LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH : JURNAL ILMIAH

Judul Karya Ilmiah (artikel) : A simplified kinetics model of natural and iron complexcatalysed hydrogen peroxide oxidation of starch
Nama Penulis : Andri Cahyo Kumoro, R. Ratnawati, **Diah Susetyo Retnowati**
Jumlah Penulis : 3
Status Pengusul : ~~penulis pertama~~/penulis ke tiga/~~penulsi korespondensi~~
Identitas Jurnal Ilmiah :
a. Nama Jurnal : Asia-Pacific Journal of Chemical Engineering
b. Nomor ISSN : 1932-2143
c. Vol., No., Bln., Thn. : Vol. 10, No. 5, 20 Mei 2015
d. Penerbit : Curtin University and John Wiley & Sons, Ltd.
e. DOI artikel (jika ada) :10.1002/apj.1896
f. Alamat web Jurnal : https://onlinelibrary.wiley.com/doi/full/10.1002/apj.1896
g. Terindeks di : Thomson Reuter, Scopus (Q2) dengan SJR 2015 = 0,329

Kategori Publikasi Jurnal Ilmiah (beri √ pada kategori yang tepat)

[√] Jurnal Ilmiah ~~Internasional~~/Internasional bereputasi*
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Total (100%)	38,72	38	38,36
Nilai Pengusul (40% / 2 × total nilai)	**7,74**	**7,60**	**7,67**

Semarang, Agustus 2020

Reviewer 1

Prof. Dr. Ir. Bambang Pramudono, MS
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Unit Kerja : Fak. Teknik Undip
Bidang Ilmu : Teknik Kimia

Reviewer 2

Prof. Dr. Ir. Bakti Jos, DEA
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Unit Kerja : Fak. Teknik Undip
Bidang Ilmu : Teknik Kimia

LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH: JURNAL ILMIAH

Judul Karya Ilmiah (Artikel)	:	A simplified kinetics model of natural and iron complex catalysed hydrogen peroxide oxidation of starch
Jumlah Penulis	:	3 orang
Penulis Jurnal Ilmiah	:	Andri Cahyo Kumoro, Ratnawati R., **Retnowati D.S.**,
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Identitas Jurnal Ilmiah	:	a. Nama Jurnal Ilmiah : Asia-Pacific Journal of Chemical Engineering (Q2)
		b. Nomor ISSN : ISSN 19322135, 1932-2143
		c. Volume, nomor, bulan, tahun : vol.10, No.5, p. 648-658, 2015
		d. Penerbit : Wiley-Blackwell
		e. DOI artikel (jika ada) : https://doi.org/10.1002/apj.1896
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	Total = (100%)	40			38,72
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Semarang, 31 Maret 2016
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Prof. Dr. Ir. Bambang Pramudono, MS
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KARYA ILMIAH: JURNAL ILMIAH

Judul Karya Ilmiah (Artikel)	:	A simplified kinetics model of natural and iron complex catalysed hydrogen peroxide oxidation of starch
Jumlah Penulis	:	3 orang
Penulis Jurnal Ilmiah	:	Andri Cahyo Kumoro, Ratnawati R., **Retnowati D.S.**,
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c.	Kecukupan dan kemutahiran data informasi dan metodologi (30%)	12			11,0
d.	Kelengkapan unsur dan kualitas penerbit (30%)	12			12,0
	Total = (100%)	40			38,0
	Nilai pengusul = 0,4/2 x 38,0 = 7,60				

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- **Kelengkapan unsur isi artikel :** Penulisan sudah sesuai dengan "Author Guidelines" . Isi artikel sesuai dengan bidang ilmu penulis (Teknik Kimia). (Skor = 4,0)
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- **Kecukupan dan kemutakhiran data/Informasi dan metodologi** : Dari 35 rujukan ada 26 rujukan yang lebih dari 10 tahun terakhir (Skor = 11,0)
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Semarang, Maret 2016
Reviewer II

Prof. Dr. Ir. Bakti Jos, DEA
NIP. 196005011986031003
Unit Kerja : Teknik Kimia FT UNDIP

Document details

Asia-Pacific Journal of Chemical Engineering
Volume 10, Issue 5, September/October 2015, Pages 648-658

A simplified kinetics model of natural and iron complex catalysed hydrogen peroxide oxidation of starch (Article)

Kumoro, A.C., Ratnawati, R., Retnowati, D.S.

Department of Chemical Engineering, Faculty of Engineering, Diponegoro University, Prof. H. Soedarto, SH Road, Tembalang, Semarang, 50275, Indonesia

Abstract

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Hydrogen peroxide is well known as one of environmentally benign reagents for the oxidation of starch . The aim of this work was to develop a simplified model for the describing of mass transfer and reaction kinetics phenomena of non-catalytic and iron complex catalysed starch oxidation using hydrogen peroxide under alkaline condition. The model was composed based on hydrogen peroxide consumptions for its decomposition and reaction with starch molecules as well as mass transfer between liquid-solid reactants. Effects of starch -water ratio (S/L), catalyst concentration and pH were evaluated. The results show that both non-catalytic and iron complex catalysed hydrogen peroxide starch oxidation follows pseudo-first-order reaction with respect to hydrogen peroxide concentration. The proposed model satisfactorily describes the overall reaction, where very good agreement with experimental data was obtained. Mass transfer between liquid-solid reactants was likely to be the controlling step for the iron complex catalysed starch oxidation using hydrogen peroxide . © 2015 Curtin University of Technology and John Wiley & Sons, Ltd. Copyright © 2015 Curtin University of Technology and John Wiley & Sons, Ltd.

SciVal Topic Prominence

Topic: Modified Starch | Pasting Properties | Amylose

Prominence percentile: 81.886

Author keywords

carbohydrate | controlling rate | kinetics | modeling | solid-liquid reaction

Indexed keywords

Engineering controlled terms: Alkalinity | Carbohydrates | Catalysis | Catalytic oxidation | Enzyme kinetics | Hydrogen | Hydrogen peroxide | Iron | Iron compounds | Kinetics | Liquids | Mass transfer | Models | Peroxides | Reaction kinetics | Starch

Engineering uncontrolled terms: Alkaline conditions | Catalyst concentration | Environmentally benign | Hydrogen peroxide concentration | Hydrogen peroxide oxidations | Kinetics modeling | Pseudo-first order reactions | Solid liquid reactions

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Roohi, P. , Fatehifar, E.
(2020) Chemical Industry and Chemical Engineering Quarterly

Fast and environmental-friendly degradation of tert-butyl mercaptan from contaminated soil using bimetallic-modified fenton process
Roohi, P. , Fatehifar, E.
(2019) Advances in Environmental Technology

The effect of polydispersity on the conversion kinetics of starch oxidation and depolymerisation
Hoogstad, T.M. , Konings, G. , Buwalda, P.L.
(2019) Chemical Engineering Science: X

Engineering main heading: Oxidation

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References (35)

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1 Tolvanen, P., Sorokin, A., Mäki-Arvela, P., Leveneur, S., Murzin, D.Y., Salmi, T.
Batch and semibatch partial oxidation of starch by hydrogen peroxide in the presence of an iron tetrasulfophthalocyanine catalyst: The effect of ultrasound and the catalyst addition policy
(2011) *Industrial and Engineering Chemistry Research*, 50 (2), pp. 749-757. Cited 22 times.
doi: 10.1021/ie100868k
View at Publisher

2 Sangseethong, K., Termvejsayanon, N., Sriroth, K.
Characterization of physicochemical properties of hypochlorite- and peroxide-oxidized cassava starches
(2010) *Carbohydrate Polymers*, 82 (2), pp. 446-453. Cited 110 times.
doi: 10.1016/j.carbpol.2010.05.003
View at Publisher

3 Wurzburg, O.B.
(1986) *Modified Starches: Properties and Uses*, pp. 17-40. Cited 207 times.
Wurzburg O.B. (eds.). CRC Press: Boca Raton, FL

4 Isbell, H.S., Frush, H.L.
Mechanisms for hydroperoxide degradation of disaccharides and related compounds
(1987) *Carbohydrate Research*, 161 (2), pp. 181-193. Cited 43 times.
doi: 10.1016/S0008-6215(00)90076-4
View at Publisher

5 Tolvanen, P., Mäki-Arvela, P., Sorokin, A.B., Salmi, T., Murzin, D.Yu.
Kinetics of starch oxidation using hydrogen peroxide as an environmentally friendly oxidant and an iron complex as a catalyst
(2009) *Chemical Engineering Journal*, 154 (1-3), pp. 52-59. Cited 73 times.
doi: 10.1016/j.cej.2009.02.001
View at Publisher

Related documents

☐ 6 Parovuori, P., Hamunen, A., Forssell, P., Autio, K., Poutanen, K.

Oxidation of Potato Starch by Hydrogen Peroxide

(1995) *Starch - Stärke*, 47 (1), pp. 19-23. Cited 145 times.
doi: 10.1002/star.19950470106

View at Publisher

☐ 7 Sorokin, A.B., Kachkarova-Sorokina, S.L., Donzé, C., Pinel, C., Gallezot, P.

From native starch to hydrophilic and hydrophobic products: A catalytic approach

(2004) *Topics in Catalysis*, 27 (1-4), pp. 67-76. Cited 49 times.
http://springerlink.metapress.com/content/101754/
doi: 10.1023/B:TOCA.0000013541.48636.b4

View at Publisher

☐ 8 Butrim, S.M., Bil'dyukevich, T.D., Yurkshtovich, T.L.

Kinetics of starch oxidation in the system nitrogen(IV) oxide tetrachloromethane

(2001) *Russian Journal of Applied Chemistry*, 74 (12), pp. 2106-2110. Cited 4 times.
http://www.springerlink.com/content/1070-4272
doi: 10.1023/A:1015519529240

View at Publisher

☐ 9 Duke, F.R., Haas, T.W.

The homogeneous base-catalyzed decomposition of hydrogen peroxide

(1961) *Journal of Physical Chemistry*, 65 (2), pp. 304-306. Cited 83 times.
doi: 10.1021/j100820a028

View at Publisher

☐ 10 Han, S.-K., Nam, S.-N., Kang, J.-W.

OH radical monitoring technologies for AOP advanced oxidation process

(2002) *Water Science and Technology*, 46 (11-12), pp. 7-12. Cited 39 times.
https://iwaponline.com/wst
doi: 10.2166/wst.2002.0709

View at Publisher

☐ 11 De Laat, J., Gallard, H.

Catalytic decomposition of hydrogen peroxide by Fe(III) in homogeneous aqueous solution: Mechanism and kinetic modeling

(1999) *Environmental Science and Technology*, 33 (16), pp. 2726-2732. Cited 541 times.
doi: 10.1021/es981171v

View at Publisher

☐ 12 Haber, F., Weiss, J.
The catalytic decomposition of hydrogen peroxide by iron salts
(1934) *Proc. Roy. Soc. A*, 147, pp. 332-351. Cited 2057 times.

13 Brooks, R.E., Moore, S.B.
Alkaline hydrogen peroxide bleaching of cellulose

(2000) *Cellulose*, 7 (3), pp. 263-286. Cited 57 times.
doi: 10.1023/A:1009273701191

View at Publisher

14 Abbot, J., Brown, D.G.
Kinetics of Iron-catalyzed decomposition of hydrogen peroxide in alkaline solution

(1990) *International Journal of Chemical Kinetics*, 22 (9), pp. 963-974. Cited 50 times.
doi: 10.1002/kin.550220907

View at Publisher

15 Lin, S.-S., Gurol, M.D.
Catalytic decomposition of hydrogen peroxide on iron oxide: Kinetics, mechanism, and implications

(1998) *Environmental Science and Technology*, 32 (10), pp. 1417-1423. Cited 717 times.
doi: 10.1021/es970648k

View at Publisher

16 Tolvanen, P., Sorokin, A., Mäki-Arvela, P., Murzin, D.Y., Salmi, T.
Oxidation of starch by H_2O_2 in the presence of iron tetrasulfophthalocyanine catalyst: The Effect of catalyst concentration, pH, solid-liquid ratio, and origin of starch

(2013) *Industrial and Engineering Chemistry Research*, 52 (27), pp. 9351-9358. Cited 12 times.
doi: 10.1021/ie4003969

View at Publisher

17 Lin, C.C., Smith, F.R., Ichikawa, N., Baba, T., Itow, M.
Decomposition of hydrogen peroxide in aqueous solutions at elevated temperatures

(1991) *International Journal of Chemical Kinetics*, 23 (11), pp. 971-987. Cited 66 times.
doi: 10.1002/kin.550231103

View at Publisher

18 Kürti, L., Barbara, C.
(2005) *Strategic Applications of Named Reactions in Organic Synthesis: Background and Detailed Mechanisms*, p. 28. Cited 647 times.
Elsevier Academic Press: London, UK

19 Petri, B.G., Watts, R.J., Teel, A.L., Huling, S.G., Brown, R.A.
(2011) *Fundamentals of ISCO Using Hydrogen Peroxide. in in Situ Chemical Oxidation for Ground Water Remediation*, pp. 33-87. Cited 170 times.
Siegrist R.L. Crimi M. Simpkin Th J. (eds.). Springer Science + Business Media: LLC

20 Fry, S.C.
Oxidative scission of plant cell wall polysaccharides by ascorbate-induced hydroxyl radicals

(1998) *Biochemical Journal*, 332 (2), pp. 507-515. Cited 418 times.
www.biochemj.org
doi: 10.1042/bj3320507

View at Publisher

21 Hadasch, A., Sorokin, A., Rabion, A., Fraisse, L., Meunier, B.
Oxidation of 2,4,6-trichlorophenol (TCP) catalyzed by iron tetrasulfophthalocyanine (FePcS) supported on a cationic ion-exchange resin
(1997) *Bull. Soc. Chim. Fr.*, 134, pp. 1025-1032. Cited 28 times.

22 Brunauer, S., Emmett, P.H., Teller, E.
Adsorption of Gases in Multimolecular Layers

(1938) *Journal of the American Chemical Society*, 60 (2), pp. 309-319. Cited 18254 times.
doi: 10.1021/ja01269a023

View at Publisher

23 Barrett, E.P., Joyner, L.G., Halenda, P.P.
The Determination of Pore Volume and Area Distributions in Porous Substances. I. Computations from Nitrogen Isotherms

(1951) *Journal of the American Chemical Society*, 73 (1), pp. 373-380. Cited 9418 times.
doi: 10.1021/ja01145a126

View at Publisher

24 Uthumporn, U., Wahidah, N., Karim, A.A.
Physicochemical properties of starch from sago (Metroxylon Sagu) palm grown in mineral soil at different growth stages (Open Access)

(2014) *IOP Conference Series: Materials Science and Engineering*, 62 (1), art. no. 012026. Cited 14 times.
http://www.iop.org/EJ/journal/mse
doi: 10.1088/1757-899X/62/1/012026

View at Publisher

25 Shiotsubo, T.
Gelatinization temperature of potato starch at the equilibrium state

(1984) *Agricultural and Biological Chemistry*, 48 (1), pp. 1-7. Cited 17 times.
doi: 10.1080/00021369.1984.10866101

View at Publisher

26 Sandhu, K.S., Singh, N.
Some properties of corn starches II: Physicochemical, gelatinization, retrogradation, pasting and gel textural properties

(2007) *Food Chemistry*, 101 (4), pp. 1499-1507. Cited 374 times.
doi: 10.1016/j.foodchem.2006.01.060

View at Publisher

☐ 27 Smith, A.M., Denyer, K., Zeeman, S.C., Edwards, A., Martin, C.
The synthesis of the starch granule
(1999) *Plant Carbohydrate Biochemistry*, pp. 79-89. Cited 3 times.
Bryant J.A. Burrell M.M. Kruger N.J. (eds.). BIOS Scientific Publishers Ltd.: Oxford, UK

☐ 28 Walling, C., Goosen, A.
Mechanism of the Ferric Ion Catalyzed Decomposition of Hydrogen Peroxide. Effect of Organic Substrates
(1973) *Journal of the American Chemical Society*, 95 (9), pp. 2987-2991. Cited 355 times.
doi: 10.1021/ja00790a042

View at Publisher

☐ 29 Beltrán, F.J., González, M., Rivas, F.J., Alvarez, P.
Fenton reagent advanced oxidation of polynuclear aromatic hydrocarbons in water
(1998) *Water, Air, and Soil Pollution*, 105 (3-4), pp. 685-700. Cited 89 times.
doi: 10.1023/A:1005048206991

View at Publisher

☐ 30 Tao, X., Ma, W., Zhang, T., Zhao, J.
A novel approach for the oxidative degradation of organic pollutants in aqueous solutions mediated by iron tetrasulfophthalocyanine under visible light radiation
(2002) *Chemistry - A European Journal*, 8 (6), pp. 1321-1326. Cited 80 times.

☐ 31 D'Alessandro, N., Tonucci, L., Bressan, M., Dragani, L.K., Morvillo, A.
Rapid and selective oxidation of metallosulfophthalocyanines prior to their usefulness as precatalysts in oxidation reactions
(2003) *European Journal of Inorganic Chemistry*, (9), pp. 1807-1814. Cited 29 times.
www.interscience.wiley.com
doi: 10.1002/ejic.200200620

View at Publisher

☐ 32 Crini, G.
Recent developments in polysaccharide-based materials used as adsorbents in wastewater treatment
(2005) *Progress in Polymer Science (Oxford)*, 30 (1), pp. 38-70. Cited 1404 times.
doi: 10.1016/j.progpolymsci.2004.11.002

View at Publisher

☐ 33 Tachiev, G., Roth, J.A., Bowers, A.R.
Kinetics of hydrogen peroxide decomposition with complexed and "free" iron catalysts
(2000) *International Journal of Chemical Kinetics*, 32 (1), pp. 24-35. Cited 62 times.
http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1097-4601
doi: 10.1002/(SICI)1097-4601(2000)32:1<24::AID-JCK4>3.0.CO;2-A

View at Publisher

☐ 34 Collinson, S.R., Thielemans, W.

The catalytic oxidation of biomass to new materials focusing on starch, cellulose and lignin

(2010) *Coordination Chemistry Reviews*, 254 (15-16), pp. 1854-1870. Cited 141 times.
doi: 10.1016/j.ccr.2010.04.007

View at Publisher

☐ 35 Bossmann, S.H., Oliveros, E., Göb, S., Siegwart, S., Dahlen, E.P., Payawan Jr., L., Straub, M., (...), Braun, A.M.

New evidence against hydroxyl radicals as reactive intermediates in the thermal and photochemically enhanced fenton reactions

(1998) *Journal of Physical Chemistry A*, 102 (28), pp. 5542-5550. Cited 462 times.
http://pubs.acs.org/jpca
doi: 10.1021/jp980129j

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Kumoro, A.C.; Department of Chemical Engineering, Faculty of Engineering, Diponegoro University, Prof. H. Soedarto, SH Road, Tembalang, Semarang, Indonesia

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Research article

A simplified kinetics model of natural and iron complex catalysed hydrogen peroxide oxidation of starch

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ABSTRACT: Hydrogen peroxide is well known as one of environmentally benign reagents for the oxidation of starch. The aim of this work was to develop a simplified model for the describing of mass transfer and reaction kinetics phenomena of non-catalytic and iron complex catalysed starch oxidation using hydrogen peroxide under alkaline condition. The model was composed based on hydrogen peroxide consumptions for its decomposition and reaction with starch molecules as well as mass transfer between liquid–solid reactants. Effects of starch-water ratio (S/L), catalyst concentration and pH were evaluated. The results show that both non-catalytic and iron complex catalysed hydrogen peroxide starch oxidation follows pseudo-first-order reaction with respect to hydrogen peroxide concentration. The proposed model satisfactorily describes the overall reaction, where very good agreement with experimental data was obtained. Mass transfer between liquid–solid reactants was likely to be the controlling step for the iron complex catalysed starch oxidation using hydrogen peroxide.

KEYWORDS: kinetics; modeling; carbohydrate; controlling rate; solid-liquid reaction

INTRODUCTION

Although oxidised starch is primarily used as surface sizing agents and coating binders in the paper industry as well as to provide water holdout for superior printing properties,[1] its applications in any industries where film formation and adhesion properties are desired steadily increase.[2] Oxidised starch is commonly manufactured by oxidation of starch using a specific oxidising agent under controlled pH and temperature. Hydroxyl groups on the starch molecules are oxidised to carbonyl and carboxyl groups during the oxidation process, which contribute to the improvement of starch paste stability.[1] In addition, the reaction also causes degradation of the starch molecules producing a modified starch with low viscosity. This allows the use of oxidised starch in various applications where high solid concentration is needed.[3]

A number of oxidising agents have been used in the starch oxidation process including sodium hypochlorite, bromine, periodate, permanganate, hydrogen peroxide and ammonium persulfate.[2] Due to its high efficiency, hypochlorite oxidation is the most common technique for the commercial production of oxidised starch. Unfortunately, this oxidant may lead to a formation of toxic chlorinated by-products. Alternatively, hydrogen peroxide has also been used as oxidant in a commercial practice to a much lesser extent. Unlike sodium hypochlorite, this oxidant does not generate harmful by-product. During oxidation reaction, decomposition of hydrogen peroxide produces an oxygen atom to oxidise the starch, leaving water as a by-product. For that reason, hydrogen peroxide is therefore considered as a more environmentally benign and preferred oxidant especially when a chlorine-free process is obliged.[1,4]

Unfortunately, only few studies on the kinetics of starch oxidation by hydrogen peroxide are reported in the literature.[1,5] Most reported studies were performed in batch reactors and followed by analysing only the final products.[6,7] It is reported that hydroxyl groups in starch molecules are first oxidised to carbonyl groups and then to carboxyl groups, which primarily occurs at C-2, C-3 and C-6.[4] This would indicate that the reaction path is consecutive with carbonyl groups as intermediates, which react further to carboxyl groups after prolonged reaction times. Depending on the type of oxidant used, parallel reaction paths are also reported. An oxidant may promote selective formation of carbonyl groups by oxidation of the hydroxyl groups at the positions C-2 and C-3, whereas another oxidant may trigger the hydroxyl groups at the position C-6 to form carboxyl groups.[8] A study by Tolvanen *et al.*

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RESEARCH ARTICLE

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The copper ion reduction and oxidation cycle during the cathodic process of gold thiosulfate leaching

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Abstract
The copper ion reduction and oxidation cycle during the cathodic process of gold thiosulfate leaching was studied using a rotating disc electrode and cyclic voltammetry, and the dynamic characteristics of the system were discussed. In a copper ammonium solution, the redox reactions of $Cu(NH_3)_4^{2+}$ were reversible and controlled by substance diffusion. The rotating disc electrode and the reduction method with a constant potential showed that the $Cu(NH_3)_2^{+}$ generated during the reduction process was easily oxidized by O_2 to $Cu(NH_3)_4^{2+}$. In the copper ammonium and thiosulfate system, the reversibility of the redox reactions of $Cu(NH_3)_4^{2+}$ became worse, and the reduction process was still controlled by material diffusion and had a higher diffusion coefficient than that in the copper ammonium solution. However, under this condition, the oxidation reaction of the generated Cu(I) species was complicated. The reduction method with a constant potential showed that the rate-determining step for the cathodic process was the oxidation step of the Cu(I) species. In addition, some amount of Cu(I) species in solution could not be oxidized in time under the experimental conditions. This part of Cu(I) species may be included during the oxidation decomposition of thiosulfate, thus affecting the dissolution of gold.

KEYWORDS
cathodic process, electrochemical study, gold thiosulfate leaching

1 | INTRODUCTION

The dissolution of gold in the copper ammonium and thiosulfate solution is an electrochemical process, consisting of an anodic process and a cathodic process, as shown in Equations 1–3.[1]

$$Au + 2S_2O_3^{2-} \rightarrow Au(S_2O_3)_2^{3-} + e^-, \quad (1)$$

$$Cu(NH_3)_4^{2+} + 3S_2O_3^{2-} + e^- \rightarrow Cu(S_2O_3)_3^{5-} + 4NH_3, \quad (2)$$

$$4Cu(S_2O_3)_3^{5-} + 16NH_3 + O_2 + 2H_2O \rightarrow 4Cu(NH_3)_4^{2+} + 4OH^- + 12S_2O_3^{2-}. \quad (3)$$

In the cathodic process, $Cu(NH_3)_4^{2+}$ was reduced to $Cu(S_2O_3)_2^{3-}$ by $S_2O_3^{2-}$ and then oxidized to $Cu(NH_3)_4^{2+}$ by oxygen. Cu(II) was used as an effective oxidant in gold dissolution by carrying out the above two processes through a continuous cycle, as shown in Figure 1.

The role of copper ions in the gold leaching system of thiosulfate is complex. Cu^{2+} was included in the thiosulfate oxidation mechanism and thiosulfate may be

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Experimental and theoretical investigation of molecular interaction and molecular polarity of organic solvent with ionic liquids and deep eutectic solvents at T (298.15–343.15) K and 1 atm

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Abstract

Densities of the binary mixtures of organic solvents (acetic acid (HAc), n-butanol (n-BuOH) and n- butyl acetate (n-BuAc)) with 1-ethyl-3-methylimidazolium hydrogen sulphate {[EMIM][HSO_4]: ***IL₁***}, 1-ethyl-3-methyimidazolium ethyl sulphate {[EMIM][$EtSO_4$]: ***IL_2***}, 1-butyl-3-methylimidazolium acetate {[BMIM][OAc]: ***IL_3***}, 1-butyl-3-methylimidazolium bis (trifluoromethylsulfonyl)imide, {[BMIM][NtF_2]: ***IL_4***}} and/or Deep Eutectic Solvents (DESs) {choline chloride-acetic acid [ChCl][AA]: ***DES_1***}, choline chloride-glycerol [ChCl][Gly]: ***DES_2***), were measured over the entire composition range at T (293.15–343.15) K and 1 atm. The volumteric properties and derived thermodynamic properties of mixed solvents were calculated from the experimental data in order to understand the specific interactions and/or non-specific interactions between mixed solvents during mixing at 298.15 K and 1 atm. Further, the molecular polarity of all the studied components were analyzed using COSMO-RS model.

KEYWORDS

COSMO-RS Model, Deep Eutectic Solvent, Density, Ionic Liquid, Organic Solvent, Volumetric Property

1 | INTRODUCTION

The current conventional esterification process produced minimum six azeotropic mixtures and therefore its very difficult to separate pure butylactate from their azeotropic mixtures, even operating at high temperature and an elvated pressure. Therefore, the development of low-cost green catalyst media for the green esterification process without forming azeotropic mixtures at 298.15 K and 1 atm are the highly challenging to the researcher and academic peoples. In recent years, ionic liquids (ILs) have gained increasing attention in separation process due to their unique properties including high thermal stabilities,non-flammability and extremely low vapour pressures, miscibility with other solvents, solubility of gases, partition coefficients of solutes between ionic liquid and aqueous phase.[1–7] In addition, its possible to modeify their chemical structure as per the process requirement. On the other hand, deep eutectic solvents (DES's) also have evolved in the recent decade, with analog properties as that of ILs. ILs and DES's has been studied in gas dissolution,separation, organic material synthesis and storage.[8] To design any green chemical process and/or reaction involving ILs and DESs on an industrial scale, it is necessary to know chemical – physical properties such as the

