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PROCEDURE FOR THE ASSESSMENT OF COGNITIVE COMPLEXITY: DEVELOPMENT AND IMPLEMENTATION IN THE TOPIC HYDROLYSIS OF SALTS

Saša A. Horvat*1, Jovana Mihajlović1, Tamara N. Rončević1, Dušica D. Rodić1,

1Faculty of Sciences, University of Novi Sad, Trg Dositeja Obradovića 3, 21000, Novi Sad, Serbia

*sasa.horvat@dh.uns.ac.rs

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HYDROLYSIS TEST

_____
Password

_____
School

_____
Class

_____ 2019.
Test date

The average grade ___, ____.

INSTRUCTIONS FOR WORK:
Carefully read all test tasks! Under the text of every task there is a space for their solving.
PLEASE RATE DIFFICULTY OF THE TASK, BY CIRCLING CERTAIN CLAIMS UPON YOU COMPLETE THE TASK !

1. Circle the number in front of the formulas of acid salt:

   1) CaOHCl
   2) $BaCl_2$
   3) K_2SO_4
   4) $KHSO_4$
   5) KCN

TYPES OF SALT	
Differentiation of salt types: neutral, acidic and basic	**Easy**
INTERACTIVITY OF THE CONCEPTS	
The task contains 1 concept	**0**
NUMERICAL RATING OF COGNITIVE COMPLEXITY	**1**

extremely easy	**very easy**	**easy**	**neither easy nor difficult**	**difficult**	**very difficult**	**extremely difficult**

2. Circle the number in front of the formulas of salts which can hydrolyse. Estimate the pH value in the aqueous solutions of salts which can hydrolyse (whether pH value in solution is greater than or less than 7)

1) Na_2CO_3
2) $(NH_4)_2SO_4$
3) Na_2SO_3
4) $CaSO_4$

SALT HYDROLYSIS	
Differentiation of salts that hydrolyse and that does not hydrolyse	**Easy**
Estimation of pH in a solution of salts of strong acid and weak base	**Medium**
Estimation of pH in a solution of salts of a weak acid and strong base	**Medium**
INTERACTIVITY OF THE CONCEPTS	
The task contains 1 concept	**0**
NUMERICAL RATING OF COGNITIVE COMPLEXITY	**4**

extremely easy	**very easy**	**easy**	**neither easy nor difficult**	**difficult**	**very difficult**	**extremely difficult**

3. pH the value of the aqueous solution of ammonium nitrate is:

a) higher than 7
b) less than 7
c) equals 7
Circle the correct answer.

SALT HYDROLYSIS	
Estimation of pH in a solution of salts of strong acid and weak base	**Medium**
INTERACTIVITY OF THE CONCEPTS	
The task contains 1 concept	**0**
NUMERICAL RATING OF COGNITIVE COMPLEXITY	**2**

extremely easy	**very easy**	**easy**	**neither easy nor difficult**	**difficult**	**very difficult**	**extremely difficult**

4. Does the dissolution of ammonium cyanide lead to a hydrolysis reaction?
($K_b(NH_3)=1{,}8\cdot10^{-5}$, $K_a(HCN)=6{,}2\cdot10^{-10}$)

pH value of the aqueous solution of this salt is:

a) higher than 7
b) less than 7
c) equals 7
Circle the correct answer.

SALT HYDROLYSIS	
Differentiation of salts that hydrolyse and that does not hydrolyse	**Easy**
Estimation of pH in a solution of salts of a weak acid and weak base	**Difficult**
INTERACTIVITY OF THE CONCEPTS	
The task contains 1 concept	**0**
NUMERICAL RATING OF COGNITIVE COMPLEXITY	**5**

extremely easy	**very easy**	**easy**	**neither easy nor difficult**	**difficult**	**very difficult**	**extremely difficult**

5. Evaluate which of the given aqueous salt solutions has a higher pH value. Write the characters <, > or =.

a) pH (Na_2CO_3) pH(NH_4Cl)

b) pH($Fe(NO_3)_3$) pH(NaCN)

c) pH (CH_3COONa) pH ($ZnCl_2$)

d) pH($CuCl_2$) pH(K_2SO_3)

SALT HYDROLYSIS	
Estimation of pH in a solution of salts of strong acid and weak base	Medium
Estimation of pH in a solution of salts of a weak acid and strong base	Medium
INTERACTIVITY OF THE CONCEPTS	
The task contains 1 concept	0
NUMERICAL RATING OF COGNITIVE COMPLEXITY	**5**

extremely easy	**very easy**	**easy**	**neither easy nor difficult**	**difficult**	**very difficult**	**extremely difficult**

6. Calculate the pOH value of ammonium chloride solution concentration of which is 0,1 mol/dm^3. ($K_b(NH_3)=1{,}8\cdot10^{-5}$). Write the chemical equation of the reaction of hydrolysis.

SALT HYDROLYSIS	
Writing the chemical equation of the salt hydrolysis reaction	**Difficult**
CALCULATION OF pH AND pOH VALUE IN SALT SOLUTIONS	
Calculation of pOH in a solution of salts of a weak base and strong acid	**Medium**
INTERACTIVITY OF THE CONCEPTS	
The task contains 2 concepts	**1**
NUMERICAL RATING OF COGNITIVE COMPLEXITY	**7**

extremely easy	**very easy**	**easy**	**neither easy nor difficult**	**difficult**	**very difficult**	**extremely difficult**

7. Write the chemical equation of the reaction of hydrolysis of sodium acetate. What is the pOH value of the sodium acetate solution prepared by dissolving 0.001 moles sodium acetate in 500 cm^3 of distilled water? Neglect the increase in volume due to dissolution ($K_kCH_3COOH=1{,}8\cdot10^{-5}$).

SALT HYDROLYSIS	
Writing the chemical equation of the salt hydrolysis reaction	**Difficult**
CALCULATION OF pH AND pOH VALUE IN SALT SOLUTIONS	
Calculation of pOH in a solution of salts of a weak acid and strong base	**Difficult**
ADDITIONAL CONCEPT	
Concentration of solutions	
INTERACTIVITY OF THE CONCEPTS	
The task contains 3 or more concepts	**2**
NUMERICAL RATING OF COGNITIVE COMPLEXITY	**7**