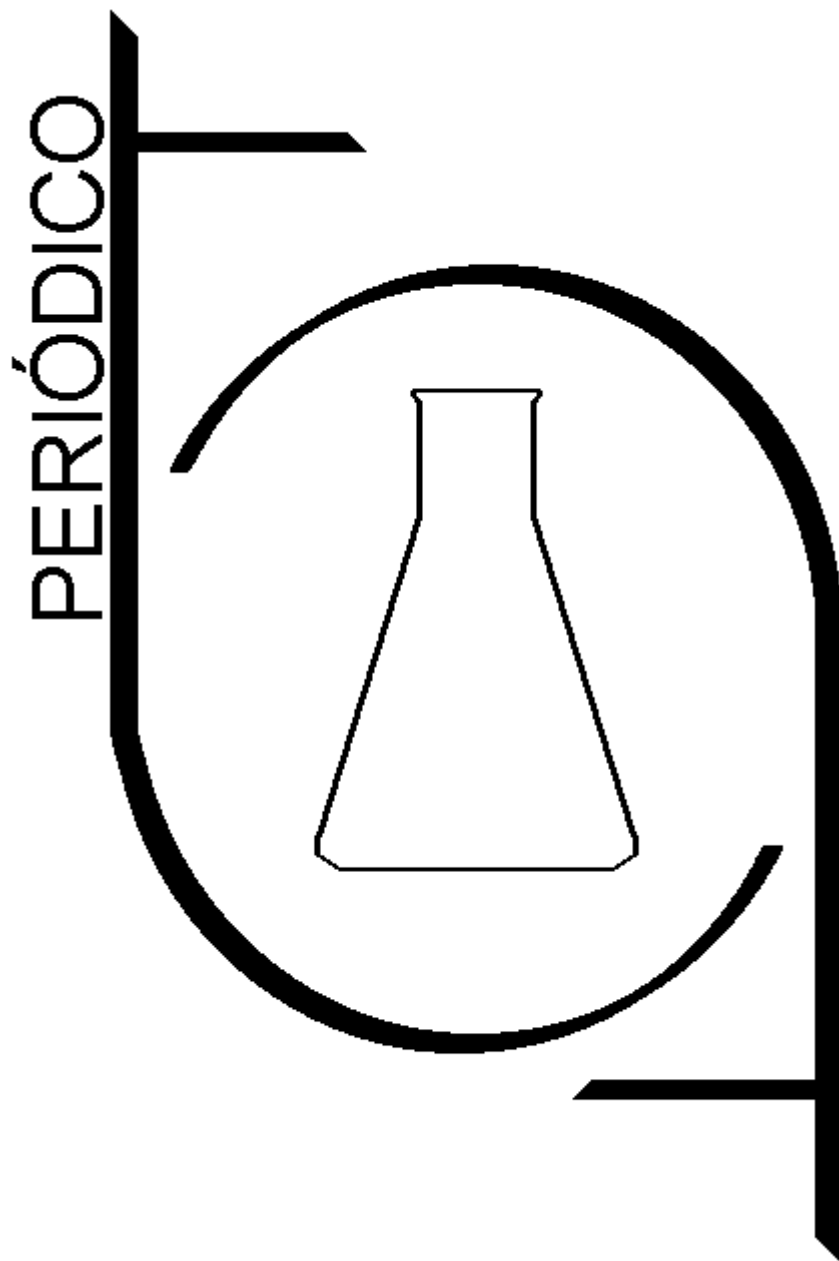


PERIÓDICO TCHÊ QUÍMICA



Volume 16

-

Número 32

-

2019 ISSN 2179-0302

Órgão de divulgação científica e informativa

www.periodico.tchequimica.com

PERIÓDICO TCHÊ QUÍMICA

ISSN - 1806-0374 (Impresso) - ISSN - 1806-9827 (CD-ROM) - ISSN - 2179-0302 (Online)

Volume 16

Número 32 – 2019

ISSN 2179 - 0302

Órgão de divulgação científica e informativa.

Dados Internacionais de Catalogação na Publicação (CIP)

Periódico Tchê Química: órgão de divulgação científica e informativa [recurso eletrônico] / Grupo Tchê Química – Vol. 1, n. 1 (Jan. 2004)- . – Porto Alegre: Grupo Tchê Química, 2005 - Semestral.

Sistema requerido: Adobe Acrobat Reader.

Modo de acesso: World Wide Web:

<<http://www.tchequimica.com>>

Descrição baseada em: Vol. 16, n. 31 (JAN. 2017).

ISSN 1806-0374

ISSN 1806-9827 (CD-ROM)

ISSN 2179-0302 (Online)

1. Química. I. Grupo Tchê Química.

CDD 540

Bibliotecário Responsável

Ednei de Freitas Silveira

CRB 10/1262



Welcome to the TCHÊ QUÍMICA JOURNAL

International multidisciplinary scientific journal

Tchê Química Journal publishes original research papers, review articles, short communications (scientific publications), book reviews, forum articles, technical reports, articles on chemical education, interviews, announcements or letters. Articles suitable for publication in the Tchê Química Journal are those that cover the traditional fields of **Chemistry, Physics, Mathematics, Biology, Pharmacy, Medicine, Engineering and Agriculture**. We are especially interested in those submissions that are highly relevant to theoretical and applied contributions in the area of chemistry and related disciplines.

PERIÓDICO TCHÊ QUÍMICA • www.periodico.tchequimica.com • Vol. 16 N. 32.
• ISSN 1806-0374 (impresso) • ISSN 1806-9827 (CD-ROM) • ISSN 2179-0302 (meio eletrônico)

© 2019. Porto Alegre, RS. Brasil

PERIÓDICO TCHÊ QUÍMICA

Volume 16

Número 32 – 2019

ISSN 2179 - 0302

Órgão de divulgação científica e informativa.

Comissão Editorial

Editores-chefe

- Dr. Luis Alcides Brandini De Boni, deboni@tchequimica.com
- Dr. Eduardo Goldani, goldani@tchequimica.com

Editores técnicos

- Ednei de Freitas Silveira
– *Bibliotecário Responsável*
- Dr. Francisco José Santos Lima, lima@tchequimica.com, Brasil, UFRN.
- Dr. Carlos Eduardo Cardoso, cardoso@tchequimica.com, Brasil, USS.
- Dr. Sérgio Machado Corrêa, correa@tchequimica.com, Brasil, UERJ.

Corpo Editorial

Membros

- Teresa M. Roseiro Maria Estronca, Dr., roseiro@tchequimica.com, Portugal, UC.
- Monica Regina da Costa Marques, Dr., aguiar@tchequimica.com, Brasil, UERJ.
- Ketevan Kapatadze, Dr., kapatadze@tchequimica.com, Geórgia, ISU.
- Márcio von Mühlen, Dr., vonmuhlen@tchequimica.com, EUA, MIT.
- Élcio Jeronimo de Oliveira, Dr., elcio@tchequimica.com, Brasil, CTA.

- José Carlos Oliveira Santos, Dr., zecarlosufcg@tchequimica.com, Brasil, UFCG.
- Alcides Wagner Serpa Guarino, Dr., guarino@tchequimica.com, Brasil, UNIRIO.
- Roseli Fernandes Gennari, Dr., gennari@tchequimica.com, Brasil, USP.
- Rafael Rodrigues de Oliveira, Dr., oliveira@tchequimica.com, Brasil, Brava Biosciences.
- Lívio César Cunha Nunes, Dr., nunes@tchequimica.com, Brasil, UFPI.
- João Guilherme Casagrande Jr, Dr., casagrande@tchequimica.com, Brasil, EMBRAPA.
- Denise Alves Fungaro, Dr., fungaro@tchequimica.com, Brasil, IPEN.
- Murilo Sérgio da Silva Julião, Dr., juliao@tchequimica.com, Brasil, UVA.
- Amit Chaudhry, Dr., chaudhry@tchequimica.com, Índia, Panjab University.
- Hugo David Chirinos Collantes, Dr., chirinos@tchequimica.com, Peru, UNI.
- Carlos E. de Medeiros J., Dr., jeronimo@tchequimica.com, Brasil, PETROBRAS.
- Walter José Peláez, Dr., pelaez@tchequimica.com, Argentina, UNC.
- Rodrigo Brambilla, Dr., brambilla@tchequimica.com, Brasil, UFRGS.
- Joan Josep Solaz-Portolés, Dr., solaz@tchequimica.com, Espanha, UV.
- José Euzébio Simões Neto, Dr., simoese@tchequimica.com, Brasil, UFRP.
- Aline Maria dos Santos Teixeira, Me., santos@tchequimica.com, Brasil, UFRJ.

- César Luiz da Silva Guimarães, Me., guimaraes@tchequimica.com, Brasil, IBAMA.
- Daniel Ricardo Arsand, Dr., arsand@tchequimica.com, Brasil, IFSul.
- Paulo Sergio Souza, Dr., souza@tchequimica.com, Brasil, Fundação Osorio.
- Moisés Rômolos Cesário, Dr., romolos@tchequimica.com, França, ULCO.
- Vanessa Barbieri Xavier, Me., xavier@tchequimica.com, Brasil, PUCRS.
- Danyelle Medeiros de Araújo Moura, Me., moura@tchequimica.com, Brasil, UFRN.
- Gabriel Rubensam, Me., grubensam@tchequimica.com, Brasil, UFRGS.
- Masurquede de Azevedo Coimbra, Me., coimbra@tchequimica.com, Brasil, Sec. de Saúde do Estado - RS.
- Oana-Maria Popa, Me., popa@tchequimica.com, IPN, Romênia.
- Andrian Saputra, PhD., saputra@tchequimica.com, University of Lampung, Indonesia

* CAS (*Chemical Abstracts Service, a division of the American Chemical Society.*)

* OAIJ (*Open Academic Journals Index*)

Missão

O Periódico Tchê Química (PTQ) publica artigos de pesquisa originais, artigos de revisão, notas curtas (publicações científicas), revisões de livros, artigos de fórum, editoriais e entrevistas. Pesquisadores de todos os países são convidados a publicar nas páginas do PTQ.

A responsabilidade sobre os artigos é de exclusividade dos autores.

Correspondências

Rua Anita Garibaldi, 359/603.
Bairro Mon't Serrat. CEP: 90450-001
Porto Alegre – RS. Brasil.
Skype: tchequimica
www.periodico.tchequimica.com
tchequimica@tchequimica.com

Periódico Tchê Química

ISSN - 1806-0374 (Print)
ISSN - 1806-9827 (CD-ROM)
ISSN - 2179-0302 (Online)

LCCN: 2010240735

Divulgação *on-line* em
<http://www.periodico.tchequimica.com>
<http://www.journal.tchequimica.com>
<http://www.tchequimica.com>

Esta revista é indexada e resumida pelo [CAS](#), [EBSCO](#), [Latindex](#), [Sumários](#), [Index Copernicus](#), [Scopus](#), [OAIJ](#), [CAB Abstracts](#) e [Reaxys](#).

Índice

Words from the Editors I

1- Artigo / Article

DORSKAIA, E. V.; PESTOV, S. M.; LEYKIN, Y. A.

RÚSSIA

**ESTUDO DA PLASMASORÇÃO DE LIPOPROTEÍNA IN VITRO
POR SORBENTE POLIMÉRICO COM GRUPOS
MONOETANOLAMINA**

*STUDY OF THE IN VITRO LIPOPROTEIN PLASMASORPTION BY
POLYMERIC SORBENT WITH MONOETHANOLAMINE GROUPS*

Página – 1

3- Artigo / Article

DE MENEZES, J. C.; GOMES, F. DE C. O.; MACHADO, A. M. R.

BRASIL

**ANÁLISE DE COMPOSTOS VOLÁTEIS E CONTROLE DE
QUALIDADE EM ESMALTES DE UNHA**

*ANALYSIS OF VOLATILE AND QUALITY CONTROL IN NAIL
POLISH*

Página – 18

5- Artigo / Article

SCHMIDT, G. R.

BRASIL

**PRODUÇÃO LABORATORIAL DA ERVA-MATE (ILEX
PARAGUARIENSIS) PARA CHIMARRÃO – UMA COMPARAÇÃO
COM AS CARACTERÍSTICAS DE PRODUTOS
DISPONÍVEIS NO MERCADO**

*LABORATORY PRODUCTION OF HERB-MATE (ILEX
PARAGUARIENSIS) FOR HOT MATE – A PARALLEL WITH THE
CHARACTERISTICS OF PRODUCTS AVAILABLE ON
THE MARKET.*

Página – 34

2- Artigo / Article

RUCHIN, A. B.

RÚSSIA

**EFEITO DA ILUMINAÇÃO NO CRESCIMENTO E
COMPORTAMENTO DE DUAS ESPÉCIES DE PEIXE CARPA
(CARASSIUS GIBELIO E C. CARASSIUS)**

*EFFECT OF ILLUMINATION ON GROWTH AND BEHAVIOR OF
TWO CARP FISH SPECIES (CARASSIUS GIBELIO AND C.
CARASSIUS)*

Página – 8

4- Artigo / Article

ANDREYCHEV, A.

RÚSSIA

**NOVOS MÉTODOS PARA ESTUDAR A ATIVIDADE DE
MAMÍFEROS SEMIAQUÁTICOS**

*NEW METHODS FOR STUDYING THE ACTIVITY OF
SEMIAQUATIC MAMMALS*

Página – 38

6- Artigo / Article

MANTASHLOU, M. J.; PIRI, K. and DELJU, A.

IRÃ

**INVESTIGANDO OS EFEITOS DO EXTRATO AQUOSO DE
CASCA DE SALGUEIRO (SALICACEAE) EM PARÂMETROS
URINÁRIOS, PESO RELATIVO, FÍGADO E ÍNDICES DE FUNÇÃO
RENAL EM RATOS**

*INVESTIGATING THE EFFECTS OF AQUEOUS EXTRACT OF
WILLOW BARK (SALICACEAE) ON URINARY PARAMETERS,
RELATIVE WEIGHT, LIVER AND RENAL FUNCTION INDICES IN
RAT*

Página – 42

7- Artigo / Article

ZAKHAROV, V. L.; ZUBKOVA, T. V.

RÚSSIA.**CONTEÚDO DE SUBSTÂNCIAS BIOLÓGICAMENTE ATIVAS E METAIS PESADOS NAS MAÇÃS DE UMA CADEIA DE VAREJO NA REGIÃO DE LIPETSK (RUSSIA), DEPENDENDO DAS VARIEDADES DE MAÇÃS***THE CONTENT OF BIOLOGICALLY ACTIVE SUBSTANCES AND HEAVY METALS IN THE APPLES OF A RETAIL CHAIN IN THE LIPETSK REGION DEPENDING ON THE APPLE TREES VARIETIES***Página - 51****9- Artigo / Article**

HORA, P. H. A.; SOUSA, A. C.; SERRA, R. B. G.; RODRIGUES, K. K. P.; FIGUÊIREDO, G. J. A.

BRASIL.**OTIMIZAÇÃO DE PROCESSO DE ADSORÇÃO DE METAIS TÓXICOS EM EFLUENTES GERADOS EM LABORATÓRIO ATRAVÉS DE CAULINITA E DERIVADOS***OPTIMIZATION OF PROCESS OF ADSORPTION OF TOXIC METALS IN LABORATORY GENERATED EFFLUENTS THROUGH CAULINITE AND DERIVATIVES***Página – 69****11- Artigo / Article**

PASSOS, M. M. da S.; FERNANDES, E. P.; GUALBERTO, S. A., SILVA, S. L. da C. e DA SILVA, D. C.

BRASIL**DETERMINAÇÃO DE FENÓLICOS E FLAVONOÍDES TOTAIS E AVALIAÇÃO DA CAPACIDADE ANTIOXIDANTE DE EXTRATOS DE POINCIANELLA BRACTEOSA (FABACEAE)***TOTAL PHENOLICS AND FLAVONOIDS DETERMINATION AND ANTIOXIDANT CAPACITY EVALUATION OF POINCIANELLA BRACTEOSA (FABACEAE) EXTRACTS***Página – 87****13- Artigo / Article**

KLUNK, M. A.; DASGUPTA, S.; DAS, M.; WANDER, P. R.

ÍNDIA / BRASIL.**CÓDIGOS COMPUTACIONAIS DE MODELAGEM GEOQUÍMICA UTILIZADOS PARA INTERAÇÃO ÁGUA-ROCHA EM SISTEMAS SIMPLES E COMPLEXOS***COMPUTER CODES OF GEOCHEMICAL MODELING USED TO WATER-ROCK INTERACTION SIMPLE AND COMPLEX SYSTEMS***Página – 108****8- Artigo / Article**

TELES, A. C.; FREITAS, A. C. de P.; RODRIGUES, A. C.

BRASIL.**COMPARAÇÃO DE MÉTODOS DE DETECÇÃO DE FALHAS EM PROCESSOS QUÍMICOS UTILIZANDO INTELIGÊNCIA ARTIFICIAL***FAILURES DETECTION METHODS IN CHEMICAL PROCESS USING ARTIFICIAL INTELLIGENCE***Página – 61****10- Artigo / Article**

ALMEIDA, M. V. de A.; SILVA, E. M. da; GOMES, N. Â.; NUNES, L. A. O.; CURTI, W. F.

BRASIL**QUALIDADE AMBIENTAL DO ATERRO SANITÁRIO DE CAMPINA GRANDE COM BASE EM ASPECTOS TÉCNICOS E OPERACIONAIS***ENVIRONMENTAL QUALITY OF CAMPINA GRANDE LANDFILL BASED ON TECHNICAL AND OPERATIONAL ASPECTS***Página – 77****12- Artigo / Article**

SUVOROVA, Galina N.; VOLOGDINA, Natalia N.; AVVAKUMOV, Nadezhda P.; KRIVOPALOVA, Maria Y.

RÚSSIA.**RESPOSTA DA REGENERAÇÃO PÓS-TRAUMÁTICA DO MÚSCULO ESQUELÉTICO À MEDICAMENTAÇÃO DE PELÓIDE HÚMICA***SKELETAL MUSCLE POSTTRAUMATIC REGENERATION RESPONSE TO HUMIC PELOID MEDICATION***Página – 96****14- Artigo / Article**

KLUNK, M. A.; DASGUPTA, S.; DAS, M.; WANDER, P. R.

MALEKI HASAN ABADI, H.; DASHTI, H.

IRÃ**LOCALIZAÇÃO IDEAL DE UM SISTEMA FOTOVOLTAICO PARA MELHORAR O PERFIL DE VOLTAGEM, CONSIDERANDO AS LIMITAÇÕES DE POTÊNCIA ATIVA E REATIVA***OPTIMAL LOCATION OF A PHOTOVOLTAIC SYSTEM TO IMPROVE THE VOLTAGE PROFILE CONSIDERING THE ACTIVE AND REACTIVE POWER LIMITATIONS***Página – 119**

15- Artigo / Article

BATALINI, C.; DE GIOVANI, W. F.;

BRASIL**SÍNTESE E CARACTERIZAÇÃO DE UM NOVO
AQUACOMPLEXO DIARSÍNICO DE RUTÊNIO (II)***SYNTHESIS AND CHARACTERIZATION OF A NEW RUTHENIUM
(II) DIARSINIC AQUACOMPLEX*

Página – 130

17- Artigo / ArticleLELKOV, K. S.; KURIS, E. D.; STOLYAROV, Y. V.; NIKITENKO, I
A.; KRAPIVIN, S. V.;**RÚSSIA****PEQUENO ROBÔ UNIAXIAL DE DUAS RODAS PARA
LABORATÓRIO EDUCACIONAL***SMALL-SIZED UNIAXIAL TWO-WHEEL ROBOT FOR
EDUCATIONAL LABORATORY*

Página – 147

19- Artigo / Article

Almahy, H. A.; Abdel-Razik, H. H.; El-Badry, Y. A.

ARÁBIA SAUDITA, SUDÃO, EGITO.**ULTRASONICAÇÃO DE CUCUMIS MELO VERSUS
PERCOLAÇÃO: POLIFENÓIS, FLAVONÓIDES TOTAIS E
EXTRATO DE BETA-CAROTENO COMO CORANTES NATURAIS***ULTRASONICATION OF CUCUMIS MELO VERSUS
PERCOLATION: POLY PHENOL, TOTAL FLAVONOID, AND
BETA-CAROTENE EXTRACT AS NATURAL DYES*

Página – 186

21- Artigo / Article

FADIAWATI, N.; DIAWATI, C.; SYAMSURI, M. M. F.

INDONÉSIA**CONSTRUINDO UM APARELHO DE DESTILAÇÃO SIMPLES
ATRAVÉS DE MATERIAIS USADOS USANDO APRENDIZAGEM
BASEADA EM PROJETOS***CONSTRUCTING A SIMPLE DISTILLATION APPARATUS FROM
USED GOODS BY USING PROJECT-BASED LEARNING*

Página – 207

16- Artigo / ArticleZAKHAROV, V. P.; KHUSNULLIN, A. G.; ZAKHAROVA, E. M.;
SHURSHINA, A. S.; KULISH, E. I.;**RÚSSIA****PREPARAÇÃO DE COMPOSIÇÕES DE MISTURAS BASEADAS
EM POLIPROPILENO SECUNDÁRIO COM PROPRIEDADES
FÍSICO-MECÂNICAS CONTROLADAS***PREPARATION OF BLENDING COMPOSITIONS BASED ON
SECONDARY POLYPROPYLENE WITH CONTROLLED
PHYSICO-MECHANICAL PROPERTIES*

Página – 139

18 - Artigo / Article

MASLENNIKOVA, N. N.; GIBADULINA, I. I.

RÚSSIA**A POSIÇÃO DA COMPETÊNCIA AMBIENTAL NA ESTRUTURA
DA PREPARAÇÃO ORIENTADA POR PRÁTICA DE
ESTUDANTES DE ENGENHARIA***THE POSITION OF ENVIRONMENTAL COMPETENCE IN THE
STRUCTURE OF THE PRACTICE-ORIENTED PREPARATION OF
ENGINEERING STUDENTS*

Página – 168

20- Artigo / ArticleDE SOUZA, E. F.; SANTOS, M. do S. M.; SILVA, C. A. de A.;
FIORUCCI, A. R.; BATISTOTE, M.**BRASIL****CAPACIDADE DEGRADATIVA DE OLEOS VEGETAIS POR
BACILLUS SUBTILIS E CARACTERIZAÇÃO FÍSICO-QUÍMICA
DE ÓLEOS RESIDUAIS DE FRITURA***VEGETABLE OILS DEGRADING CAPACITY BY BACILLUS
SUBTILIS AND PHYSICO-CHEMICAL CHARACTERIZATION OF
WASTE FRYING OILS*

Página – 196

22- Revisão / ReviewCAPARICA, R.; ROZISCA, E. A.; MACENA, J. C.; CAMPOS, L. de
A.; GRIGOLETTO, D. F.**BRASIL****APLICAÇÕES FARMACOLÓGICAS DA MELATONINA***PHARMACOLOGICAL APPLICATIONS OF MELATONIN*

Página – 214

23- Artigo / Article

ORDOUEE, B.; HASHEMINEZHAD, H.

MEDIÇÃO E ADSORÇÃO DE IONS DE METAIS PESADOS A PARTIR DE ÁGUA COM NANO-ADSORBENTES POROSOS POR MÉTODO DE ABSORÇÃO ATÔMICA*MEASUREMENT AND ADSORPTION OF HEAVY METALS ION FROM WATER USING POROUS NANO-ADSORBENTS BY ATOMIC ABSORPTION METHOD*

Página - 228

25- Artigo / Article

SYAMSURI, M. M. F.; FADIAWATI, N.

REVELANDO AS CONCEPÇÕES DOS PROFESSORES DE QUÍMICA PRÉ-SERVIÇOS SOBRE ORBITAL ATÔMICO DE HIDROGÊNIO USANDO TESTES ABERTOS: UM ESTUDO DE CASO NA INDONÉSIA*REVEALING PRE-SERVICE CHEMISTRY TEACHERS' CONCEPTIONS OF HYDROGEN ATOMIC ORBITALS USING OPEN-ENDED TESTS: A CASE STUDY IN INDONESIA*

Página - 250

27- Artigo / Article

RAMOS, V. M. B.; RÖHNELT, M. G.; BRAMBILLA, R.

BRASIL**COMPÓSITOS DE PEAD/SÍLICA -PARTE I: PREPARAÇÃO E CARACTERIZAÇÃO DE SÍLICAS ORGANOFUNZIONALIZADAS COM GRUPOS METILSILANO E OCTILSILANO***HDPE/SILICA COMPOSITES- PART I: PREPARATION AND CHARACTERIZATION OF METHYLSILANE AND OCTYLSILANE-MODIFIED SILICAS*

Página - 263

29- Artigo / Article

RAMOS, V. M. B.; RÖHNELT, M. G.; BRAMBILLA, R.

BRASIL**COMPÓSITOS DE PEAD/SÍLICA-PARTE II: EFEITO DO TAMANHO DE PARTÍCULA E DA MODIFICAÇÃO DA SÍLICA SOBRE AS PROPRIEDADES TÉRMICAS E MECÂNICAS***HDPE/SILICA COMPOSITES-PART II: EFFECT OF SILICA PARTICLE SIZE AND SILICA MODIFICATION ON THE THERMAL AND MECHANICAL PROPERTIES*

Página - 287

24- Artigo / Article

ARAÚJO, S. G.; AMADO, P. A.; PINTO, M. E. A.; CASTRO, A. H. F.; LIMA, L. A. R. dos S.

IRÃ**FENÓLICOS TOTAIS E POTENCIAL ANTIOXIDANTE DE CINCO ESPÉCIES DA FAMÍLIA LAMIACEAE***TOTAL PHENOL AND ANTIOXIDANT POTENTIAL OF FIVE SPECIES OF LAMIACEAE FAMILY***BRASIL**

Página - 239

26- Artigo / Article

GONÇALVES, T. P. R.; LIMA, W. G.; SILVA, I. C. A.; PARREIRA, A. G.; LIMA, L. A. R. dos S.

BRASIL**ATIVIDADE ANTIBACTERIANA DO EXTRATO ETANÓLICO DE *Eugenia dysenterica* DC (MYRTACEAE)***ANTIBACTERIAL ACTIVITY OF THE ETHANOL EXTRACT OF *Eugenia dysenterica* DC (MYRTACEAE)*

Página - 257

28- Artigo / Article

KLUNK, M. A.; SHAH, Z.; WANDER, P. R.

BRASIL**UTILIZAÇÃO DA ARGILA MONTMORILONITA PARA ADSORÇÃO DO CORANTE VERDE MALAQUITA***USE OF MONTMORILLONITE CLAY FOR ADSORPTION MALACHITE GREEN DYE*

Página - 279

30- Artigo / Article

SKOROBOGATOVA, Olga N.1; YUMAGULOVA, E. R.; STORCHAK, T. V.; IVANOVA, N. A.

RÚSSIA.**FITOPLÂNCTON DE ÁGUAS DE SUPERFÍCIE SOB A POLUIÇÃO DE ÓLEO (CAMPO DE SAMOTLOR, SIBÉRIA OCIDENTAL)***PHYTOPLANKTON OF SURFACE WATERS UNDER OIL POLLUTION (SAMOTLOR FIELD, WESTERN SIBERIA)*

Página - 306

31- Artigo / Article

CASTRO, Douglas A.; PEREIRA, Douglas H.; LEAL, Paulo V. B.

QUIRGUISTÃO

ALGUNS PARÂMETROS DO SISTEMA IMUNE EM LESÕES EM CONDIÇÕES MONTANHOSAS*SOME PARAMETERS OF THE IMMUNE SYSTEM AT INJURIES IN HIGHLAND CONDITIONS*

Página – 321

33- Artigo / Article

BULYCHEV, N. A.; RABINSKIY, Lev N.

RÚSSIA

MODIFICAÇÃO DE SUPERFÍCIES DE NANOPARTICULAS DE DIÓXIDO DE TITÂNIO COM COPOLÍMERO DE ÁCIDO ACRÍLICO / ISOBUTILENO SOB TRATAMENTO ULTRASÔNICO*SURFACE MODIFICATION OF TITANIUM DIOXIDE NANOPARTICLES WITH ACRYLIC ACID/ISOBUTYLENE COPOLYMER UNDER ULTRASONIC TREATMENT*

Página - 338

35- Artigo / Article

PETROV, S. A.; MAMAEVA, N. L.; NARUSHKO, M. V.

RÚSSIA

TECNOLOGIA PROBLEMA-DIÁLOGO DE FORTALECER COMPETÊNCIA AMBIENTAL ENTRE ESPECIALISTAS PARA O TRABALHO NAS CONDIÇÕES ÁRTICAS E SUBÁRTICAS DA FEDERAÇÃO DA RÚSSIA*PROBLEM-DIALOGUE TECHNOLOGY OF FORMING ENVIRONMENTAL COMPETENCE AMONG SPECIALISTS FOR WORK IN THE ARCTIC AND SUBARCTIC CONDITIONS OF THE RUSSIAN FEDERATION*

Página - 362

37- Artigo / Article

NIKOLAEVA L. P.

RÚSSIA

pH DA MEDULA ÓSSEA*pH OF BONE MARROW*

Página - 388

32- Artigo / Article

RABINSKIY, L. N.

RÚSSIA

PROBLEMA NÃO ESTACIONÁRIO DO PLANO DE DIFRAÇÃO DE ONDA DE PRESSÃO OBLÍQUA EM CONCHA FINA NA FORMA DE CILINDRO PARABÓLICO*NON-STATIONARY PROBLEM OF THE PLANE OBLIQUE PRESSURE WAVE DIFFRACTION ON THIN SHELL IN THE SHAPE OF PARABOLIC CYLINDER*

Página – 328

34- Artigo / Article

UNASPEKOV, B. A.; ZHUMADILOVA, Z. O.; AUELBEKOV, S. S.; TAUBALDIEVA, A. S.; ALDABERGENOVA, Gaziza B.

CAZAQUISTÃO

INVESTIGAÇÃO DOS PROCESSOS DE DISTRIBUIÇÃO DO CALOR NA SUPERFÍCIE INTERNA DA ESTRUTURA DE ENTREGA, TENDO EM CONTA O MOVIMENTO DO AR NA ZONA DE LIMITE ENTRE O DISPOSITIVO E A VEDAÇÃO*INVESTIGATION OF HEAT DISTRIBUTION PROCESSES ON THE INNER SURFACE OF THE ENCLOSING STRUCTURE, TAKING INTO ACCOUNT THE MOVEMENT OF AIR IN THE BOUNDARY AREA BETWEEN THE DEVICE AND FENCING*

Página - 345

36- Artigo / Article

ISAKULOV B. R.; JUMABAYEV M. D.; ABDULLAEV H. T.; AKISHEV U. K.; AYMAGANBETOV M. N.

CAZAQUISTÃO

PROPRIEDADES DOS LIGANTES DE ESCÓRIA ALCALINA BASEADOS EM RESÍDUOS INDUSTRIAIS*PROPERTIES OF SLAG-ALKALI BINDERS BASED ON INDUSTRIAL WASTE*

Página – 375

38- Artigo / Article

ALVES, G. de B.; BEVERARI, S. F.; FLORENTINO, L. C.; GUERRERO, A. S.; SILVA, M. A. de A.

BRASIL

BIOSSÍNTESE E CARACTERIZAÇÃO DE CELULOSE BACTERIANA PROVENIENTE DO CHÁ DE KOMBUCHA*BIOSYNTHESIS AND CHARACTERIZATION OF BACTERIAL CELLULOSE FROM THE KOMBUCHA TEA*

Página – 395

39- Artigo / Article

GRIDINA, V. V.; CHEKANUSHKINA, E. N.; KISMETOV, K. L.;
AKHTARIEVA, R. F.; SHAPIROVA, R.R.

RÚSSIA

**PREPARAÇÃO PROFISSIONAL DE PROFESSORES NOS EUA
NA PERSPECTIVA DO PROFISSIONALISMO E DA
COMPETÊNCIA**

*PROFESSIONAL PREPARATION OF TEACHERS IN THE USA
FROM THE PERSPECTIVE OF PROFESSIONALISM AND
COMPETENCE*

Página - 406

41- Artigo / Article

FEDOROVA T. A.; TAZINA S. I.; SEMENENKO N. A.; MAMONOV
A. V.; SOTNIKOVA T. I.

RÚSSIA

**O PAPEL DOS MARCADORES INFLAMATÓRIOS NA
AVALIAÇÃO DE ALTERAÇÕES DO MIOCÁRDIO,
DIAGNÓSTICOS E PROGNÓSTICOS EM PACIENTES COM
ENDOCARDITE INFECCIOSA**

*THE ROLE OF INFLAMMATORY MARKERS IN THE
EVALUATION OF MYOCARDIUM ALTERATIONS, DIAGNOSTICS
AND PROGNOSIS IN PATIENTS WITH INFECTIVE
ENDOCARDITIS*

Página - 437

43- Artigo / Article

ARYSTAN, Leila I.; MULDAEVA, Gulmira M.; HAYDARGALIEVA,
Leila S.; PAKHOMOVA, Damira K.; ISKAKOV, Yernar B.

CAZAQUISTÃO

**O ESTADO DA MEMBRANA DE CÉLULAS VERMELHAS EM
ANEMIA DE DEFICIÊNCIA DE FERRO EM MULHERES DE
IDADE REPRODUTIVA**

*THE STATE OF THE RED BLOOD CELL MEMBRANE IN IRON
DEFICIENCY ANAEMIA IN WOMEN OF REPRODUCTIVE AGE*

Página - 471

45- Artigo / Article

ASHARI, Sahar

IRÃ

**INVESTIGAÇÃO COMPARATIVA DE TÉCNICAS DE
MODELAGEM PARA PREDIÇÃO DO COEFICIENTE DE ATRITO
ESTÁTICO DE ALGUMAS SEMENTES DE PLANTAS
MEDICINAIS**

*COMPARATIVE INVESTIGATION OF MODELING TECHNIQUES
FOR PREDICTION OF STATIC FRICTION COEFFICIENT OF
SOME MEDICINAL PLANT SEEDS*

Página - 485

40- Artigo / Article

SEVERINA, Natalia S.

RÚSSIA

**COMPLEXO DE SOFTWARE PARA RESOLVER AS
DIFERENTES TAREFAS DA DINÂMICA DE GÁS FÍSICO**

*SOFTWARE COMPLEX FOR SOLVING THE DIFFERENT TASKS
OF PHYSICAL GAS DYNAMICS*

Página - 424

42- Artigo / Article

UMIRBEKOVA, A. K.; TOKSONBAEV, R. N.2; ABITAYEVA, R.
Sh.; AKHMETKARIMOVA, K. S.

REPÚBLICA DO QUIRGUIZISTÃO

**PREPARAÇÃO DE PROFESSORES FUTUROS PARA A
IMPLEMENTAÇÃO DE NOVAS ABORDAGENS PEDAGÓGICAS
NAS CONDIÇÕES DO CONTEÚDO RENOVADO DE EDUCAÇÃO
ESCOLAR**

*PREPARATION OF FUTURE TEACHERS TO THE
IMPLEMENTATION OF NEW PEDAGOGICAL APPROACHES IN
THE CONDITIONS OF THE RENEWED CONTENTS OF SCHOOL
EDUCATION*

Página - 455

44- Artigo / Article

SAVINOVA, M. S.; PROTODYAKONOVA, G. P.; POPOVA, N. V.;
TATARINOVA, Z. G.; PAVLOVA, A. I.

RUSSIA

**MÉTODO PARA OBTENÇÃO DE UM CONCENTRADO DE
PROTEÍNA-VITAMINA PARA PREVENÇÃO DE DOENÇAS EM
ANIMAIS DE FAZENDA**

*METHOD FOR OBTAINING A PROTEIN-VITAMIN
CONCENTRATE FOR DISEASE PREVENTION IN FARM
ANIMALS*

Página - 478

46- Artigo / Article

AGEEVA Natalia M.; BIRYUKOV Aleksandr P.; AWANESIANZ
Rafail W.;

RUSSIA.

**BIOSSÍNTESE DE PROTEINASES E PECTINASES POR
LEVEDURAS DE VINHO**

*BIOSYNTHESIS OF PROTEINASES AND PECTINASES BY WINE
YEASTS*

Página - 497

47- Artigo / Article

MAKSIMKINA, E. A.; VASKOVA, L. B.; MUSINA, N. Z.; TIAPKINA, M. V.

RÚSSIA

ANÁLISE DO IMPACTO ORÇAMENTÁRIO DE MEDICAMENTOS ANTIPSICÓTICOS NO TRATAMENTO HOSPITALAR DA ESQUIZOFRENIA

BUDGET IMPACT ANALYSIS OF ANTIPSYCHOTIC DRUGS IN THE HOSPITAL TREATMENT OF SCHIZOPHRENIA

Página - 509

49- Artigo / Article

KUZNETSOVA, E. L.; MAKARENKO, A. V.

RÚSSIA

MODELO MATEMÁTICO DA EFICIÊNCIA ENERGÉTICA DE MÓDULOS MECATRÔNICOS E FONTES DE ENERGIA PARA OBJETOS MÓVEIS PROSPECTIVOS

MATHEMATICAL MODEL OF ENERGY EFFICIENCY OF MECHATRONIC MODULES AND POWER SOURCES FOR PROSPECTIVE MOBILE OBJECTS

Página – 529

51- Artigo / Article

BULYCHEV, N. A.; BODRYSHEV, V. V.; RABINSKIY, L. N.;

RÚSSIA

ANÁLISE DAS CARACTERÍSTICAS GEOMÉTRICAS DO SISTEMA DE SOLVENTE POLIMÉRICO DE DUAS FASES DURANTE A SEPARAÇÃO DE SOLUÇÕES DE ACORDO COM A INTENSIDADE DA IMAGEM DE MICROGRAFIAS

ANALYSIS OF GEOMETRIC CHARACTERISTICS OF TWO-PHASE POLYMER-SOLVENT SYSTEMS DURING THE SEPARATION OF SOLUTIONS ACCORDING TO THE INTENSITY OF THE IMAGE OF MICROGRAPHS

Página – 551

53- Artigo / Article

FORMALEV, V. F.; KOLESNIK, S. A.; KUZNETSOVA, E. L.;

RÚSSIA

SOLUÇÃO ANALÍTICA APROXIMADA DO PROBLEMA DE TRANSFERÊNCIA CONJUGADA DE CALOR ENTRE A CAMADA DE LIMITE E A TIRA ANISOTRÓPICA

APPROXIMATE ANALYTICAL SOLUTION OF THE PROBLEM OF CONJUGATE HEAT TRANSFER BETWEEN THE BOUNDARY LAYER AND THE ANISOTROPIC STRIP

Página – 572

48- Artigo / Article

SHAROV A. V.; PLOTNIKOVA O. M.; EVSEEV V. V.; RYKOVA A. I.

RÚSSIA

PROPRIEDADES TOXICOLÓGICAS DE METAIS PESADOS ADSORVIDOS NA SUPERFÍCIE DE CARVÃO ATIVADO

TOXICOLOGICAL PROPERTIES OF HEAVY METALS ADSORBED ON THE SURFACE OF ACTIVATED CARBON

Página – 516

50- Artigo / Article

ANAMOVA, R. R.; NARTOVA, Lidiya G.;

RÚSSIA

HABILIDADE ESPACIAL GEOMÉTRICA COMO ELEMENTO DO PROCESSO COGNITIVO DE APRENDIZAGEM

GEOMETRIC SPATIAL ABILITY AS AN ELEMENT OF COGNITIVE LEARNING PROCESS

Página – 542

52- Artigo / Article

RUOSO, A. C.; BITENCOURT, L. C.; SUDATI, L. U.; KLUNK, M. A.; CAETANO, N. R.

BRASIL

NOVOS PARAMETROS PARA OTIMIZAR O PROCESSO DE FABRICAÇÃO DE LENHA ECOLÓGICA A PARTIR DE REJEITOS DE BIOMASSA FLORESTAL

NEW PARAMETERS FOR THE FOREST BIOMASS WASTE ECOFIREFWOOD MANUFACTURING PROCESS OPTIMIZATION

Página – 560

54- Artigo / Article

NAZAROVA, L. Sh.; DANILKO, K. V.; MALIEVSKY, V. A.; VIKTOROVA, T. V.; RAKHMATULLINA, I. R.;

RÚSSIA

PERFIL DA CITOCINA (TNFA, IL1B, IL6, IL10) E SUA ASSOCIAÇÃO COM CARACTERÍSTICAS CLÍNICAS NA ARTRITE IDIOPÁTICA JUVENIL

CYTOKINE PROFILE (TNFA, IL1B, IL6, IL10) AND ITS ASSOCIATION WITH CLINICAL FEATURES IN JUVENILE IDIOPATHIC ARTHRITIS

Página – 583

55- Artigo / Article

FORMALEV, V. F.; KOLESNIK, S. A.; KUZNETSOVA, E. L.

RÚSSIA

MODELAGEM MATEMÁTICA DO UM NOVO MÉTODO DE PROTEÇÃO TÉRMICA BASEADA NA INJEÇÃO DE REFRIGERANTES ESPECIAIS*MATHEMATICAL MODELING OF A NEW METHOD OF THERMAL PROTECTION BASED ON THE INJECTION OF SPECIAL COOLANTS*

Página – 598

57- Artigo / Article

BUKHTOYAROV, V. V.; TYNCHENKO, V. S.; PETROVSKIY, E. A.; Buryukin, F. A.

RÚSSIA

ANÁLISE COMPARATIVA DOS MÉTODOS PARA SIMULAÇÃO DA OPERAÇÃO DE POÇOS COM INSTALAÇÕES DE BOMBA SUBMERSÍVEL ELÉTRICA*COMPARATIVE ANALYSIS OF METHODS FOR SIMULATING THE WELL OPERATION WITH ELECTRIC SUBMERSIBLE PUMP INSTALLATIONS*

Página – 621

59- Artigo / Article

MAMEDOV, A.; MOROZOVA, N.; YUMASHEV, A.; DYBOV, A.; NIKOLENKO, D.

RÚSSIA

CRITÉRIOS PARA RESTAURAÇÕES PROVISÓRIAS UTILIZADAS NA PREPARAÇÃO PARA A REABILITAÇÃO ABRANGENTE ORTODÔNTICA E ORTOPÉDICA*CRITERIA FOR PROVISIONAL RESTORATIONS USED IN PREPARATION FOR COMPREHENSIVE ORTHODONTIC AND ORTHOPEDIC REHABILITATION*

Página – 647

61- Artigo / Article

IGNATOVICH, L. S.; GINTER, E. V. 2; LYKOV, A. S. 3; KUZMINA, I. Y.; KUSTOVA, S. B.

RÚSSIA

O USO DE ALIMENTOS SUPLEMENTARES NÃO CONVENCIONAIS PARA ALIMENTAÇÃO DE BOVINOS E GALINHAS POEDEIRAS*THE USE OF NON-CONVENTIONAL SUPPLEMENTARY FEEDS IN CATTLE AND LAYER DIET*

Página – 668

56- Artigo / Article

MOSKALEVA N. E.; MESONZHNIK N. V.; KUZNETSOV R. M.; MARKIN P. A.; APPOLONOVA S. A.

RÚSSIA

DETERMINAÇÃO DA TERIFLUNOMIDA ATRAVÉS DE UMA AMPLA GAMA DE CONCENTRAÇÕES DINÂMICAS EM PLASMA HUMANO POR LC-MS/MS*DETERMINATION OF TERIFLUNOMIDE ACROSS A WIDE DYNAMIC CONCENTRATION RANGE IN HUMAN PLASMA BY LC-MS/MS*

Página – 608

58- Artigo / Article

MOSKALEVA N. E.; KUZNETSOV R. M.; MARKIN P. A.; APPOLONOVA S. A.

RÚSSIA

CARACTERIZAÇÃO POR ESPECTROMETRIA DE MASSA DE METABÓLITOS DE MEBEVERINA PLASMÁTICA E SUA SÍNTESE*MASS SPECTROMETRIC CHARACTERIZATION OF PLASMA MEBEVERINE METABOLITES AND ITS SYNTHESIS*

Página – 633

60- Artigo / Article

OMELCHUK, M. V.; KOROTKOVA, Y. S.; VORONTSOVA, E. A.

RÚSSIA

ESTIMATIVA DO TAMANHO DAS ZONAS DE ESTAGNAÇÃO NO TERRITÓRIO DA FAZENDA TANQUE DE PROPANO-BUTANO VISANDO AUMENTAR A SEGURANÇA DA INSTALAÇÃO*ESTIMATION OF THE SIZE OF STAGNATION ZONES ON THE TERRITORY OF THE PROPANE-BUTANE TANK FARM AIMED AT INCREASING THE SAFETY OF THE FACILITY*

Página – 656

62- Artigo / Article

ALIBEKOV, R. S.; KAIYPOVA, A. B.; URAZBAYEVA, K. A.; ORTAYEV, A. E.; AZIMOV, A. M.

CAZAQUISTÃO

EFEITO DA SUBSTITUIÇÃO DO AÇÚCAR POR XAROPE DE MILHO ALTA DE FRUTOSE NA GELEIA DE FÍSALIS*EFFECT OF SUBSTITUTION OF SUGAR BY HIGH FRUCTOSE CORN SYRUP OF THE CONFITURE ON THE BASE OF PHYSALIS*

Página – 688

63- Artigo / Article

RYNDIN, Vladimir V.

CAZAQUISTÃO**DECLARAÇÃO DA SEGUNDA LEI DA TERMODINÂMICA COM
BASE NO POSTULADO DE NÃO-EQUILÍBRIO***STATEMENT OF THE SECOND LAW OF THERMODYNAMICS
ON THE BASIS OF THE POSTULATE OF NONEQUILIBRIUM***Página – 698****65- Artigo / Article**SALIKHOVA T. R., OMAROV N. S-M.; CHERKESOVA A. U.;
GADJIMURADOVA S. M.; ASKERKHAANOVA E. R.**RÚSSIA****ASPECTOS CLÍNICO-MORFOLÓGICOS E
IMUNOHISTOQUÍMICOS DA PATOGENIA DO POLIPO
ENDOMETRIAL NA PÓS-MENOPAUSA***CLINICO-MORPHOLOGICAL AND IMMUNOHISTOCHEMICAL
ASPECTS OF ENDOMETRIAL POLYP PATHOGENESIS IN
POSTMENOPAUSE***Página – 724****67- Artigo / Article**BALDAEV, L. K.; KHAMITSEV, B. G.; BALDAEV, S. L.;
PROKOFIEV, M. V.**RÚSSIA****AS CARACTERÍSTICAS DA TECNOLOGIA DE PULVERIZAÇÃO
DE DETONAÇÃO PARA REVESTIMENTOS À BASE DE
CARBONETO DE TUNGSTÊNIO***THE FEATURES OF DETONATION SPRAYING TECHNOLOGY
FOR TUNGSTEN CARBIDE BASED COATINGS***Página – 739****69- Artigo / Article**TANIA, L.; DIAWATI, C.; SETYARINI, M.; KADARITNA, N.;
SAPUTRA, A.**INDONÉSIA****UTILIZANDO UMA TITULAÇÃO POTENTIOMÉTRICA DE
ÁCIDO-BASE PARA DETERMINAR O pKA A PARTIR DO
ESTRATO DO PERICARPO DO MANGOSTÃO***USING POTENTIOMETRIC ACID-BASE TITRATION TO
DETERMINE pKA FROM MANGOSTEEN PERICARPS EXTRACT***Página – 768****64- Artigo / Article**

DÍEZ, C. M.; SOLANO, C. J.

PERU**LINEARIZAÇÃO DAS TEMPERATURAS DO AR NO OCEANO
PACÍFICO NA LINHA EQUATORIAL***LINEARIZATION OF AIR TEMPERATURES ON THE PACIFIC
OCEAN ON THE EQUATORIAL LINE***Página – 713****66- Artigo / Article**

BULYCHEV, N. A.; RABINSKIY, L. N.; TUSHAVINA, O. V.

RÚSSIA**INVESTIGAÇÃO DA ADSORÇÃO DE UM COPOLÍMERO
AMFIPOLAR NA SUPERFÍCIE HIDROFÓBICA DE
NANOPARTICULAS DE FTALOCIANINA DE COBRE***INVESTIGATION OF AN AMPHIPOLAR COPOLYMER
ADSORPTION ON THE HYDROPHOBIC SURFACE OF COPPER
PHTHALOCYANINE NANOPARTICLES***Página – 732****68- Artigo / Article**RAKHIMZHANOVA, L. B.; ISSABAYEVA, S. N.; ZHUMARTOV, M.
A.;**CAZAQUISTÃO****MODELAGEM NO ESTUDO DE GRÁFICOS DE COMPUTADOR
NA FUNDAMENTALIZAÇÃO DA INFORMÁTICA***MODELING IN STUDYING COMPUTER GRAPHICS IN THE
FUNDAMENTALIZATION OF COMPUTER SCIENCE***Página – 755****70- Artigo / Article**LIMA, B. T. de M.; CARMO, E. S.; MEDEIROS, F. D.; SOUZA, J. B.
P.**BRASIL****CARACTERIZAÇÃO MICROBIOLÓGICA, EFICÁCIA
ANTIMICROBIANA E DETERMINAÇÃO DE PARÂMETROS
FÍSICO-QUÍMICOS DE TINTURA DE PEGA-PINTO (*Boerhavia
diffusa* L.)***MICROBIOLOGICAL CHARACTERIZATION, ANTIMICROBIAL
EFFICACY AND DETERMINATION OF PHYSICAL-CHEMICAL
PARAMETERS OF PEGA-PINTO TINCTURE (*Boerhavia diffusa* L.)***Página – 774**

71- Artigo / Article

STIVAL, M.; CUNHA, E. J. N. S.; CUNHA, M.; ROCHA, J. R. C.;

BRASIL**APLICAÇÃO DE ATIVIDADE LÚDICA PARA O APRENDIZADO DE CONCEITOS QUÍMICOS: ESTUDO DE CASO***APPLICATION OF LUDIC ACTIVITY FOR LEARNING OF CHEMICAL CONCEPTS: CASE STUDY*

Página – 783

73- Artigo / Article

SILVA, M. P.; MOURA, H. P.; LOPES, G. A. C.; COSTA, J. A.; DA FONSECA FILHO, H. D.

BRASIL**MINERALOGIA DE MATERIAL CONSTRUTIVO DO SÉCULO XVIII: A IGREJA DE PEDRA DE MAZAGÃO VELHO (AMAPÁ-BRASIL)***MINERALOGY OF BUILDING MATERIAL OF THE EIGHTEENTH CENTURY: THE STONE CHURCH IN MAZAGÃO VELHO CITY (AMAPÁ, BRAZIL)*

Página – 806

75- Artigo / Article

MOURA, A. L.; SILVA, J. F.; DE FREITAS, J. J. R.; FREITAS, J. C. R.; DE FREITAS FILHO, J. R.

BRASIL**EXPERIENCIANDO UMA SÍNTESE ONE-POT DE 1,2,4-OXADIAZOL MEDIADA POR FORNO DE MICRO-ONDAS: QUÍMICA VERDE EM FOCO***EXPERIENCING A SYNTHESIS ONE-POT OF 1,2,4-OXADIAZOLE MEDIATED BY MICROWAVE OVEN: GREEN CHEMISTRY IN FOCUS*

Página – 820

77- Artigo / Article

DELGADO, Gerzon E.; DELGADO-NIÑO, P., GRIMA-GALLARDO, P.

VENEZUELA**ESTRUTURA CRISTALINA DO COMPOSTO CUATERNÁRIO SEMICONDUTOR $CuFeCrSe_3$** *CRYSTAL STRUCTURE OF THE QUATERNARY SEMICONDUCTOR COMPOUND $CuFeCrSe_3$*

Página – 848

72- Artigo / Article

MENEZES, J. S.; ANDRADE JÚNIOR, F. P. de2; SILVA, B. P.

BRASIL**PERFIL DE UTILIZAÇÃO DE MEDICAMENTOS PSICOTRÓPICOS DOS USUÁRIOS DO CENTRO DE ATENÇÃO PSICOSSOCIAL DE CUITÉ-PB***PROFILE OF THE USE OF PSYCHOTROPIC MEDICINES OF THE USERS OF THE PSYCHOSOCIAL ATTENTION CENTER OF CUITÉ-PB*

Página – 794

74- Artigo / Article

DELGADO, G. E.; GUILLEN, M.; MORA A. J.

VENEZUELA**ÁCIDO 4-METIL HIPÚRICO: UM CASO DE POLIMORFISMO E SOLVATOMORFISMO***4-METHYL HYPPURIC ACID: A CASE OF POLYMORPHISM AND SOLVATOMORPHISM*

Página – 812

76- Artigo / Article

MEDEIROS, M. S.; GOULART, A. C.; PACHECO, I. S.; AMARAL, F. A.; CANOBRE, S. C.

BRASIL**ANÁLISE MULTIVARIADA APLICADA A QUALIDADE DA ÁGUA SUBTERRÂNEA DE ABASTECIMENTO EM ESCOLAS DO CAMPO DE UBERLÂNDIA-MG***MULTIVARIATE ANALYSIS APPLIED AT THE SCHOOL OF THE UBERLAND-AMERICAN FIELD OF CONSUMER UNDERGROUND WATER QUALITY*

Página – 833

78- Artigo / Article

FONSECA, J. C.; AMADO, P. A.; CASTRO, A. H. F.; LIMA, L. A. R. S.

BRASIL**ANÁLISE FITOQUÍMICA E AVALIAÇÃO DO EFEITO FITOTÓXICO DA FRAÇÃO HEXÂNICA DAS FOLHAS DE *Smilax brasiliensis* (SMILACACEAE)***PHYTOCHEMICAL ANALYSIS AND EVALUATION OF THE PHYTOTOXIC EFFECT OF THE HEXANE FRACTION FROM THE LEAVES OF *Smilax brasiliensis* (SMILACACEAE)*

Página – 816

79- Artigo / Article

SOUSA, J. A.; MACHADO, I. da C. P.; BARROS, F. de A. A.

BRASIL**REAL INTERESSE DE INSTITUIÇÕES FEDERAL E ESTADUAL EM RELACIONAR O ENSINO DE QUÍMICA COM A FORMAÇÃO PARA CIDADANIA***REAL INTEREST OF FEDERAL AND STATE INSTITUTIONS IN RELATION TO CHEMISTRY EDUCATION WITH CITIZENSHIP TRAINING*

Página – 862

81- Artigo / Article

DELGADO, G. E.; DELGADO-NIÑO, P.; JAMALIS, J.

VENEZUELA, COLÔMBIA, MALÁSIA**DADOS DE DIFRAÇÃO DE RAIOS-X PARA UM NOVO TIOFENO CHALCONA OBTIDO POR UMA REAÇÃO DE CLAISEN-SCHMIDT***X-RAY POWDER DIFFRACTION DATA FOR A NEW THIOPHENE CHALCONE OBTAINED BY A CLAISEN-SCHMIDT REACTION.*

Página – 878

83- Artigo / Article

SILVA, D. de F.; NETO, H. D.; FERREIRA, M. D. L.; FILHO, A. A. de O.; LIMA, E. de O.

BRASIL**ESTUDO IN SILICO DO PERFIL ANTIMICROBIANO DO β -CITRONELOL: POTENCIALIDADE COMO ANTIFÚNGICO***IN SILICO STUDY OF THE ANTIMICROBIAL PROFILE OF β -CITRONELLOL: POTENTIAL AS AN ANTIFUNGAL*

Página – 894

85- Artigo / Article

QUINTERO-RINCÓN, P.; FONTAL-RIVERA, B.; CONTRERAS, R.; FONSECA, Y.; VELÁSQUEZ-GIL, J.

VENEZUELA**SÍNTESE E CARACTERIZAÇÃO DE TRÊS CARBOXILATOS DE ORGANOTINA (IV) DO ÁCIDO ENT-CAURENÓICO: ATIVIDADE ANTIFÚNGICA CONTRA OS TRAMETES VERSICOLOR (L.: FR) PILÁT***SYNTHESIS AND CHARACTERIZATION OF THREE ORGANOTIN(IV) CARBOXYLATE OF ENT-KAURENOIC ACID: ANTIFUNGAL ACTIVITY AGAINST TRAMETES VERSICOLOR (L.: FR) PILÁT*

Página – 912

80- Artigo / Article

BOAES, T. da S.; ARRUDA, G. L.; FERREIRA, T. P. de S.; CHAGAS JUNIOR, A. F.; CHAPLA, V. M.

BRASIL**VARIAÇÃO DA PRODUÇÃO METABÓLICA DO FUNGO ENDOFÍTICO DIAPORTHE SP. ISOLADO DE CLITORIA GUIANENSIS BENTH UTILIZANDO OSMAC***VARIATION OF THE METABOLIC PRODUCTION OF THE ENDOPHYTIC FUNGUS DIAPORTHE SP. OF CLITORIA GUIANENSIS BENTH USING OSMAC*

Página – 870

82- Artigo / Article

COSTA, L. T. A.; AGUIAR, A.

BRASIL**ESTUDO CINÉTICO DO EFEITO DO AZUL DE METILENO NA DESCOLORAÇÃO DE OUTROS CORANTES POR PROCESSOS FENTON***KINETIC STUDY OF THE EFFECT OF METHYLENE BLUE ON THE DECOLORIZATION OF OTHER DYES BY FENTON PROCESSES*

Página – 885

84- Artigo / Article

BERETTA, B. M.; MELO, A. R.; CAMPOS, D. De P.; MORONA, J.; BROLESI, T. M.

BRASIL**CARACTERIZAÇÃO DE DOIS TIPOS DE PILHAS: ALCALINA E ZINCO-MANGANÊS, DE ACORDO COM AS RESOLUÇÕES CONAMA Nº 401/2008 E Nº 430/2011***CHARACTERIZATION OF TWO TYPES OF BATTERIES: ALKALINE AND ZINC-MANGANES, IN ACCORDANCE WITH CONAMA RESOLUTIONS N ° 401/2008 AND N ° 430/2011*

Página - 899

86- Artigo / Article

GOMES, J. V.; DA SILVA, F. V.; DO CARMO, D. F. de M.; MAIA, P. J. S.

BRASIL**AS SÉRIES DE INVESTIGAÇÃO CRIMINAL NO ENSINO DA QUÍMICA POR MEIO DA EXPERIMENTAÇÃO INVESTIGATIVA E LÚDICA***TV SERIES OF CRIMINAL INVESTIGATION IN CHEMISTRY TEACHING THROUGH OF RESEARCH AND LUDIC EXPERIMENTATION*

Página – 919

87- Artigo / Article

BABAEE KHOU, G.; ADABI, M. H.; JAHANI, D.; VAZIRI, S. H.

IRÃ

MICROFACIAS E GEOQUÍMICA DA FORMAÇÃO DA RUTEH NA ÁREA DE RUTEH, ALBORZ CENTRAL, IRAN*GEOCHEMISTRY AND MICROFACIES OF THE RUTEH FORMATION IN THE RUTEH AREA, CENTRAL ALBORZ, IRAN*

Página – 930

89- Artigo / Article

FERREIRA, A. M. V.; PIRES, E. V.; ENDRES, L.; FREGADOLLI, F. L.; SANTANA, A. E. G.

BRASIL

PERFIL QUÍMICO DOS COMPOSTOS ORGÂNICOS PRESENTES NA CUTÍCULA DE MACHOS E FÊMEAS DA ESPÉCIE *Pachycoris torridus* (Scopoli, 1772) (Hemiptera: Scutelleridae) SUBMETIDOS OU NÃO A PROCEDIMENTO ANESTÉSICO E EM DIFERENTES TEMPOS*CHEMICAL PROFILE OF ORGANIC COMPOUNDS PRESENTED IN THE CUTICLE OF MALES AND FEMALES OF THE SPECIES *Pachycoris torridus* (SCOPOLI, 1772) (Hemiptera: Scutelleridae) SUBMITTED OR NOT ANESTHETIC PROCEDURE AND IN DIFFERENT TIMES*

Página – 967

91- Artigo / ArticleZhanaliyeva Rashida N.¹; Torsykbayeva Bigamila B.²; Altynbekova Minash O.³; Imangaliyeva Bazarkhan S.⁴; Nazarova Aiman Zh.⁵;

CAZAQUISTÃO

SÍNTESE DO 2-(2I - ACILÓXI-ETÓXI) CLORETO DE ETILA E SUA INTERAÇÃO COM AMIDOS E RODANÍDEOS DE METAIS ALCALINOS*SYNTHESIS OF 2-(2I - ACYLOXY-ETHOXY) ETHYL CHLORIDE AND THEIR INTERACTION WITH AMIDES AND ALKALI METAL RHODANIDES*

Página – 996

93- Artigo / Article

SALES, J. B. R.; OLIVEIRA, E. J. A.; NAVARRO, D. M. A. F.; AMORIM, L. B.; RODRIGUES, Sofia S. F. B.

BRASIL

ESTUDO POPULACIONAL DO MOSQUITO *Aedes aegypti* E MEDIDAS DE INTERVENÇÃO EM CAMPO COM USO DE ÓLEO ESSENCIAL DE CROTON RHAMNIFOLIOIDES COM EFEITO DETERRENTE*POPULATION STUDY OF THE *Aedes aegypti* MOSQUITO AND MEASURES OF INTERVENTION IN THE FIELD WITH USE OF ESSENTIAL OIL OF CROTON RHAMNIFOLIOIDES WITH DETERRENT EFFECT*

Página – 1017

88- Artigo / Article

OVCHINNIKOV V.V.; UCHEVATKINA N.V.; KURBATOVA I.A.; LUKYANENKO E.V.; YAKUTINA S.V.

RUSSIA

AUMENTO DA DURABILIDADE DA LIGA DE TITÂNIO VT6 PELA IMPLANTAÇÃO DE COBRE E IONS DE ALUMÍNIO*VT6 TITANIUM ALLOY WEARABILITY INCREASE VIA IMPLANTATION OF COPPER AND ALUMINUM IONS*

Página – 945

90- Artigo / Article

VALENCIA, K.; SANJOSÉ, V.; TORRES, T.

BRASIL

AS ATIVIDADES LABORATORIAIS CONTRIBUEM PARA UMA CONCEPÇÃO CONTEMPORÂNEA DA CIÊNCIA NA FORMAÇÃO INICIAL DE PROFESSORES?*DO LABORATORY ACTIVITIES CONTRIBUTE TO A CONTEMPORARY CONCEPTION OF SCIENCE IN INITIAL TEACHER TRAINING?*

Página – 982

92- Artigo / Article

KRASNENKO A. Yu.; STETSENKO I. F.; RAKITKO A. S.; CHUROV A. V.; ILINSKII V. V.

RÚSSIA

SEQUENCIAMENTO DE COBERTURA ULTRA BAIXO É O MÉTODO DE QUANTIFICAÇÃO DE BIBLIOTECA MAIS PRECISA ANTES DO SEQUENCIAMENTO DE EXOMA*ULTRALOW COVERAGE SEQUENCING IS THE MOST ACCURATE LIBRARY QUANTIFICATION METHOD PRIOR TO EXOME SEQUENCING*

Página – 1010

94- Artigo / Article

CERVELIN, A.; DE BONI, L. A. B.

BRASIL

CONSTRUINDO UM ESPECTROFOTÔMETRO COM MATERIAIS RECICLADOS. PARTE I*BUILDING A SPECTROPHOTOMETER WITH RECYCLED MATERIALS. PART I*

Página – 1029

95- Artigo / Article

VOSTRIKOVA, T. V. 1; ZEMLYANUKHINA, O. A.; KALAEV, V. N.

RUSSIA

**USO DE CARACTERÍSTICAS BIOQUÍMICAS-FISIOLÓGICAS,
CELULARES E SUBCELULARES DE BETULA PENDULA COMO
MARCADORES DE GERMINAÇÃO DE SEMENTE E
MONITORAMENTO DA POLUIÇÃO DO TERRITÓRIO**

*USE OF PHYSIOLOGICAL-BIOCHEMICAL, CELLULAR AND
SUB-CELLAR CHARACTERISTICS OF BETULA PENDULA AS
MARKERS OF SEED GERMINATION AND MONITORING
TERRITORY POLLUTION*

Página – 1034

Author instructions

**As we are updating the journal policy we kindly
invite you to visit the journal website to get the
most recent pieces of information.**

Thank you. Editors.

WORDS FROM THE EDITORS

Dear readers and authors

On behalf of the editors and editorial board, we would like to inform you that we are going to make some important changes in the journal for the next year in order to improve not only the quality of the Journal but also fill some gaps we are facing regarding evaluation, costs, website, and other subjects.

1. **Make official the 100 manuscripts rule.** It is important to have a standard regarding the number of published papers per issue. Nowadays, we do not have any standard, and sometimes we make mistakes.
2. **Increase the periodicity of the journal from 2 to 3 editions per year.** With the implementation of this concept, we will limit ourselves to a maximum of 300 papers per year. Since this is a small journal, 300 papers would be a lot of material to us. At the same time, it will make us more selective. We have been receiving a few thousand manuscripts per year, and we can't publish them all. **After changing the periodicity from 2 to 3 issues per year, in 2020, we are going to launch the issues in March, July, and November.**
3. **We cannot publish every original manuscript that we receive.** Why? Some manuscripts are not related to the journal's scopes or objectives, so if you are an author, please observe it before making a submission. Other manuscripts have problems that when they are pointed out by the review board of the journal, the manuscripts are too hard to improve.
4. **Implementation of a publication fee.** After all these years, it is important to implement an official publication fee, and it helps to maintain and improve the journal. More information about it will be released soon at the Journal's website. If you can't pay the fee, please talk to us, we are sensitive to your case.
5. **Evaluation time.** After all those years, we can safely say that we normally take from 60 to 120 days to evaluate a manuscript. So we advise the authors to organize their publications schedule, we don't have fast or express publication option. The review process takes time. As an author, you can really help us by executing the requested changes all at once, and properly using the journal's template. Sometimes it is faster, sometimes not.
6. **Author alliance.** This is a project from the Editors, to help young and/or new authors in our journal to achieve their full potential and make high-quality publications. We would like to share some simple tips on how to prepare your manuscript in the best possible way.
7. **Cover letter.** We will update our cover letter to include a checkbox to participate in the Author alliance program. So if you already download the author's instructions files observe if you have the latest version of the file, you can do it by making a new download.
8. **Letters of acceptance.** We will no longer provide this type of service in this journal. Why? It takes time to produce it, and it's an instrument that can be falsified and used improperly. Instead, we recommend the authors to present the e-mails that we exchange or present the publication itself in the journal.

CONSTRUINDO UM APARELHO DE DESTILAÇÃO SIMPLES ATRAVÉS DE MATERIAIS USADOS USANDO APRENDIZAGEM BASEADA EM PROJETOS**CONSTRUCTING A SIMPLE DISTILLATION APPARATUS FROM USED GOODS BY USING PROJECT-BASED LEARNING**FADIAWATI, Noor^{1*}; DIAWATI, Chansyanah²; SYAMSURI, M. Mahfudz Fauzi³^{1,2,3}University of Lampung, Faculty of Teacher Training and Education, Department of Chemical Education

* Correspondence author

e-mail: noor.fadiawati@fkip.unila.ac.id

Received 04 February 2019; received in revised form 28 April 2019; accepted 12 May 2019

RESUMO

Os alunos foram desafiados a construir um aparato simples de destilação usando o aprendizado baseado em projetos. Nesses projetos do aparelho, aplicaram-se seus conhecimentos e habilidades para buscarem ferramentas alternativas de substituição, planejar, construir e testar o funcionamento do aparelho. Um aparelho de destilação simples foi projetado e construído por estudantes onde algumas ferramentas poderiam ser substituídas por bens usados, tais como: (1) um bico de bunsen poderia ser substituído por uma lâmpada de parede espírita; (2) uma garrafa de vidro de refrigerante substitui um frasco de Pyrex como um frasco de destilação; (3) uma garrafa plástica modificada com tubo de alumínio e mangueiras de plástico substitui uma tubulação de vidro como um condensador, e (4) um dínamo modificado de brinquedos de carro foi usado como aerador com fonte de corrente elétrica de bateria, banco de potência ou telefone usando eletricidade carregador. O aparelho já poderia ser usado para purificar a água do mar que foi modelada usando água salgada. Os destilados eram mais claros e incolores comparados com a amostra, não acendiam as luzes e não havia bolhas de gás. Este projeto melhorou a compreensão dos alunos nos conceitos de destilação e aumentou as habilidades de pensamento criativo.

Palavras-chave: experimento de laboratório; equipamento de laboratório; um aparelho simples de destilação; aprendizagem baseada em projetos; aprendizagem prática

ABSTRACT

Students had been challenged to build a simple distillation apparatus by using project-based learning. In these project of the apparatus, they were applied their knowledges and skills to look for an alternative replacement tools, plan, build, and test the functioning of the apparatus. A simple distillation apparatus was designed and constructed by students where some tools could be replaced with used goods, such as: (1) a bunsen burner could be replaced with an spirit-wall lamp; (2) a soft drink glass bottle replaces a Pyrex flask as a distilling flask; (3) a modified plastic bottle with aluminium tube and plastic hoses replaces a glass tubing as a condenser, and (4) a modified dynamo from car toys was used as aerator with source of electric current from battery, power bank, or electric using phone charger. The apparatus already could be used to purify sea water that modeled by saline solution. The distillates were clearer and colorless compared to saline solution and did not conduct electricity. Based on that, the project was improved students' understanding and creative thinking skills on the distillation concepts.

Keywords: laboratory experiment; laboratory equipment; a simple distillation apparatus; project-based learning; hands-on learning

1. INTRODUCTION

Distillation is one of the techniques of separating a substance in its mixture physically based on the boiling point difference. In the process of separation, the mixture which has a lower boiling point will boil first then the resulting steam melts the condenser and condenses into a liquid again (Day and Underwood, 1986; Kister, 1992; Ledgard, 2006). Distillation is a difficult technique to visualize and even harder to demonstrate without specialized equipment. However, a suitable distillation apparatus easily illustrates the phenomena of evaporation and condensation (Campanizzi, et al., 1999).

According to Regulation of the Minister of Education and Culture of the Republic of Indonesia No. 37 in 2018 year, the learning material of mixed separation with distillation techniques was introduced for the first time in science subjects at the secondary school level (Author team, 2018). Secondary school students are expected to have the competence to do a separate of mixtures based on physical and chemical properties so that students can understand the characteristics of substances, as well as physical and chemical changes in substances that can be used for everyday life. Therefore, to achieve these competencies, it is necessary to carry out mixtures separation practice activities with distillation techniques in learning.

The practical apparatus is one of the supporting factors for the implementation of practice activities in schools. However, practice activities of mixtures separation with distillation techniques in schools are rarely carried out. This is due to constraints due to the lack of availability of practical apparatus. (Fadiawati and Diawati, 2011; Fadiawati, 2013; Fadiawati and Tania, 2014) A commercial simple distillation apparatus use a Pyrex flask as a distilling flask, glass tubing as a condenser, and a cup as the receiver. Components of the apparatus are made of glass, need to be assembled if you want to use, and the price is relatively expensive. In addition, the difficulty of the teacher in assembling the apparatus and the concerns of the teacher and students break the apparatus if they are not careful during practice also a reason (Retug, 2010; Maknun, et al., 2012; Sudargo dan Aisah, 2010).

Students as candidates for chemistry teachers who will later be in school must be able to develop practical apparatus. This is a challenge for the students in order the practice

activities of mixtures separation by using distillation techniques in schools can be carried out.

Several studies have been conducted to modify the distillation apparatus (Campanizzi, et al., 1999; Kahl, et al., 2014). The use of modified practice apparatus in the learning process proved to be able to improve mastery of concepts and higher order thinking skills including creative thinking skills (Hooi, et al., 2014; Mott, et al., 2014; Kahl, et. al., 2014). However, these modified apparatus are not the result of copyright or creative thinking of students so that students do not have comprehensive knowledge about the usefulness of each tools and concepts that are followed in the work process of the apparatus.

In this article, we described the results of a modified simple distillation apparatus by students through project-based learning (PjBL). In these project of the apparatus, students applied their knowledges and skills to look for an alternative replacement tools, plan, build, and test the functioning of the apparatus.

Therefore, through the project of modified a practical apparatus is believed that the students' creative thinking skills can be trained (Fisher, 2006; Burke and Williams, 2009; Colcott, et al., 2009; Dyer, et al., 2009; Aubrey, et al., 2012; Diawati, et al., 2018).

This is corresponded with the globalization area, the cotemporary job market demands graduates who are able to work in an ill-defined and ever-changing environment, facing nonroutine and abstract work, make a decisions and responsibility, and working in team (Bergh, et al., 2006). Therefore, students need a number of higher order thinking skills including creative thinking skills.

Through PjBL, students have designed and built a simple and inexpensive distillation apparatus using scrapwares and sodium chloride (NaCl) solution as the sample that it would be separated.

2. MATERIALS AND METHODS

There are five essential features of PjBL. These are projects (a) engage students in investigating an authentic question or problem that drives activities and organizes concepts and principles; (b) result in students developing a series of artifacts, or products, that address the question or problem; (c) allow students to engage in investigations; (d) involve students, teachers,

and members of society in a community of inquiry as they collaborate about the problems, and (e) promote students using cognitive tools (Krajcik, et al., 1994).

Students designed and built a simple distillation apparatus through four model stages of PjBL which are modified by Diawati, et al. (2018) for 8 weeks. These are (a) identifying and defining project; (b) planning a project; (c) implementing a project; (d) documenting and reporting project findings. Students were provided with worksheet that it contain questions as assistance to guide students to find several alternative solutions.

In the first week, students were oriented in the classroom by the lecturer. The lecturer give an explanation of the project and an importance of communicating and information sharing during collaboration with member of team and the lecturer. After that in the stage of identifying and defining project, students read the problem illustration about distillation and practice related of it in the secondary school. They were given a challenge with the problem: "What should you do so that secondary school students can do distillation experiment without any worry about breaking the apparatus while assembling the tools to complete the practical activities?"

Students planned a project outside of the classroom for 2 weeks. In this stage, students applied their knowledges and skills related to the problem. They were asked to search a simple distillation apparatus that has been developed or modified. Then, they identified the strength and weakness of it. According to the worksheet, they look for various alternative replacement tools for a heating source, a distilling flask, a condenser, and a cup as the receiver. Then, students were asked discuss with the lecture that why they choose these various alternative replacement tools.

At the stage of implementing a project, students were given 4 weeks to design, build, and test the product of a simple distillation apparatus. Regard to design, students were asked to compare with the design of a simple distillation apparatus that has been developed or modified. After students finished determining material alternative replacement tools, they drew a design of a simple distillation apparatus. Then they built and tested the apparatus. During the project, students consulted with the lecturer regularly because implementing design to be an apparatus is not one-time process.

Documenting and reporting project

findings stage was done for a week. Students prepared for the project's report. At the weekend they presented the project findings in the classroom.

During the project from designed till finished the apparatus, students' creative thinking skills was assessed using process performance assessment instrument and the product a simple apparatus also was assessed using product assessment instrument.

3. RESULTS AND DISCUSSION:

According to the problem illustration about the constraint in the practice of distillation in the secondary school, students can identify the problems. From the interview, it is represented by the statements of these students:

Student 1: "Any tools of a commercial simple distillation apparatus that can be replaced with other tools?"

Student 2: "Are there alternative replacement tools for a commercial simple distillation apparatus?"

Related to the statements, the lecturer provides directive questions. For example:

Question 1: "What tools of a commercial simple distillation apparatus can be replaced?"

Question 2: "What is the function of each tool in a commercial simple distillation apparatus? Can alternative replacement tools have the same function as tools of a commercial simple distillation apparatus?"

Through reference searching, students found a simple distillation tool that has been developed or modified, such as distillation apparatus using household items (Campanizzi, et al., 1999) and used goods (Widiyatmoko and Pamelasari, 2012). According that, they were interested to modify a commercial simple distillation apparatus using used goods. The use of used goods was expected to reduce the costs, abundant and easy to obtain, and not complicated in the process of realization to become an apparatus.

There were some tools could be replaced with used goods, such as: (1) a bunsen burner could be replaced with an spirit-wall lamp; (2) a soft drink glass bottle replaces a Pyrex flask as a distilling flask; (3) a modified plastic bottle with aluminium tube and plastic hoses replaces a glass tubing as a condenser, and (4) a modified dynamo from car toys was used as aerator with

source of electric current from battery, power bank, or electric using phone charger. According to alternative replacement tools that determined by students, the lecturer give a question to look for the reason that why they chosen it.

A spirits-wall lamp was determined on the grounds that the size of the flame can be adjusted, so that the heating temperature can be adjusted as desired. The fuel used was spirits that were easily obtained, the price was affordable, and the resulting fire was blue and did not cause soot. A soft drink glass bottle as distilling flask was chosen because transparent so that the sample could be seen clearly. This distilling flask equipped with alcohol thermometer that it was mounted on a distillation flask lid made of used rubber slippers. This used rubber slipper serves to hold the thermometer in order to stand upright and to prevent the discharge of steam. A modified plastic bottle with aluminium tube and plastic hoses was determined because heat resistant, conductor, and corrosion resistant. Modified aerator was determined in order an apparatus could be applied in any where, although in the school without an electric.

3.1. Distillation apparatus design

Design of a simple distillation apparatus using used goods was shown in Figure 1.

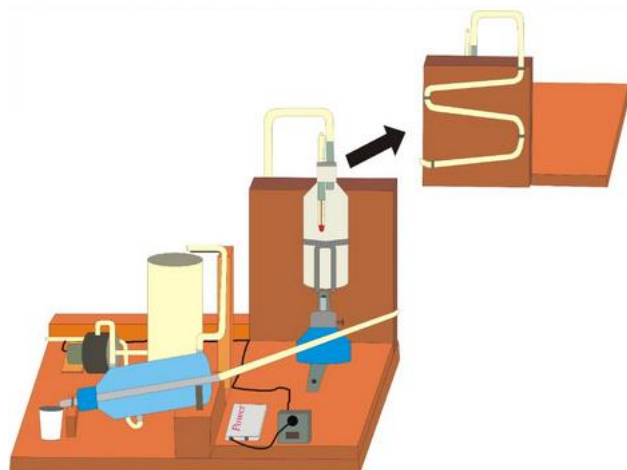


Figure 1. Design of a simple distillation apparatus from used goods

A simple distillation apparatus constructed by students was shown in Figure 2.



(a)



(b)

Figure 2. Construction of a simple distillation apparatus from used goods: (a) front view and (b) back view

All components in these apparatus were assembled into one unit, so that when used it was not necessary to assemble it first. The condenser was located lower than the distillation flask. The condenser hose was threaded and attached to the back of the vertical board where the distillation flask attaches. The condenser was equipped with water circulation. In addition, the condenser was also accompanied by a drain hose so that when finished, it could be opened the lid of the drain hose without having to disassemble the condenser.

A modified simple apparatus was safe and environmentally friendly. This apparatus can also be used in laboratories, inside and outside the classroom. The cost of this student-made a simple distillation apparatus inexpensive, ~ US\$6 total (can be seen in Table 1).

Table 1. Description of alternative replacement tools

Component	Price/ US\$
Wooden board	2.5
Wall lamp	0.5
Dynamo	0.5
Plastic hoses (0.75 inchi)	1
Alcohol thermometer (length: 30cm; Temp. Range: -10 to +110 °C)	1
Cable (0.5 inchi)	0.5
Total	6

3.2. Performace assessment

As shown in Table 2, students have developed creative problem-solving skill during the project. According to worksheet and interview results, they have written the relevant formulation of problem, identified the function of each tools in a simple distillation apparatus, identified the tools of apparatus that can be replaced, determined and looked for various alternative replacement tools, designed, built, and tested the product of a modified simple distillation apparatus using used goods.

3.3. Apparatus performace

A modified simple distillation apparatus could already be used to purify sea water that modeled saline solution. This was indicated by obtaining distillates that were clearer and colorless compared to the sample. Test results with an electrolyte tester show that the distillate did not turn on the lights and there were no gas bubbles.

The value of the apparatus performance was shown in Figure 3 and 4.

Through this project, students gain valuable experience on how to plan the investigation, solve the problem creatively and analyze the results.

4. CONCLUSIONS:

Through project-based learning, students have successfully designed and built a simple distillation apparatus using used goods. There apparatus was safe and environmentally friendly. This project has facilitated the improvement of students' creative problem-solving skills.

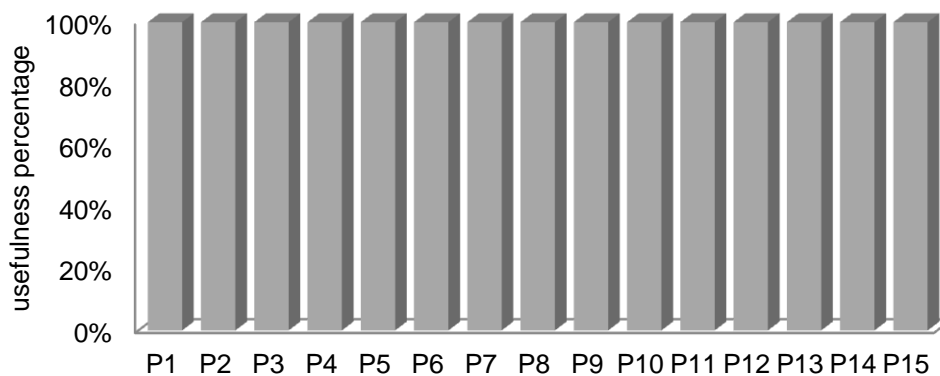
Table 2. The creative problem-solving in the project-based practice

No	Item Indicator of Creative Problem-Solving Process	Score
1	Students write the relevant problem formulation	86
2	Students write the varied problem formulation	89
3	Students write the relevant ideas' formulation of the project's purpose	89
4	Students write the relevant ideas' formulation of the project's importance	91
5	Students write the corrected and relevant method or procedure and concept of the project	80
6	Students describe the function of each tools, determine the tools of apparatus that can be replaced, and list less-costly and no hazard alternative replacement tools	92
7	Students draw a design of the apparatus different with a commercial simple distillation apparatus	95
8	Students describe the function of each replacement tools of the apparatus	95
9	Students describe the working principle of each replacement tools of the apparatus	93
10	Students describe the operating principle of each replacement tools of the apparatus	90

5. REFERENCES:

1. Aubrey, C., Ghent, K., and Kanira, E. Enhancing Thinking Skills in Early Childhood. *Inter. J. Early Years Educ.*, 2012, 20(4), 332-348.
2. Author Team. *Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia No. 37*, 2018.
3. Burke, L.A. and Williams, J.M.

- Developmental Changes in Children's Understandings of Intelligence and Thinking Skills. *Early Child Development and Care*, 2009, 179(7), 949-968.
4. Campanizzi, D.R.D., Mason, B., and Hermann, C.K.F. Distillation Apparatuses using Household Items. *J. Chem. Educ.*, 1999, 76(8), 1079-1080.
 5. Colcott, D., Russell, B., and Skouteris, H. Thinking about Thinking: Innovative Pedagogy Designed to Foster Thinking Skills in Junior Primary Classrooms. *Teacher Development*, 2009, 13(1), 17-27.
 6. Day, R.A. and Underwood, A.L. *Qualitative Analysis*, 5th Edition. New Jersey: Prentice-Hall Publications, 1986.
 7. Diawati, C., Liliyasi, Setiabudi, A. and Buchari. Using Project-Based Learning to Design, Build, and Test Student-Made Photometer by Measuring the Unknown Concentration of Colored Substances. *J. Chem. Educ.*, 2018, 95(3), 468-475.
 8. Dyer, J.H., Gregersen, H.B., and Christensen, C.M. The Innovator's DNA. *Harvard Business Rev.*, 2009, 87(12), 60-67.
 9. Fadiawati, N. Pengembangan Perangkat Pembelajaran Kesetimbangan Kimia berbasis Representasi Kimia untuk Siswa Kelas XI IPA. *Proceeding of Research, Education, and Application of Mathematics and Natural Sciences Seminar*, Yogyakarta: State University of Yogyakarta, 2013, p 197-203.
 10. Fadiawati, N. and Diawati, C. The Problem-Based Learning Model to Increase Student's Skills in Communication, Classification, and Comprehension of Acid-Base Concepts. *Proceeding of National Seminar in Mathematics and Natural Sciences*, Bandar Lampung: University of Lampung, 2011, p 39-48.
 11. Fadiawati, N. and Tania, L. Efektivitas Pendekatan Saintifik dalam Meningkatkan Keterampilan Berpikir Kreatif Siswa pada Materi Kesetimbangan Kimia. *University of Lampung Research Report*, Bandar Lampung (unpublished), 2014.
 12. Fisher, R. *Thinking skills. Learning to Teach in the Primary School*, London: Bloomsbury Academic, 2006, p374-386.
 13. Hooi, Y.K., Nakano, M. and Koga, N. A Simple Oxygen Detector Using Zinc-Air Battery. *J. Chem. Educ.*, 2014, 91(2), 297-299.
 14. Kahl, A., Heller, D., and Ogden, K. Constructing a Simple Distillation Apparatus To Purify Seawater: A High School Chemistry Experiment. *J. Chem. Educ.*, 2014, 91(4), 554-556.
 15. Kister, H.Z. *Distillation Design*. New York: Mc Graw-Hill, Inc., 1992.
 16. Krajick, J.S., Blumenfeld, P.C., Marx, R.W., and Soloway, E. A Collaborative Model for Helping Middle-Grade Science Teachers Learn Project-Based Instruction. *Elementary School Journal*, 1994, 94(5), 483-497.
 17. Ledgard, J.B. *A Laboratory History of Chemical Warfare Agents*. United States: J.B. Ledgard, 2006.
 18. Maknun, D., Surtikanti, R.R.H.K., and Subahar, T.S. Pemetaan Keterampilan Esensial Laboratorium dalam Kegiatan Praktikum Ekologi. *Jurnal Pendidikan IPA Indonesia*, 2012, 1(1), 1-7.
 19. Mott, J.R., Munson, P.J., Kreuter, R.A., Chohan, B.S., and Syke, D.G. Design, Development, and Characterization of an Inexpensive Portable Cyclic Voltammeter. *J. Chem. Educ.*, 2014, 91(7), 1028-1036.
 20. Retug, N. Analisis Kebutuhan Pengembangan Perangkat Pembelajaran Berbasis Masalah Pada Pembelajaran Sains Kimia di SMP. *Jurnal Pendidikan dan Pengajaran*, 2010, 43 (13), 106-113.
 21. Sudargo, F. and Aisah, S.S. Kemampuan Pedagogik Calon Guru dalam Meningkatkan Kemampuan Berpikir Kritis dan Keterampilan Proses Melalui Pembelajaran Berbasis Praktikum. *Jurnal Pengajaran MIPA*, 2010, 15(1), 4-12.
 22. Van de Bergh, V., Mortelmans, D., Spooren, P., Van Petegem, P. Gijbels, D., and Vanthournout, G. New Assessment Modes within Project-Based Education-The Stakeholders. *Studies in Educational Evaluation*, 2006, 32, 345-368.
 23. Widiyatmoko, A. and Pamelasari, S.D. Pembelajaran Berbasis Proyek untuk Mengembangkan Alat Peraga IPA dengan Memanfaatkan Bahan Bekas Pakai. *Jurnal Pendidikan IPA Indonesia*, 2012, 1(1), 51-56.



Information:

Usefulness

P1 : spirits-wall lamp

P2 : flame

P3 : soft drink glass bottle

P4 : heat resistance of glass bottle

P5 : gravel as boiling stone

P6 : thermometer

P7 : used rubber slipper

P8 : plactic hoses

P9 : condenser

P10 : water pump

P11 : electric current source

P12 : distillate

P13 : distillate cup

P14 : wooden board

P15 : electrolyte tester

Figure 3. Graph of usefullness of a simple distillation apparatus from used goods

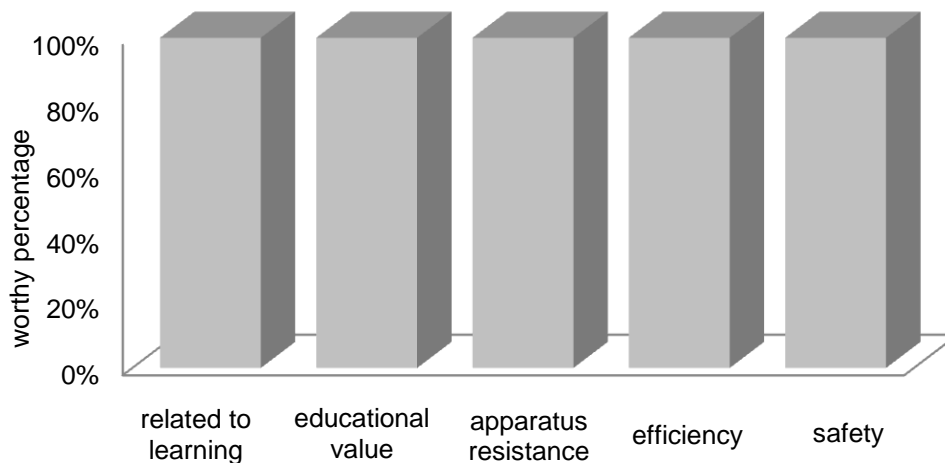


Figure 4. Graph of worthiness of a simple distillation apparatus from used goods