

PETROCHEMICAL & PETROLEUM REFINING TECHNOLOGY

LABORATORY MANUAL

EXPERIMENT 1	DETERMINATION OF FLASH POINT OF PETROLEUM PRODUCTS
EXPERIMENT 2	DETERMINATION OF API GRAVITY
EXPERIMENT 3	DETERMINATION OF VISCOSITY OF OIL
EXPERIMENT 4	DETERMINATION OF REID VAPOR PRESSURE
EXPERIMENT 5	OIL DISTILLATION ACCORDING TO ASTM METHOD



SEMESTER SEPTEMBER 2014

PREPARED BY:

LECTURERS : MS NADIA ISA
MR SYED AZHAR SYED ABD. RAHMAN
MDM NORULAKMAL NOR HADI
MDM WAN NUR HUESNA WAN KAIRUDIN

Mechanical Operation Lab Manual Petrochemical Technology

Lauren Gardner



Mechanical Operation Lab Manual Petrochemical Technology:

Immerse yourself in the artistry of words with is expressive creation, Discover the Artistry of **Mechanical Operation Lab Manual Petrochemical Technology** . This ebook, presented in a PDF format (*), is a masterpiece that goes beyond conventional storytelling. Indulge your senses in prose, poetry, and knowledge. Download now to let the beauty of literature and artistry envelop your mind in a unique and expressive way.

https://staging.conocer.cide.edu/files/publication/Download_PDFS/myths%20and%20legends%20of%20alaska%20illustrations.pdf

Table of Contents Mechanical Operation Lab Manual Petrochemical Technology

1. Understanding the eBook Mechanical Operation Lab Manual Petrochemical Technology
 - The Rise of Digital Reading Mechanical Operation Lab Manual Petrochemical Technology
 - Advantages of eBooks Over Traditional Books
2. Identifying Mechanical Operation Lab Manual Petrochemical Technology
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Mechanical Operation Lab Manual Petrochemical Technology
 - User-Friendly Interface
4. Exploring eBook Recommendations from Mechanical Operation Lab Manual Petrochemical Technology
 - Personalized Recommendations
 - Mechanical Operation Lab Manual Petrochemical Technology User Reviews and Ratings
 - Mechanical Operation Lab Manual Petrochemical Technology and Bestseller Lists
5. Accessing Mechanical Operation Lab Manual Petrochemical Technology Free and Paid eBooks
 - Mechanical Operation Lab Manual Petrochemical Technology Public Domain eBooks
 - Mechanical Operation Lab Manual Petrochemical Technology eBook Subscription Services

- Mechanical Operation Lab Manual Petrochemical Technology Budget-Friendly Options
- 6. Navigating Mechanical Operation Lab Manual Petrochemical Technology eBook Formats
 - ePub, PDF, MOBI, and More
 - Mechanical Operation Lab Manual Petrochemical Technology Compatibility with Devices
 - Mechanical Operation Lab Manual Petrochemical Technology Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Mechanical Operation Lab Manual Petrochemical Technology
 - Highlighting and Note-Taking Mechanical Operation Lab Manual Petrochemical Technology
 - Interactive Elements Mechanical Operation Lab Manual Petrochemical Technology
- 8. Staying Engaged with Mechanical Operation Lab Manual Petrochemical Technology
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Mechanical Operation Lab Manual Petrochemical Technology
- 9. Balancing eBooks and Physical Books Mechanical Operation Lab Manual Petrochemical Technology
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Mechanical Operation Lab Manual Petrochemical Technology
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Mechanical Operation Lab Manual Petrochemical Technology
 - Setting Reading Goals Mechanical Operation Lab Manual Petrochemical Technology
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Mechanical Operation Lab Manual Petrochemical Technology
 - Fact-Checking eBook Content of Mechanical Operation Lab Manual Petrochemical Technology
 - Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
- 14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

Mechanical Operation Lab Manual Petrochemical Technology Introduction

In this digital age, the convenience of accessing information at our fingertips has become a necessity. Whether its research papers, eBooks, or user manuals, PDF files have become the preferred format for sharing and reading documents. However, the cost associated with purchasing PDF files can sometimes be a barrier for many individuals and organizations. Thankfully, there are numerous websites and platforms that allow users to download free PDF files legally. In this article, we will explore some of the best platforms to download free PDFs. One of the most popular platforms to download free PDF files is Project Gutenberg. This online library offers over 60,000 free eBooks that are in the public domain. From classic literature to historical documents, Project Gutenberg provides a wide range of PDF files that can be downloaded and enjoyed on various devices. The website is user-friendly and allows users to search for specific titles or browse through different categories. Another reliable platform for downloading Mechanical Operation Lab Manual Petrochemical Technology free PDF files is Open Library. With its vast collection of over 1 million eBooks, Open Library has something for every reader. The website offers a seamless experience by providing options to borrow or download PDF files. Users simply need to create a free account to access this treasure trove of knowledge. Open Library also allows users to contribute by uploading and sharing their own PDF files, making it a collaborative platform for book enthusiasts. For those interested in academic resources, there are websites dedicated to providing free PDFs of research papers and scientific articles. One such website is Academia.edu, which allows researchers and scholars to share their work with a global audience. Users can download PDF files of research papers, theses, and dissertations covering a wide range of subjects. Academia.edu also provides a platform for discussions and networking within the academic community. When it comes to downloading Mechanical Operation Lab Manual Petrochemical Technology free PDF files of magazines, brochures, and catalogs, Issuu is a popular choice. This digital publishing platform hosts a vast collection of publications from around the world. Users can search for specific titles or explore various categories and genres. Issuu offers a seamless reading experience with its user-friendly interface and allows users to download PDF files for offline reading. Apart from dedicated platforms, search engines also play a crucial role in finding free PDF files. Google, for instance, has an advanced search feature that allows users to filter results by file type. By specifying the file type as "PDF," users can find websites that offer free PDF downloads on a specific topic. While downloading Mechanical Operation Lab Manual Petrochemical Technology free PDF files is convenient, its important to note that copyright laws must be respected. Always ensure that the PDF files you download are legally available for free. Many authors and publishers voluntarily provide free PDF versions of their work, but its essential to be cautious and verify the

authenticity of the source before downloading Mechanical Operation Lab Manual Petrochemical Technology. In conclusion, the internet offers numerous platforms and websites that allow users to download free PDF files legally. Whether its classic literature, research papers, or magazines, there is something for everyone. The platforms mentioned in this article, such as Project Gutenberg, Open Library, Academia.edu, and Issuu, provide access to a vast collection of PDF files. However, users should always be cautious and verify the legality of the source before downloading Mechanical Operation Lab Manual Petrochemical Technology any PDF files. With these platforms, the world of PDF downloads is just a click away.

FAQs About Mechanical Operation Lab Manual Petrochemical Technology Books

How do I know which eBook platform is the best for me? Finding the best eBook platform depends on your reading preferences and device compatibility. Research different platforms, read user reviews, and explore their features before making a choice. Are free eBooks of good quality? Yes, many reputable platforms offer high-quality free eBooks, including classics and public domain works. However, make sure to verify the source to ensure the eBook credibility. Can I read eBooks without an eReader? Absolutely! Most eBook platforms offer web-based readers or mobile apps that allow you to read eBooks on your computer, tablet, or smartphone. How do I avoid digital eye strain while reading eBooks? To prevent digital eye strain, take regular breaks, adjust the font size and background color, and ensure proper lighting while reading eBooks. What the advantage of interactive eBooks? Interactive eBooks incorporate multimedia elements, quizzes, and activities, enhancing the reader engagement and providing a more immersive learning experience. Mechanical Operation Lab Manual Petrochemical Technology is one of the best book in our library for free trial. We provide copy of Mechanical Operation Lab Manual Petrochemical Technology in digital format, so the resources that you find are reliable. There are also many Ebooks of related with Mechanical Operation Lab Manual Petrochemical Technology. Where to download Mechanical Operation Lab Manual Petrochemical Technology online for free? Are you looking for Mechanical Operation Lab Manual Petrochemical Technology PDF? This is definitely going to save you time and cash in something you should think about.

Find Mechanical Operation Lab Manual Petrochemical Technology :

myths and legends of alaska illustrations

~~mythes populaires dans la prose fantastique de mircea eliade~~

my love secret bwmm billionaire romance book english edition

~~my love search confession of an abandoned wife book 1 volume 1~~

my pals are here maths 5a answers

n1996 msi motherboard manual

my ideal vacation essay

my time in heaven

n14 cummins fan belt

my single friend english edition

my first easter

my teacher is an alien a short story english edition

my teacher essay in urdu

my saving grace i will honor your heart english edition

my english lab focus on grammar answers

Mechanical Operation Lab Manual Petrochemical Technology :

story sequence reading rockets - Jun 12 2023

web first graders develop stories with beginnings middles and ends they view a story and discuss the beginning middle and end and cue words including first next and last

writing beginning middle end lesson plans worksheets - Sep 22 2021

draw beginning middle and end lesson plan - Nov 05 2022

web are you ready to write stories with your first or second graders the lessons in this story writing unit will make the process easy and fun it starts with a grade level story model

beginning middle and end first grade english - Jul 13 2023

web in this lesson students get practice with finding the beginning middle and end of the story have your students help you fix a mixed up story while they learn the parts of a

beginning middle end writing lesson plans worksheets - Feb 08 2023

web mar 7 2022 step 1 introduce beginning middle and end with mentor texts okay so now your students are ready to dive into personal narrative writing the first step is to

beginning middle and end mix up lesson plan - May 11 2023

web the focus of this lesson is 1st grade language arts this lesson will be broken down into three days students should have been previously explicitly taught about how to make a

[beginning middle end writing paper teaching](#) - Dec 06 2022

web first graders develop stories with beginnings middles and ends they view a story and discuss the beginning middle and end and cue words including first next and last

browse 1st grade writing lesson plans education com - Sep 03 2022

web are you ready to write stories with your first or second graders the lessons in this story writing unit will make the process easy and fun it starts with a grade level story model

[how to teach writing beginning middle and end](#) - Apr 10 2023

web beginning middle end writing paper use this template to help your students craft a short story or retell a book they read there is a picture and text book for each section

narrative writing beginning middle end teaching resources ppt - Mar 29 2022

web are you ready to write stories with your first or second graders the lessons in this story writing unit will make the process easy and fun it starts with a grade level story model

[creative writing beginning middle and end lesson](#) - Mar 09 2023

web first and second graders are becoming avid readers learning to correctly sequence a story is an important building block to becoming a fluent reader the lesson plan draw

writing a story with beginning middle end tutorial for kids - Aug 14 2023

web apr 30 2020 try youtube kids learn more this is a tutorial on writing a story with beginning middle end tutorial for kids task see if you can think of a beginning middle and end for your

[how to teach narrative writing for kindergarten and first grade](#) - Oct 04 2022

web beginning middle end this three part series of writing prompts will reinforce story structure in your child s writing she ll take one sentence and expand it into three

beginning middle end worksheet education com - May 31 2022

web education com s teacher approved content helps first graders focus on becoming reading writing experts while preparing them for the next grade level using our lesson plans

[1st grade beginning middle and end words utah](#) - Jan 07 2023

web lesson plan author study faith ringgold lesson plan christmas adventure writing lesson plan 1 encourage your first graders to sharpen their literacy skills build their

[5 tips for teaching a beginning middle end reading lesson](#) - Feb 25 2022

web curated oer curator rating educator rating not yet rated lesson plan beginning middle and end curated and reviewed by lesson planet first graders identify the

results for beginning middle end writing tpt - Apr 29 2022

web are you ready to write stories with your first or second graders the lessons in this story writing unit will make the process easy and fun it starts with a grade level story model

results for writing beginning middle end tpt - Dec 26 2021

browse 1st grade reading writing lesson plans education com - Jan 27 2022

web first and second graders explore the importance of having a beginning middle and end when writing stories in this story writing lesson plan students write short stories using

beginning middle and end lesson plan for 1st grade - Oct 24 2021

results for beginning middle end lesson plans tpt - Nov 24 2021

beginning middle end lesson plans worksheets reviewed by - Aug 02 2022

web results for narrative writing beginning middle end 720 results sort by relevance view list narrative writing transitions linking words for beginning middle and end

results for first grade beginning middle end tpt - Jul 01 2022

web nov 5 2016 remember that the focus of this lesson is not on writing but on identifying the beginning middle and end of a story here are two examples of organizers that i

tim und struppi der blaue lotos lovelybooks - Jul 01 2022

web nachdem tim in indien einen internationalen ring von rauschgiftschmugglern aufgedeckt hat genießt er beim maharadscha von gaipajama die wohlverdiente erholung doch

tim und struppi 04 der blaue lotos thalia - Apr 10 2023

web tolle abenteuer für leseanfänger nachdem tim in indien einen internationalen ring von rauschgiftschmugglern aufgedeckt hat genießt er beim maharadscha von gaipajama

tim struppi mini band 4 der blaue lotos sonderausgabe - Dec 06 2022

web apr 5 2008 tim struppi mini band 4 der blaue lotos sonderausgabe hergé amazon de books

tim struppi mini band 4 der blaue lotos sonderausgabe - Mar 09 2023

web apr 25 2008 tim struppi mini band 4 der blaue lotos sonderausgabe hergé isbn 9783551710017 kostenloser versand für alle bücher mit versand und verkauf

der blaue lotos wikipedia - Jul 13 2023

nach ihrem letzten abenteuer die zigarren des pharaos befinden sich tim und struppi als gäste des maharadschas von gaipajama in indien um urlaub zu machen die handlung setzt ein als tim eine unverständliche nachricht ausgesendet von einem kurzwellensender mit einem empfänger abhört kurz darauf erhält er besuch aus shanghai doch der besucher wird von einem giftpfeil

tim und struppi 4 der blaue lotos carlsen - May 11 2023

web die comichefte von tim und struppi sind klassische abenteuergeschichten die für kinder ab 8 jahren geeignet sind sie sind spannend fantasievoll und deshalb auch für

tim struppi mini band 4 der blaue lotos sonderausgabe - Aug 02 2022

web album bd germanophone broché souple ancien 1981 1975 1946 traduction allemande de la cinquième aventure du célèbre héros d hergé le lotus bleu tome 20 pour la série

tim und struppi band 4 der blaue lotos von hergé medimops - Oct 24 2021

web tim und struppi band 4 der blaue lotos von hergé taschenbuch bei medimops de bestellen gebraucht günstig kaufen sparen gratis versand bei medimops

der blaue lotos tim und struppi bd 4 tausendkind - Apr 29 2022

web der blaue lotos tim und struppi bd 4 schnelle lieferung kompetenter service jetzt online bei tausendkind bestellen

tim und struppi 4 der blaue lotos kindercomic ab 8 - Jun 12 2023

web tim und struppi 4 der blaue lotos kindercomic ab 8 jahren ideal für leseanfänger comic klassiker 4 hergé isbn 9783551732248 kostenloser versand für alle

tim struppi mini band 4 der blaue lotos sonderausgabe - Jan 27 2022

web isbn 9783551710017 tim struppi mini band 4 der blaue lotos sonderausgabe gebraucht antiquarisch neu kaufen preisvergleich käuferschutz wir bücher

tim und struppi 4 der blaue lotos belgoshop - May 31 2022

web tim und struppi 4 der blaue lotos altersempfehlung 8 99 jahre 64 seiten taschenbuch softcover carlsen comics isbn 978 3 551 73224 8 autor hergé

tim struppi blaue lotos von hergé abebooks - Feb 25 2022

web tim und struppi band 4 der blaue lotos von hergé und eine große auswahl ähnlicher bücher kunst und sammlerstücke erhältlich auf abebooks de

die abenteuer von tim und struppi 4 der blaue lotos issue - Dec 26 2021

web die abenteuer von tim und struppi 4 der blaue lotos issue die abenteuer von tim und struppi 4 die abenteuer von tim und struppi die abenteuer von tim und

der blaue lotos tim und struppi wiki fandom - Sep 03 2022

web der blaue lotos originaltitel le lotus bleu ist der 5 teil der tim und struppi reihe weil tim im lande der sowjets als band 0 gezählt wird trägt dieser die nr 4 es

tim und struppi der blaue lotos youtube - Aug 14 2023

web feb 28 2019 band 4 tim und struppi der blaue lotos nachdem tim in indien einen internationalen ring von rauschgiftschmugglern aufgedeckt hat genießt er beim

tim und struppi der blaue lotos zeichentrickfilm youtube - Nov 24 2021

web mar 21 2020 tim und struppi der blaue lotos zeichentrickfilm tim und struppi ist eine der bekanntesten und bedeutendsten europäischen comicserien der belgier

der blaue lotos tim und struppi bd 4 weltbild - Jan 07 2023

web der blaue lotos tim und struppi bd 4 kindercomic ab 8 jahren ideal für leseanfänger comic klassiker autor hergé jetzt bewerten merken teilen nachdem tim in indien

tim und struppi 04 der blaue lotos orell füssli - Oct 04 2022

web beschreibung tolle abenteuer für leseanfänger nachdem tim in indien einen internationalen ring von rauschgiftschmugglern aufgedeckt hat genießt er beim

tim struppi band 4 der blaue lotos von hergé tim und - Nov 05 2022

web tim struppi band 4 der blaue lotos von hergé tim und struppi carlsen comics isbn kostenloser versand für alle bücher mit versand und verkauf duch amazon

tim und struppi 4 der blaue lotos kindercomic ab 8 jahren - Feb 08 2023

web tim und struppi 4 der blaue lotos kindercomic ab 8 jahren ideal für leseanfänger comic klassiker 4 hergé amazon de books

tim struppi farbfaksimile band 4 der blaue lotos amazon de - Sep 22 2021

web tim struppi farbfaksimile band 4 der blaue lotos gebundene ausgabe 22 januar 2009 von hergé autor 2 sternebewertungen alle formate und editionen anzeigen

9783551710017 tim struppi mini band 4 der blaue lotos - Mar 29 2022

web tim struppi mini band 4 der blaue lotos sonderausgabe finden sie alle bücher von hergé bei der büchersuchmaschine eurobuch com können sie antiquarische und

magnetic resonance imaging in nonlinear fields with nonlinear - Aug 20 2023

web abstract imaging in the presence of nonlinear static and gradient magnetic fields is outlined analytic expressions are provided for the signal obtained using specific magnetic resonance imaging mri sequences with the addition of field

nonlinearities

magnetic resonance imaging with nonlinear gradient fields signal - Sep 21 2023

web jan 1 2012 nonlinear spatial encoding fields for magnetic resonance imaging mri hold great promise to improve on the linear gradient approaches by for example enabling reduced imaging times

gradient nonlinearity calibration and correction for a compact - Jan 13 2023

web jan 21 2017 abstract due to engineering limitations the spatial encoding gradient fields in conventional magnetic resonance imaging cannot be perfectly linear and always contain higher order nonlinear components if ignored during image reconstruction gradient nonlinearity gnl manifests as image geometric distortion

magnetic resonance imaging with nonlinear gradient fields - Oct 22 2023

web the theoretical basis of this new imaging modality patloc imaging are comprehensively presented suitable image reconstruction algorithms are developed for a variety of imaging sequences and imaging results including in vivo data are explored based on novel hardware designs

monoplanar gradient system for imaging with nonlinear gradients - May 17 2023

web keywords magnetic resonance imaging mri gradients planar gradient nonlinear encoding fields spatial encoding image reconstruction patloc introduction spatial encoding in mri is usually realized by using three orthogonal fields with linear spatial variation along the three spatial directions x y and z using linearly

mapping the impact of non linear gradient fields on diffusion - Jul 19 2023

web diffusion weighted magnetic resonance imaging dwmri allows measurement of tissue diffusivity and is a well established non invasive technique for identification of ischemic stroke differentiation of acute from chronic stroke multiple sclerosis schizophrenia or alzheimer s disease 1 4

spin dephasing under nonlinear gradients implications for imaging - Mar 15 2023

web jul 14 2011 dephasing under nonlinear gradients is increasingly relevant given the growing interest in nonlinear imaging and here we report several notable differences from the linear case most notably in addition to signal loss intravoxel dephasing under gradients creating a wide and asymmetric frequency distribution across the voxel can

real time magnetic resonance imaging radial gradient echo s lww - Jul 07 2022

web the aim of this study is to evaluate a real time magnetic resonance imaging mri method that not only promises high spatiotemporal resolution but also practical robustness in a wide range of scientific and clinical applications

gradient nonlinearity calibration and correction for a compact - Feb 14 2023

web dec 29 2016 1 introduction conventional magnetic resonance imaging mri reconstruction methods based on direct fast fourier transform implicitly assume that the spatial encoding gradient fields employed for mr signal formation and data

acquisition are perfectly linear throughout the entire imaging volume glover and pelc 1986

mapping the impact of nonlinear gradient fields with noise on - Jun 06 2022

web may 1 2023 here we investigate the impact of gradient nonlinearity correction in the presence of noise we introduced empirically derived gradient nonlinear fields at different signal to noise ratio snr levels in two experiments tensor

gradient nonlinearity calibration and correction for a compact - Oct 10 2022

web dec 29 2016 due to engineering limitations the spatial encoding gradient fields in conventional magnetic resonance imaging cannot be perfectly linear and always contain higher order nonlinear components if ignored during image reconstruction gradient nonlinearity gnl manifests as image geometric distortion

integrated image reconstruction and gradient nonlinearity correction - Apr 16 2023

web oct 8 2014 to describe a model based reconstruction strategy for routine magnetic resonance imaging that accounts for gradient nonlinearity gnl during rather than after transformation to the image domain and demonstrate that this approach reduces the spatial resolution loss that occurs during strictly image domain gnl correction

relationship between imaging parameters and distortion in magnetic - Mar 03 2022

web nov 17 2023 1 introduction the gamma knife a stereotactic irradiation sti device is used to treat metastatic brain tumors auditory nerve tumors and cerebral artery malformations 1 3 computed tomography ct and magnetic resonance imaging mri are performed to determine the irradiated area for sti treatment generally the range of

magnetic resonance imaging with nonlinear gradient fields signal - Jun 18 2023

web this text deals with a radically new approach of image encoding the fundamental principle of gradient linearity is challenged by investigating the possibilities of acquiring anatomical images with the help of nonlinear gradient fields

the role of nonlinear gradients in parallel imaging a k space - Aug 08 2022

web sep 26 2012 more recently researchers have begun to show the utility of hybrid phase encoded projection imaging methods such as four dimensional 4d rio where the initial phase on each projection changes with each readout and cognac in which nonlinear spatial encoding magnetic fields seems are played as phase encodes while linear

real time magnetic resonance imaging radial gradient echo - Sep 09 2022

web real time magnetic resonance imaging radial gradient echo sequences with nonlinear inverse reconstruction real time gradient echo mri with extreme radial undersampling and nonlinear inverse reconstruction allows for direct monitoring of arbitrary physiological processes and body functions

real time magnetic resonance imaging radial gradient echo - Apr 04 2022

web dec 1 2019 real time gradient echo mri with extreme radial undersampling and nonlinear inverse reconstruction allows for direct monitoring of arbitrary physiological processes and body functions in a variety of clinical scenarios

real time magnetic resonance imaging in pediatric radiology - May 05 2022

web feb 10 2021 the recent development of highly undersampled radial gradient echo sequences in combination with nonlinear inverse image reconstruction now allows for mri examinations in real time image acquisition times as short as 20 ms yield mri videos with rates of up to 50 frames per second with spin density t1 and t2 type contrast

magnetic resonance imaging with nonlinear gradient fields - Dec 12 2022

web monoplanar gradient system for imaging with nonlinear rotating frame gradient fields for magnetic resonance tomographic imaging using the nonlinear response of gradient nonlinearity calibration and correction for a magnetic resonance imaging chemistry libretexts magnetic particle imaging mit opencourseware magnetic resonance

mapping the impact of nonlinear gradient fields with noise on - Nov 11 2022

web may 1 2023 diffusion weighted magnetic resonance mr imaging dw mri provides image contrast determined by brownian motion of water protons and has been increasingly used as biomarkers 1 to study acute ischemic stroke 2 brain trauma 3 multiple sclerosis 4 schizophrenia 5 or alzheimer s disease 6