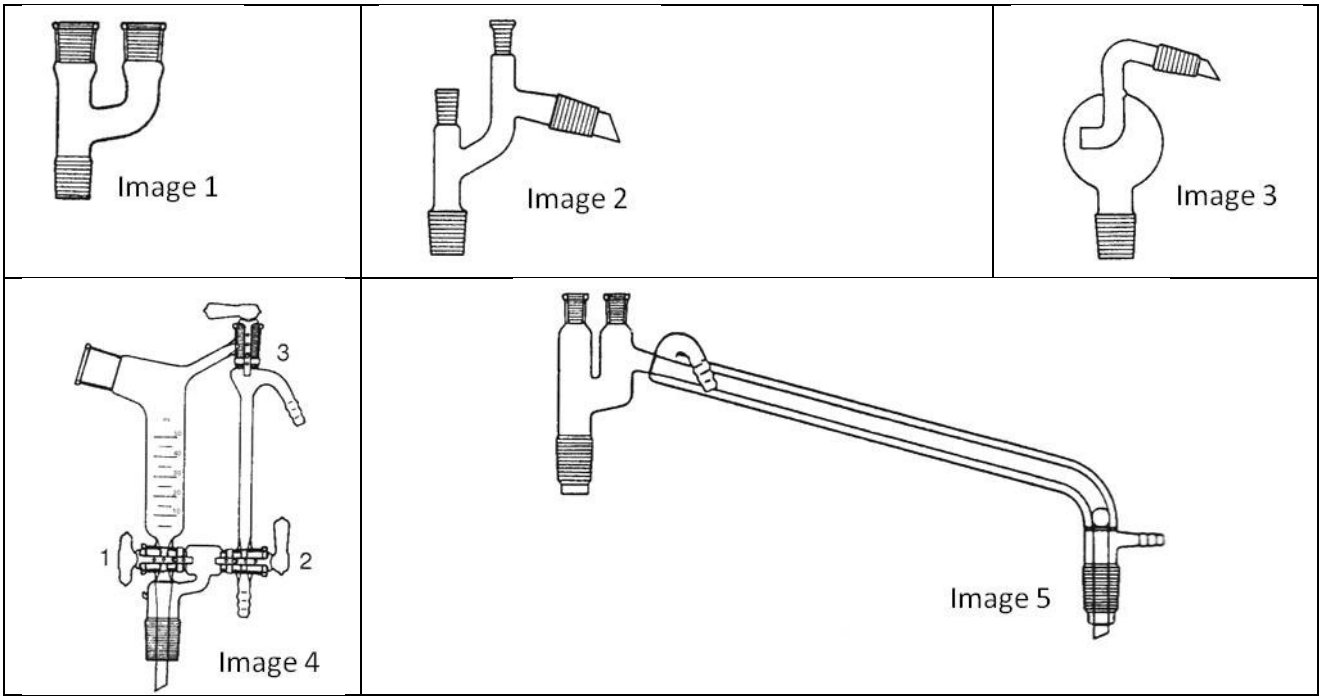
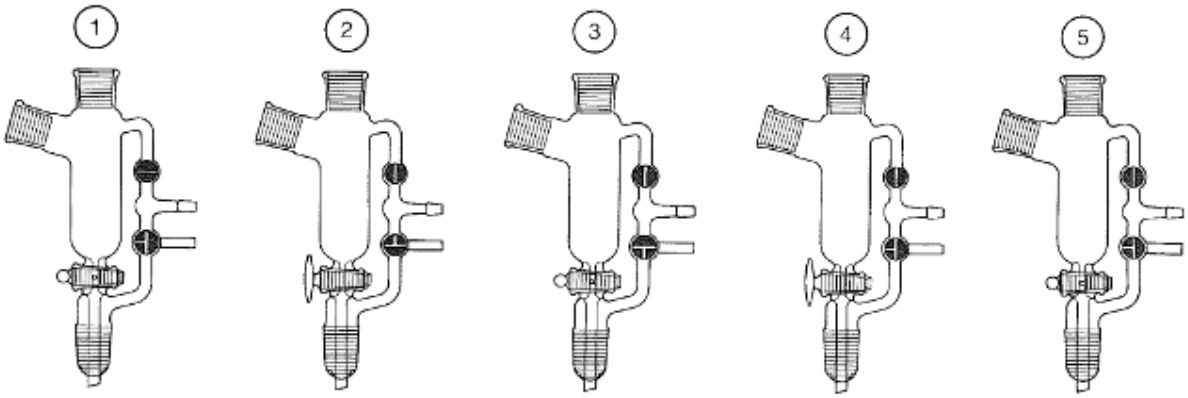
251: Which image shows a distillation condenser adapter?

1) Image 1
2) Image 2
3) Image 3
4) Image 4
5) Image 5



252: Which vacuum alternating adapter shows the correct tap position, if the receiver is to be changed whilst the rest of the apparatus remains under an evacuated condition?



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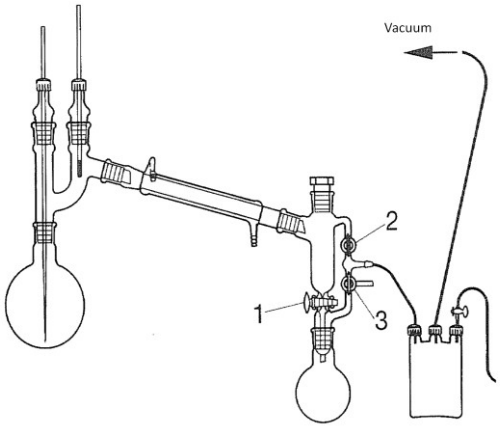
253: In which case is it necessary to conduct a vacuum distillation instead of a standard pressure distillation?

1) If the substance that is to be distilled is flammable
2) If the decomposition point of the substance lies under the boiling point at standard pressure
3) If the substance that is to be distilled is viscous
4) If the substance that is to be distilled is sensitive to oxygen
5) If the substance does easily crystallize

254: In which order must the valves 1 - 3 of the vacuum alternating adapter be operated so that the receiver can be changed whilst the rest of the apparatus remains under an evacuated condition?



1) 1, 2, 3, change receiver, 3, evacuate receiver, 3, 2, 1
2) 1, 3, change receiver, 3,2,evacuate receiver, 1, 2, 3
3) 2, 1, 3,change receiver, 3,evacuate receiver, 1, 2
4) 1, 3, 2, change receiver, 3,2,evacuate receiver, 2, 1
5) 1, 3, change receiver, 2,3, evacuate receiver, 2, 1

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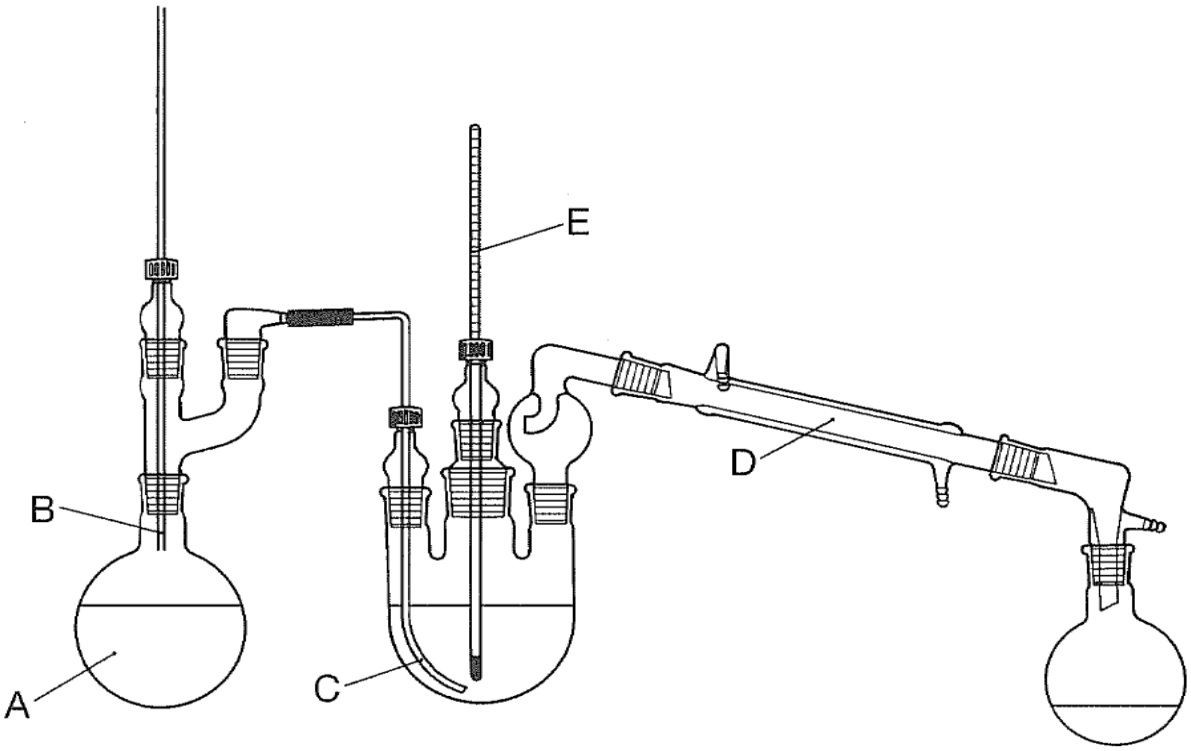
258: Image A shows a steam distillation apparatus. Which detail is *depicted wrong*?



1) A thermometer is missing in flask A
2) Tube B does not immerse far enough
3) Tube C is too long
4) Condensor D has to be a coil condensor
5) Thermometer E does immerse to deep

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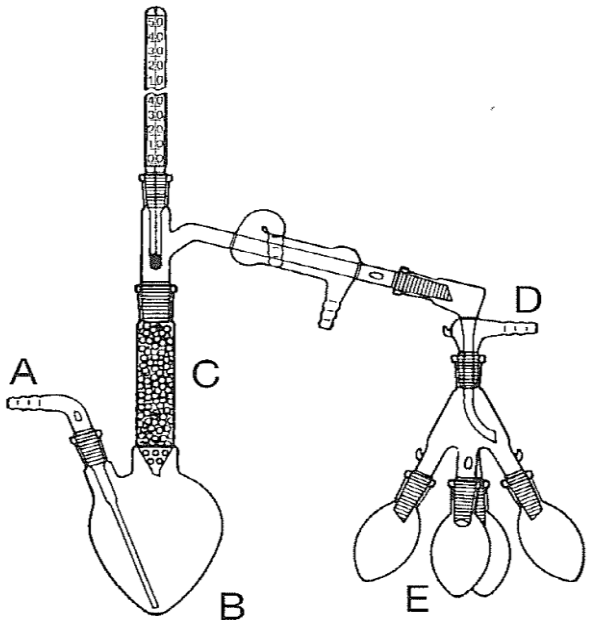
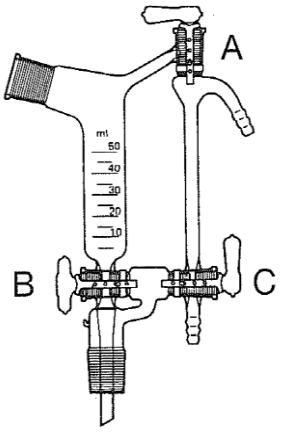
259: Which statement about the method of working of the shown vacuum distillation apparatus is *wrong*?

1) A is the boiling capillary. Before starting up the glass tube that is immersed into the flask must be pulled out.
2) B is a pointed flask. Its advantage to a round-bottom flask it can be distilled out to a smaller residue.
3) C is a packed column. With packing bodies a better separation of a liquid mixture is achieved than without.
4) D is the vacuum connection. Before the apparatus can be taken into service a tap must be installed that makes it possible to aerate the system when the udder-type receiver is rotated
5) E are small flaks that take up the individual fractions



260: The adjoining image shows a vacuum receiving changer according to Anschütz-Thiele. Which of the given answers describes its function *incorrectly*?

1) After the receiver has been changed at first tap C must be closed, then tap A can be opened
2) To change the receiver first tap B must be closed
3) To remove the vacuum in the receiver tap C must be opened
4) As soon as the receiver is evacuated tap B is opened
5) The vacuum connection is carried out underneath tap C, whilst air is able to stream underneath tap A as soon as it is opened



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