Preparatory problems

PREFACE

Dear friends!

Contents

Theoretical problems

A phase diagram of methane given above is plotted in the coordinates ólogarithm of pressure in bars O2

Problem 3. Carnot cycle

In the following graph, a reversible Carnot cycle for an ideal gas is shown in çpressure

ycle

Problem 5. The Second Law of thermodynamics applied to a chemical reaction

When does chemical reaction proceed spontaneously? T

r o btlreamh s6f.o rCmaat tailoyrt 1 o f a s n g l e m o l e c u l e

Problem 9. Simple experiments with copper(II) chloride

Copper(II) chloride forms brown crystals soluble in water.

1. The color of the solutions depends on concentration. Explain this fact.

Problem 11. The Prussian blue

C=O groups are characterized by intense absorption at 1750-1660 cm^{ï1} and OïH group is characterized by absorption in the region of 3600-3000 cm^{ï}

Scheme 1

Scheme 1

H

Epimer of turneforcidine at C(7) atom, ( )-platynecine, was synthesized by the reaction sequence given in Scheme 2. It is noteworthing that **K** is the product of [2+2]-cycloaddition.

Scheme 2

N

Decipher these schemes. Write down the structural formulae of compounds **A**

-201()B 0 0 116064m()J6()BE 1404 fl 0 0 1236204 79248 m ()B 0 0 2693304 79248 m ()B 1404 fl

H332	Harmful if inhaled

5) Filter the precipitate using the filter paper and wash it with 4ï5 portions of hot distilled water. Then wash the precipitate off to the 400-

ATTENTION! *The ammonia solution is ha4ros(A)-ivero is -9P yhe T eT AP b2Bo(T)-leam*

[redacted]

Problem 29. Complexometric determination of iron, chromium, and zinc in an alloy

Titrate the flask contents with 0.025 M EDTA standard solution until the color changes from pink to yellow-

$NaSO_4$	Sodium sulfate

B. Prepa1s1tryr trype1s1g1sn(p)-ts[ )]TJETBT1 0 0 13765764 515.83 Tman(p)-d(p)- synepf try6-5(e) 4 -nek91sn(d)-99hflask t atory r gne elac-5(e) 4()-99h25 g p1sn(pe)- o

desiccant off using the paper filter or fritted glass filter. Evaporate the filtrate on the rotary evaporator to approximately 20% of the original volume.

D.

Statement

1. What effects does an alkali produce on the starting materials and the reaction intermediates? Write down the equation of sodium borohydride reaction with water in neutral medium. Suggest the mechanism of the lactone disruption.

2.

filtration through any filter ^ ꚍ lr r ꞁɥ v m r ^ q r

Vac2(Pudra)udrailratf rcrosidr

Always wear protective glasses or mask when doing vacuum distillation!

D. Analysis of the product

Weigh the receiver flask with the required fraction and find the mass of the product. Calculate the yield.

Determine the refractive index n_D^{20} of the product using the refractometer. If you perform the measurement at a different temperature, reduce the obtained value to 20 ^oC.

Questions

1. What is the role of toluene in the above process?

2. Write down the reaction mechanism.

3. Suppose ^{18}O-labeled ethyl alcohol and ^{18}O-labeled *tert*-butyl alcohols are involved into the reactions instead of unlabeled ethyl alcohol. Which compound(s) will be the ^{18}O atom found in when the reactions with the labeled alcohols are complete? Prove your choice.

Problem 33. Kinetic studies of Nor

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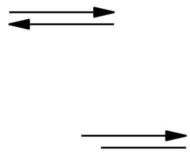

5a. Propose the structures of **B** and **C**. Note that **C** is a radical.

5b. Propose the expression for the rate of Norfloxacin oxidation with permanganate according to the above scheme.

Pro