

Advanced Higher Chemistry
30 January 2018

Researching Chemistry

Please attempt the following questions in preparation for the online tutorial on Tuesday 30th January.

1. Which of the following is not a required property of a solid used as a primary standard?
 - a) Soluble in water
 - b) Low formula mass
 - c) High State of purity
 - d) Stable in air and solution
2. Which of the following solids is not suitable for use as a primary standard?
 - a) Potassium hydrogen phthalate, $\text{KH}(\text{C}_8\text{H}_4\text{O}_4)$
 - b) Sodium carbonate, Na_2CO_3
 - c) Sodium hydroxide, NaOH
 - d) Potassium iodate, KIO_3
3. Which of the following techniques should be used to purify an impure sample of caffeine?
 - a) Refluxing
 - b) Recrystallisation
 - c) Vacuum filtration
 - d) Thin layer chromatography
4. Which of the following methods cannot be used to check the purity of a sample?
 - a) Melting point
 - b) Back titration
 - c) Recrystallisation
 - d) Thin layer chromatography

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5. Which of the following pieces of apparatus should be used to separate two immiscible liquids?
- a) Condenser
 - b) Desiccator
 - c) Buchner funnel
 - d) Separating funnel
6. Which of the following reagents would be the most suitable for the gravimetric determination of chloride ions?
- a) Silver nitrate
 - b) Copper nitrate
 - c) Sodium nitrate
 - d) Potassium nitrate
7. Which of the following statements is true about the R_f value of an individual component of a mixture?
- a) The polarity of the component has no effect on the R_f value.
 - b) The type of stationary phase used has no effect on the R_f value.
 - c) The composition of the mobile phase has no effect on the R_f value.
 - d) The distance the solvent front moves has no effect on the R_f value.

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8. A student determined the percentage of manganese in three samples of steel and obtained results of 0.54%, 0.52% and 0.52%. The actual value for the percentage of manganese in the steel was 0.32%.

The student's results were:

- a) accurate and precise
 - b) precise but not accurate
 - c) accurate but not precise
 - d) neither accurate nor precise
9. 4.94 g of hydrated calcium sulfate, $\text{CaSO}_4 \cdot n\text{H}_2\text{O}$, was heated to constant mass to produce 3.89 g of CaSO_4 .
- (a) Outline the steps involved in heating the sample to constant mass.
 - (b) Calculate n in $\text{CaSO}_4 \cdot n\text{H}_2\text{O}$.
10. Describe how a 100 cm³ standard solution containing 20 cm³ of ethanoic acid should be prepared.
11. Describe how a mixed melting point can be used to check the purity of a substance.
12. Describe how colorimetry is carried out.
13. Explain why heating under reflux is often used in the preparation of organic compounds.