Knovel 在科学研究和日常教学中的应用

Knovel Knovel

Know More. Search Less.

Knovel的价值

有哪些主要挑战?

研究员

- 通过合作经营与商业工程领域有着非常密切的联系
- 想要跟上前沿
- 太多的时间花在寻找并对结果排序上
- 在截止日期前需要完成一个快速的文献检索以准备提案
- 需要找到领域内较活跃的学者并且评估可能的合作伙伴

工程学图书馆员

- 授人以渔,使得在大量内容中找到正确答案和数据点更为简单
- 教导学生在研究中不要过于依赖谷歌和维基百科
- 与教职工和学生们培养关系
- 需要在预算逐渐削减的同时继续为学生和教职工提供全面的资源
- 与多家厂商和平台打交道

能带来哪些价值?

大学研究员

通过提供广泛接触到相关内容的渠道以支持我的研究发现需求,并当做重要的起点。精确工具的使用和专业学科索引提高了查全率和查准率。

- 节省时间
- 紧跟领域新动向
- 找到搭档

工程学图书馆员

可以从多个出版商获取工程专业数据,这些数据是不断监管和更新的,覆盖了同类最佳的工程学科信息。

- 节省时间
- 为所有用户带来成功
- 培养与教职工和学生们的关系

Engineering Village和Knovel一起展示了一个整体集合如何跨越工程学校本科和研究生的科研和教学活动,给最值得信赖的技术数据传递了最新的突破思维,每个产品都能满足用户职场下的特定需求点。

信息的使用:常见问题解答

科研

协作和网络   合成与分析

检索, 发现, 阅读, 评论   实验

- **什么是最新的趋势和技术?**
- **研究之前有做过吗?我有哪些新的研究机会?**
- **我的同行在做什么?**
- **我如何写一个成功地投资提案?**
- **我如何监控我的竞争对手?**
- **如何找到我的合作伙伴?**
- **如何快速获取我不熟悉领域的背景知识?**

教学

准备课程资料   审查和评分

鉴定主题   分配支持工具

- **如何让我的学生参与/感兴趣?**
- **如何保证学生们使用可信赖的信息资源?**
- **如何教导学生写一份成功的研究论文?**
- **如何教导学生解决实际开放式问题?**
- **如何使学生对职场做好准备?**

Knovel 的核心价值

Engineering Village

Knovel®

摘要& 索引

全文& 交互式数据

期刊 & 商业出版物

专利

参考作品

材料性能

会议论文

方程式

案例研究

科研

教学

关于Knovel

- **没有其他的工程学平台能提供Knovel 今天所能提供的先进的互动性和数据检索:**

  - 为工程师进行优化.

  - 高性能的检索保证内容可以被发现–这些发现能转化为更好的采纳并促进发现.

  - 超过10万的交互式图形, 图表公式

- **Knovel 是教学和科研的资产:**

  - 教授可以鼓励学生运用多种资源和工具来解决一个有宽度的现实问题.

  - 教授可以检查学生对于资料的理解力, 形成对核心原则更深入的了解

- **Knovel 帮助培养下一代工程师**

  - 学生将使用在全球范围内领先的公司的工程师所使用的相同的研究工具和值得信赖的信息, 为成为有竞争力的员工做好准备。

"鉴于其满足用户需求的能力和快速而有效率的服务, Knovel已经成为其目标用户群体的黄金标准."

- "STM 电子图书: 2012 市场规模, 占有率, 和前景" by Laura Ricci

//CODiE//
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EContent
2012-2013
100

卓越的 学术客户名单

- 全球成千上万的工程师和工程学学生使用Knovel
- 世界最佳工程技术大学前20名中的14所
- 历史年度续签率达90%以上

地区

· 中国科学院	· 香港大学	· 同济大学
· 清华大学	· 香港科技大学	· 天津大学
· 上海交通大学	· 华中科技大学	· 重庆大学
		· 高科联盟

卓越的 企业客户名单

- 全球成千上万的工程师和工程学学生使用Knovel

- 世界500强企业中的74个

- 历史年度续签率达90%以上

- "十大" 在石油和天然气, 精细化工, 航空航天与国防和工程设计与施工领域的工程公司

全球

Knovel 解决方案: 三个关键要素整合

Knovel是一种基于网络的专业在线工程平台，将技术信息集成于分析与搜索工具，致力于推动创新，为工程师提供值得信赖的答案。

用户将Knovel视作可靠的一站式技术参考，包括资料属性数据。他们向Knovel而不是某一本电子书寻求答案。在Knovel的海量工程资源中快速寻求答案，同时与原本静态的数据互动，这种特点使Knovel远远超越了整套电子书的价值。

验证内容

检索优化

Data Analysis
Tools数据分析工具
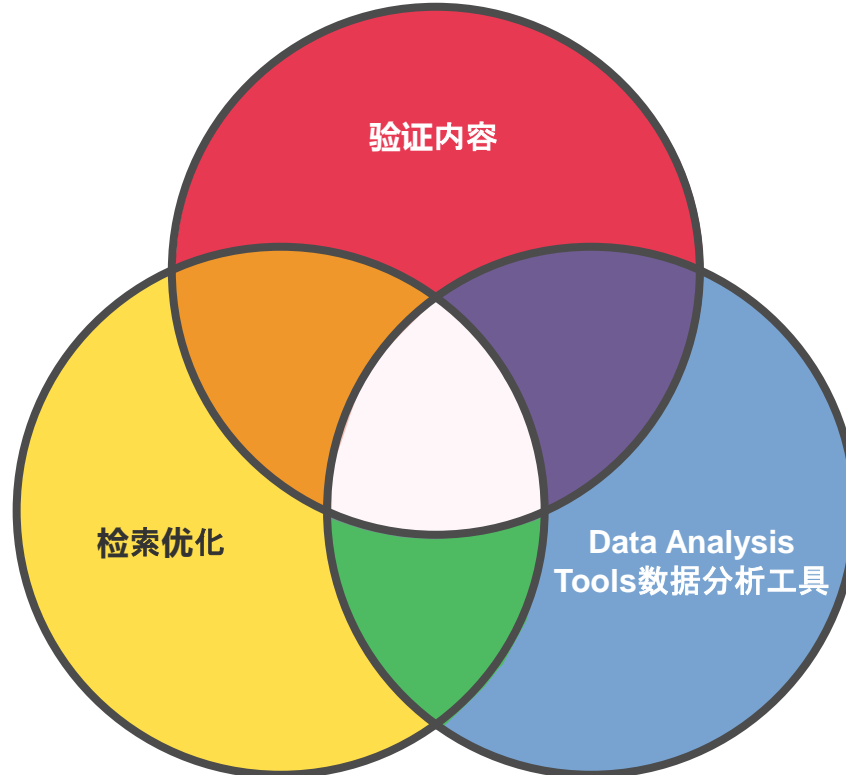
来自相关渠道的可信内容

权威内容

- 来自被承认的团体与出版合作者的已被证实的、公认的科学资源；
- 由客户需求驱使的严格甄选过程，由行业专家审核；
- 编辑顾问委员会提供了深厚的工程经验与领导，确保内容的深度和广度，以满足客户需求；
- Knovel 的关键内容是独有的且高度互动的。

AASHTO美国州公路和运输观员协会	DECHEMA德国化工与生物技术学会	National Ground Water Association 美国地下水协会
AIA美国航天协会	FASEB美国实验生物学联会	PMI国际项目管理学会
AIChE美国化学工程学会	IFIS国际食品信息服务	RSC英国皇家化学学会
AMACOM美国管理协会	IABSE国际桥梁与结构工程协会	InternationalSAE国际自动机工程学会
AOCS美国油脂化学学会	IChemE化学工程师学会	SIAM美国工业与应用数学学会
ASHRAE美国冷冻空调协会	IET国际工程技术学会	SME矿冶与探测学会
ASME美国机械工程协会	ISA国际自动化协会	SNAME美国造船暨轮机工程学会
ASM International美国材料信息学会IOP英国物理学会		SPE国际塑料工程师学会
AEE美国能源工程协会	TMS美国矿冶与材料学会	SVC美国真空镀膜协会
ASTM International美国材料试验协会	NACE International美国防蚀工程学会	SPIE国际光学工程学会
AWWA美国水行业协会	NCRP 美国辐射防护与度量委员会	TRB 美国运输研究委员会
		WEF水环境协会

为工程师优化检索

权威内容

- 来自被承认的团体与出版合作者的已被证实的、公认的科学资源；
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为工程师优化检索

- 查找隐藏在表格，图表和方程式中的数据
- "理解"工程学语言
- 自动进行单位换算
- 允许数值范围检索
- 进行多变量检索

数据分析工具 集成到工程学工作流程中

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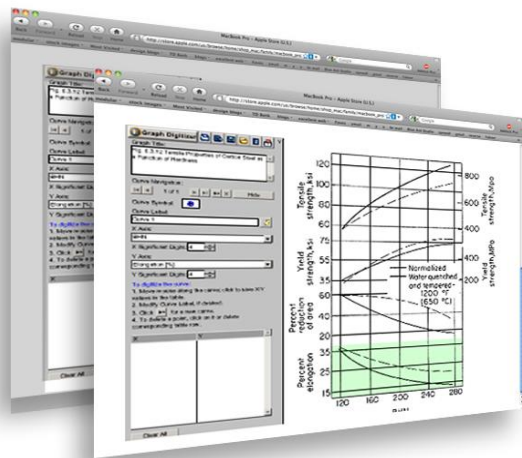
数据分析工具集成到工程学工作流程中

• 对于初始计算和信息验证易于使用的工具

• 超过10万的交互式表格，图表和方程式

• 像分类电子表格一样轻松地自定义和操作数据

• 通过在图上绘点数字化一个或多个曲线

• 保留格式和文件数据源的同时能简单地将数据导出到Excel表格

它如何工作？

从年轻工程师……

……到行业资深人士……

……来：

- **建立基础知识**

并

- **解决工程问题**

……通过Knovel的：
- **基本答案**
- **加速发现**
- **持续访问……**

背景

约翰是一家全球化学品制造商的资产完整性工程师,负责一条生产线。

最终产品是一种平衡溶液,成分包括乙酸、过氧化氢、多种稳定剂、一种催化剂(矿物酸)以及过氧乙酸。

挑战

在工艺中增加了一个最终产品的储存罐。

几个月后的定期安全检查发现储存罐的腐蚀速度出乎意料的快。

如果这个问题得不到解决的话,这将带来:
a. 安全担忧,以及
b. 产品质量问题(腐蚀的金属与产品混合)

解决方案 - Knovel在行动

工程师使用Knovel理解了储存罐不寻常的腐蚀情况,识别了腐蚀问题的根源。
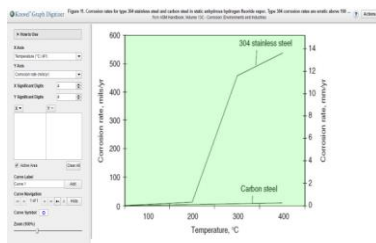
Knovel帮助识别了温度等可能影响工艺的风险因素,最终将储存罐移动到了阳光照射不到的地方,从而避免温度过高。

影响

通过解决腐蚀问题,这提升了工艺安全性,帮助保持了产品质量。

按每升1.25美元计算,这三个储量5万升的储存罐对每批产品的影响超过15万美元。

Knovel能够提供

	基本答案	加速发现	持续访问
什么 >>>			
如何 >>>	来自超过140家值得信赖的提供商的内容 通过交互式方程式、图表和工具提供问题解决能力 广泛的材料属性数据	理解工程语言的搜索能力 基于分类学的搜索过滤，是一个很好的工程概念学习工具	移动应用程序：下班后也能访问 软件插件（AutoCAD、Inventor、Excel） 增强的可发现性，例如EBSCO、SUMMON、PRIMO

帮助 >>>

学生：
- 学习：建立基础知识，在课程中表现出色
- 准备：合作教育/公司实习/未来工作，使用行业工程师所使用的工具

工程科研人员：
- 实现正常运行时间最大化，降低成本，降低工程风险
- 开发新工艺或改进工艺
- 满足合规和监管要求
- 提高知识支持以及可采取行动数据的可及性

Knovel-不只是电子书

	Knovel	E Book Company	E book via Google	Print Book
所有的内容皆出自可信任的来源	✓			
内容专注于工程人员研究者的需求	✓			
整合文字检索与交互式内容	✓			
提供可互动的表格、图解和公式以获得更好的输出应用	✓			
在表格、图解和公式中搜寻数据 – 不仅文字	✓			
转换度量单位以搜寻更多相关结果	✓			
可以查询特定的数值或范围	✓			
在工程与材料主题中执行最佳化检索以获得具体的结果	✓			

功能特色-数值型检索

- **Knovel数值型检索**：根据工程师的思维方式以及搜索需求而设计。用户可以搜索数字类型的关键词或数据。Knovel还能够以表格、图表和方程式的形式返回搜索结果。

功能特色-交互式表格

▪ **Knovel交互式表格**：让您可以随意变动行或列的排列、可隐藏选择的行列数据让相关数据有最佳的呈现、或将数据汇出。而Knovel更期望其使用者可将汇出的表格作为引用证明的数据来源。
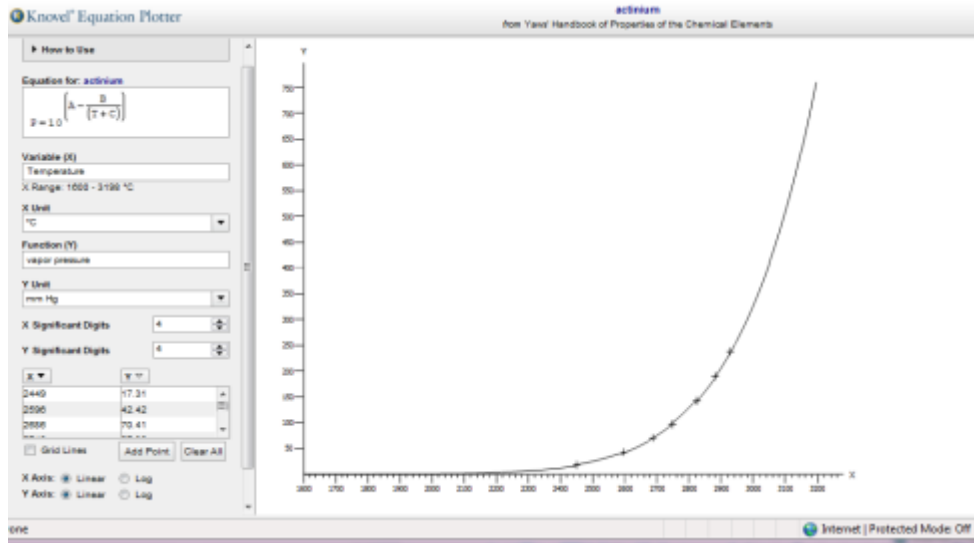
功能特色-交互式图表

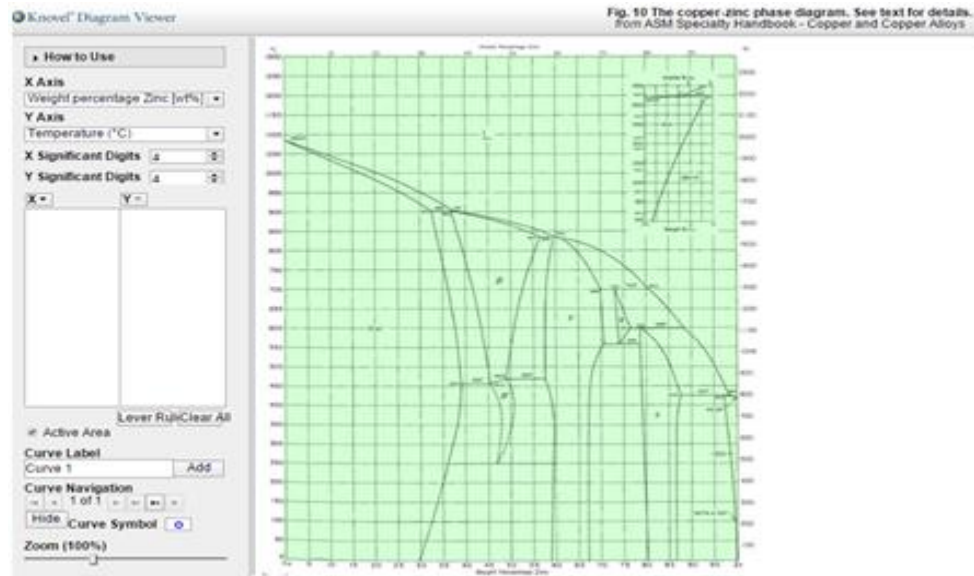- Knovel交互式图表：**可让您测定精确的数据坐标而不用依赖易出错的推断技术。所有相关数据皆可输出以协助您决定并且对于后来的同侪评审来说是一个很好的引用资源。**
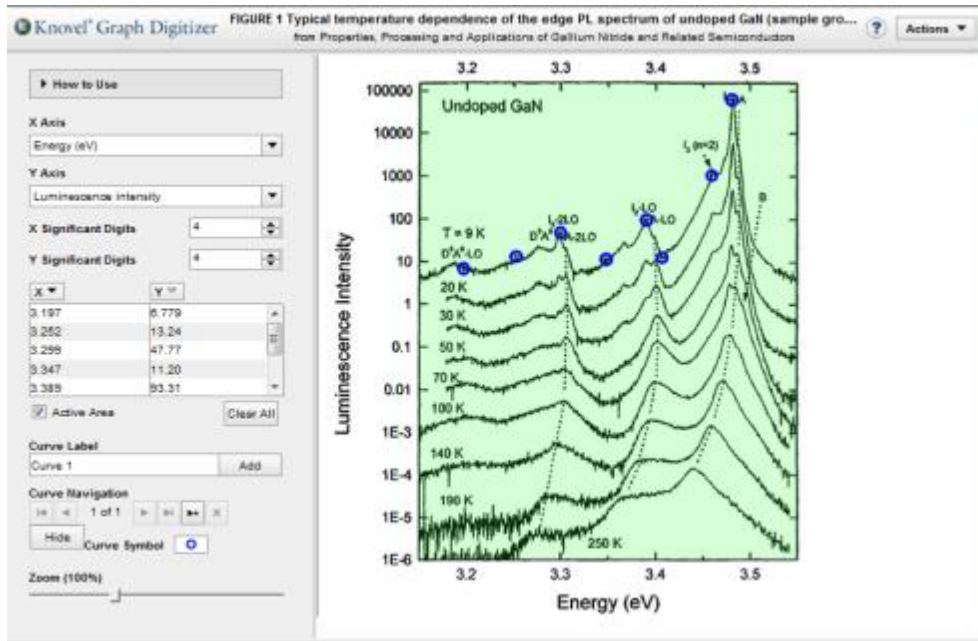
曲线数字转化器——可以将静态的曲线数据汇出，也可以将数据在图上标绘出来、汇出、打印。

功能特色-交互式图表

方程式标绘器 —— 根据方程式进行绘制曲线图，您可以在图上进行描点，标注及改变坐标单位等操作。

相图阅读器——可确定两相系统的边界组分，内置杠杆原理计算器。

功能特色-互动式方程式

包括超过500个实用方程式, 使用内置的方程求解计算, 并导出计算报告和分享知识;并结合文字, 数学, 图像和情节以便捷地一键式的工程公式功能, 访问包含数学函数, 工程单位, 编程结构, 以及数学符号工具箱等。

工具-元素周期表:

提供了各个化学元素的信息, 包括:原子质量, 电子结构, 化合价, 同位素组成和其它常用理化性能参数。

工具-工程单位转换器

Knovel单位转换器有两种模式可供选择。非订户获得免费使用的和共享的工具能够访问约1,000内置单位为超过80的工程运算使用。Knovel用户拥有额外的定制功能。它们可以保存和访问用户创建的单位，标记和排序自定义的单位，并创建自己的默认设置。

科研人员如何评价Knovel

- 是**与谷歌相比**快速找到相关答案的**更好的选择**

- 是用以确定材料具体用途的材料性能数据的转向资源，没有任何其他资源提供如此方便、准确的访问途径

- 拥有交互式表格，图表和方程式，使数据"**活起来**"；帮助学生了解一个变量如何影响另一个

- 向学生介绍**现实世界的问题**，这些在标准教科书中是学不到的

- 是学生必须处理真实数据的**高级顶层设计过程中必不可少的工具**，

- 有利于创造所有学生可以同时访问的阅读书目．

用户反馈

"与其使用谷歌等搜索引擎获得原始数据甚至没有数据，学生们更愿意使用Knovel 在几分钟内获得相关结果，帮助他们解决职场中遇到的实际问题."

- Dr. Vladimir Genis,
应用工程学副教授与项目主任
德雷赛尔大学
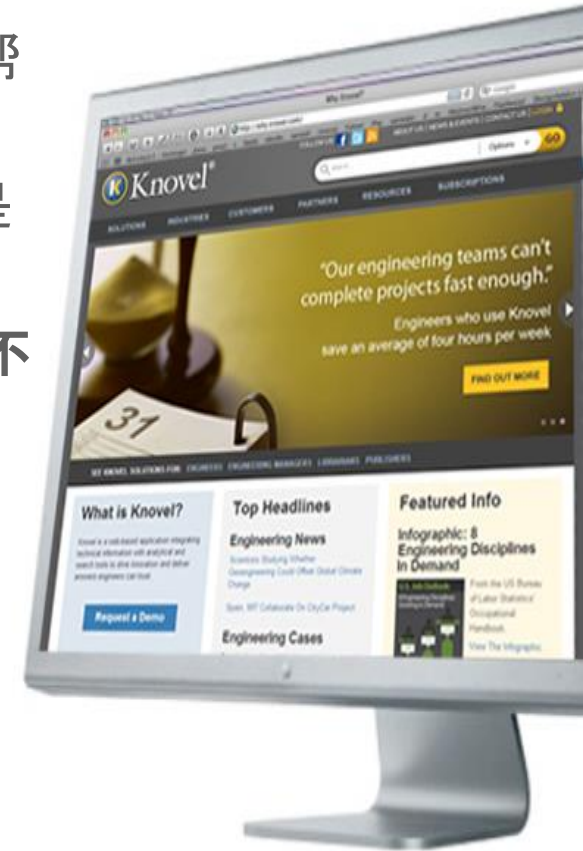
"使学生和教职工能够远程访问大量重要的参考信息，提供同时搜索广泛相关资源的能力，使得他们的研究更加高效和高产。"

- 路易斯安那州立大学

"我们把Knovel应用到我们的课程中，因为我们的许多学生无疑会在进入职场后遇到它."

- Dr. Robert Malloy,
材料工程学院教授与主席
马萨诸塞大学洛厄尔分校

"Knovel is the first place we go to answer chemistry, engineering, and materials related questions. I almost always find what I'm looking for because I'm able to search across so many different sources and I know that the sources within Knovel are of high quality and reliable."

- 化学与化学工程图书馆员,
明尼苏达大学

"自从学习Knovel后，我在寻找和验证资源上花的时间变少了，就有更多的时间来学习重要课程，这就是我在学校所做的."

- 康纳尔大学生物工程学生

学术机构面临的挑战

挑战

- 教导学生如何处理现实世界的开放式问题
- 开发新的课程或保持课程的更新
- 教导学生在研究中不要过于依赖谷歌和维基百科
- 培养学生的信息素养和解决问题的能力
- 帮助学生在大量资源中找到正确答案和数据点
- 整合对于学生来说成本不那么高昂的资源

打造极品

- 易于在线访问，值得信赖的资源
- 学生在职场中解决问题所需要的资源
- 使寻找工程学数据更为简单的工具
- 学生能免费获取的信息资源
- 可获取材料性能数据
- 提供最新的内容
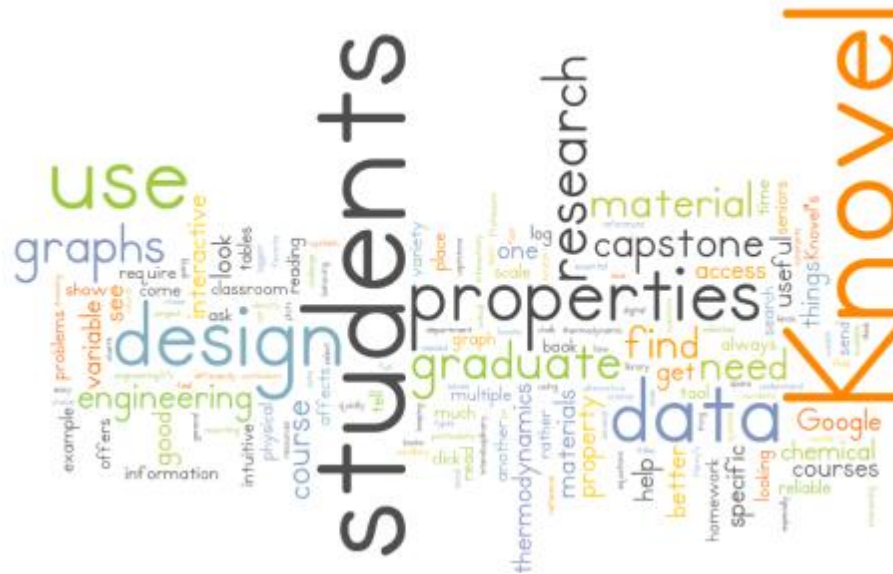
了解Knovel：首页

搜索栏让用户能够很方便地访问Knovel上丰富且经过验证的分类内容

Knovel的所有工具，其中包括交互式内容和材料属性搜索，都可以通过"持续的"工具栏轻松访问

"我的Knovel"将显示用户最近的搜索和活动，提供个性化的体验

Knovel

Support Center   Welcome Sreenath Juttu ▼

SEARCH   🔅 PROPERTY SEARCH

title: distillation   🔍

MY KNOVEL

Recently Viewed

⬚ Refrigeration, Air Conditioning and Heat Pumps...

⬚ Atlas of Stress-Corrosion and Corrosion Fatigue ...

⬚ DIPPR Project 801 - Full Version

Recent Searches

🔍 octafluoropropane

🔍 pump

🔍 corrosion

GO TO MY KNOVEL

WHAT CAN YOU DO WITH KNOVEL?

Instant access to thousands of materials and their properties in Knovel

Plastics   Chemicals

Metals   Composites

Alloys

TRY THE MATERIAL PROPERTY SEARCH

FEATURED

Read and search your go-to references anywhere, anytime.

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Feedback

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- ☆ My Knovel
- ✳ Property Search
- Σ Equations
- ⇄ Unit Converter
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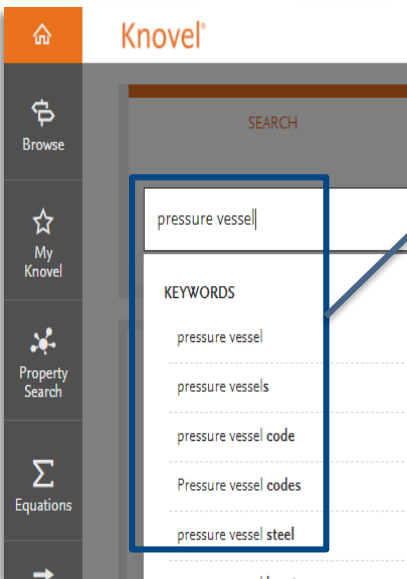
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自动建议：
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搜索结果可以根据工程概念进行细化，帮助过滤用户所需的结果
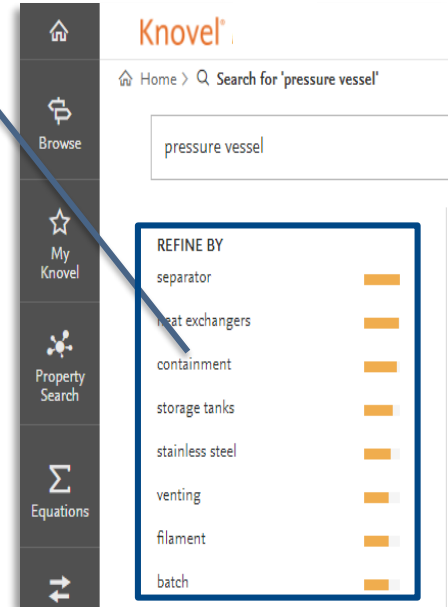
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通过理解工程语言的专用智能搜索对材料或物质进行搜索，例如"H2O"或"水"

搜索并找到特定材料的属性或找到满足特定属性的材料

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将最常需要的内容、笔记和数据保存到"我的Knovel"中
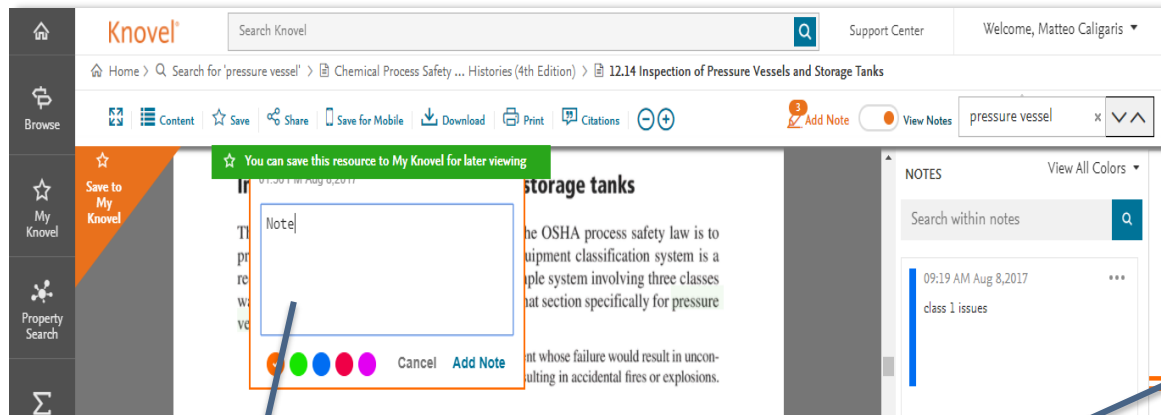
阅读、注释、保存和分享内容

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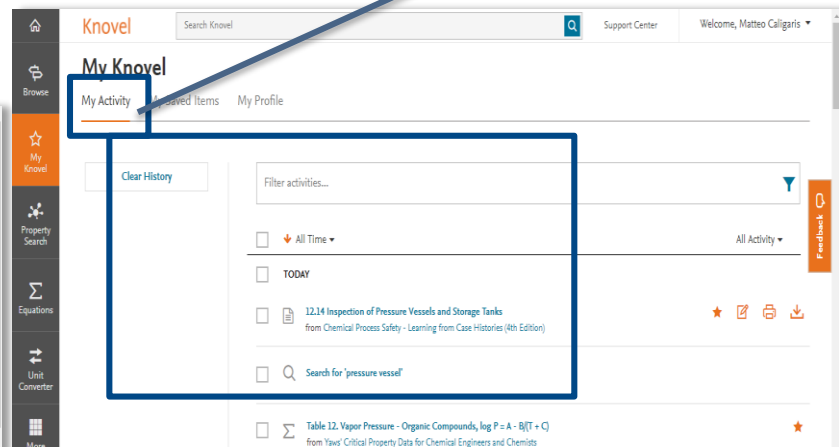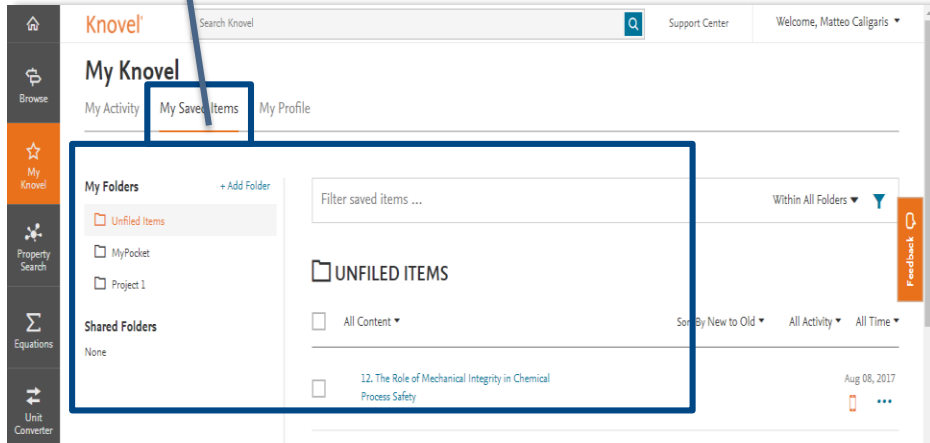
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即刻访问：即刻开始使用Knovel，无需等待电子邮件确认**

为什么注册?

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保存搜索和活动，节省时间

移动访问：
通过适用于智能手机和平板电脑（iOS/安卓）的My Knovel To Go应用程序在路上访问内容

做笔记：
对内容进行注释，方便回顾、搜索和分享

**注：用户注册后可以即刻访问Knovel，可以在获得访问权限后的两天内完成电子邮件注册

教师在准备课程教案时总是需要更新内容，保证与时俱进
例如：准备向同学介绍关于'机器学习'的相关内容时，教师往往需要阅读大量中外文的书籍、综述类文献，准备最紧跟时代的教案；并且希望启发同学的自主阅读和查找文献的习惯
英文关键词：machine learning

Knovel 为您提供与Ei数据库无缝链接的：参考书籍，相关章节，会议文章，教学案例和书籍中提取定义

提供书籍PDF格式全文-基础知识

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Machine Learning   ✕ 🔍   ⊷ Share Search Results | ☆ Save Search Query | ▷ Video

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> 2. Important Elements in Machine Learning
> 3. Feature Selection and Feature Engineering
> 4. Linear Regression
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...Machine learning Machine intelligence Machine consciousness Before getting into the details of each stage of AI, refer to Figure 9.4: Figure 9.4: Stages of AI (Image credit: https://cdn-images-1.medium.com/max/1600/0*aefkt8m-V66Wf5-j.png)... More ∨

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From Cognitive Radio Engineering (2016)

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"Table of Contents"

1

A Gentle Introduction to Machine Learning

In the last few years, machine learning has become one of the most important and prolific IT and artificial intelligence branches. It's not surprising that its applications are becoming more widespread day by day in every business sector, always with new and more powerful tools and results. Open source, production-ready frameworks, together with hundreds of papers published every month, are contributing to one of the most pervasive democratization processes in IT history. But why is machine learning so important and valuable?

Introduction - classic and adaptive machines

Since time immemorial, human beings have built tools and machines to simplify their work

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[CONFERENCE PROCEEDING] Prediction of Process Window for Plastic Injection Molding Using Simulation Tools and a Support Vector Machines Classifier

...comparison of supervised learning algorithms, in Proceedings of the 23rd international conference on Machine learning , ACM: Pittsburgh, Pennsylvania. 161-168 (2006). 11. P. Zhao, H. Zhou, Y. Li, and D. Li,... More ⌄

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[CONFERENCE PROCEEDING] A Study of Using Internet Technology to Improve Learning Efficiency of Learning Injection Molding Technology

...of polymer materials; (4) structure of injection mold and (5) shooting trouble solving. And avoiding operate the real machine , we designed the virtual reality machine of injection molding... More ⌄

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[CONFERENCE PROCEEDING] Challenges in Teaching E-Learning Courses for Plastics Engineering Technology

...mechanisms, technology courses can be effectively offered to students in an online setting. There a themselves to an online format, such as those that contain lab sections, but some labs or portions o

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Learning Efficiency Test

The main propose of learning efficiency test is to prove whether the system has learning efficiency. The learners fill in the basic information for them, and proceeding the pre-test quiz. At the same time, LMS would record these information in the database.

After that, the learners proceed the learning about the courses of injection molding. After the learners learning the courses, the learning system would be shown the post-test quiz.

Discussion

From the experiments of the learning efficiency test, we used the paired samples t-test and independent samples t-test to analyze the results of the experiment through the SPSS software. The results have two parts: the paired samples t-test, and the independent samples t-test. About the results, we designed that all learners is "ALL", the learner that learned the correlation courses is "Y", and the learner that never learned the correlation courses is "N".

Paired Samples T-Test

According to table 2, we could get the result that t-value is -14.182 and p-value was smaller than 0.05. From fig.10, the mean score of the "ALL" had an increasing trend. Through the e-learning system learning, the mean score of pre-test and post-test was statistically significant ($p = 0.000$), indicating that the knowledge of the e-learning system had a significant effect on the learning of these learners.

Table2. Paired samples t-test for "ALL"

Through the paired samples t-test for "Y" group, we can get the result that the mean score of pre-test and post-test for Y group was statistically significant ($p = 0.000$), is shown in table3. The knowledge of the e-learning system had a significant effect on the learners of "Y" group. The mean score of post-test was clearly higher than the mean score of pre-test, is shown in fig.11.

Table 3. Paired samples t-test for "Y" group

	Sample	Mean Score	Standard Deviation	t-value	p-value
Pre-Test	17	37.06	17.946	-8.468	*0.000
Post-Test	17	80.59	14.349		

Figure11. Variation of mean score for "Y" group

For the learners of "N" group, through the paired samples t-test, indicating the knowledge of the learning system had a significant effect on the learning of these

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[ENCYCLOPEDIA] Machine Learning Approach

From International Encyclopedia of Ergonomics and Human Factors, Volume 1 (2nd Edition) (2006)

...MACHINE LEARNING APPROACH Machine learning refers to algorithms that automatically learn (i.e. set tuning parameters) based on experience or training data. Two very popular methods in the area of machine learning are decision trees and artificial neural networks. When compared to the methods of statistical approach, these two can be characterized as model... Less ⋀

[ENCYCLOPEDIA] BN Learning

From Encyclopedia of Statistics in Quality and Reliability, Volumes 1-4 (2007)

..., known as structural EM, that presumably converges to a local maximum of the BIC score [7, 13]. Probabilistic Models It is well known that classic machine learning methods like Hidden Markov mo and Kalman filters can be considered as special cases of BNs [4, 13] Specific types of BN models we

as solving the classification, regression, and clustering problems, even though there are other categories of tasks that the data mining methods can be applied to: summarization of data and deviation detection; problem-solving, and knowledge-engineering tasks (Moustakis et al. 1996).

It is difficult to draw the precise boundaries of data mining because it is basically interdisciplinary, reaching into statistics, database technology, machine learning, pattern recognition, artificial intelligence, visualization, and other knowledge discovery techniques. In later sections, some of the major data mining methods are reviewed from the machine learning and statistical approaches.

3 MACHINE LEARNING APPROACH

Machine learning refers to algorithms that automatically learn (i.e. set tuning parameters) based on experience or training data. Two very popular methods in the area of machine learning are decision trees and artificial neural networks. When compared to the methods of statistical approach, these two can be characterized as model (or distribution)-free methods. However, even though decision trees and artificial neural networks are known as the methods of machine learning, some of those methods were also developed as statistical methods.

3.1 DECISION TREES

Decision trees represent the decision rules, which partition the data (or the feature space) into a set of groups (or a set of rectangles) with hierarchical and sequential structures. A decision tree is said to perform classification or regression according to the types of the class labels (i.e. categories or dependent variables). Decision trees are called classification

instability of trees, and inadequate crisp decisions, several new methods, such as soft splits, bagging, and boosting, are introduced to decision tree research.

Even though decision trees have some limitations, it is still an attractive and powerful method. Gehrke (2003) summarized the major advantages of decision trees. First, decision trees are easy to understand because they were inspired by the human decision processes. Second, decision trees are nonparametric and thus especially suited for exploratory knowledge discovery. Third, decision trees can be constructed relatively fast compared to other data mining methods. Fourth, the accuracy of decision trees is comparable to other classification models.

3.2 ARTIFICIAL NEURAL NETWORKS

An artificial neural network is a computational model that consists of a network structure, and learning and recall procedures. Tsoukalas and Uhrig (1997) defined an artificial neural network as "a data processing system consisting of a large number of simple, highly interconnected processing elements (artificial neurons) in an architecture inspired by the structure of the cerebral cortex of the brain." These processing elements (or neurons) usually belong to three kinds of layers — an input layer, one or more hidden layers, or an output layer — and are interconnected as a feedforward network structure, in which neurons in a given layer have no lateral connections with each other and no connection back to the previous layers. The connection weights are unknown parameters, which are estimated by a training method. The most popular training method is backpropagation, which repeatedly distributes training errors from output neurons proportionally back to their connection weights until training error reaches a given threshold.

场景二：数值检索 – 数秒定位查询答案（独家）

数值检索

仅添加一条光学属性
的条件检索

鼠标拖动"intensity"至空白处，

检索结果数秒精简到2
条，急速提高效率

互动表格

x-axis label	y-axis label	graph title	text	graph digitizer
Wave number, v (cm^{-1})	Loss α (dB/km) bottom	FIGURE 1 Absorption spectra of silica glass. Dotted curves: model absorption spectra calculated to reproduce the measured refractive index curve; solid curves: measured absorption spectra; broken line: Rayleigh scattering and loss spectrum of a low loss pure silica core single-mode fibre.	*view text*	
Energy, E (eV)	Loss α (dB/km) top	FIGURE 1 Absorption spectra of silica glass. Dotted curves: model absorption spectra calculated to reproduce the measured refractive index curve; solid curves: measured absorption spectra; broken line: Rayleigh scattering and loss spectrum of a low loss pure silica core single-mode fibre.	*view text*	
Wavelength (μm)		FIGURE 1 Dispersion behaviour of silica at room temperature from 0.5 to 2.3 μm.	*view text*	
		FIGURE 1 Temperature dependence of viscosity for silica glasses		

光纤相关属性数值

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结果输出

结果导出Excel表格，可以分享或直接用于论文，文献自动生成 – 方便快捷
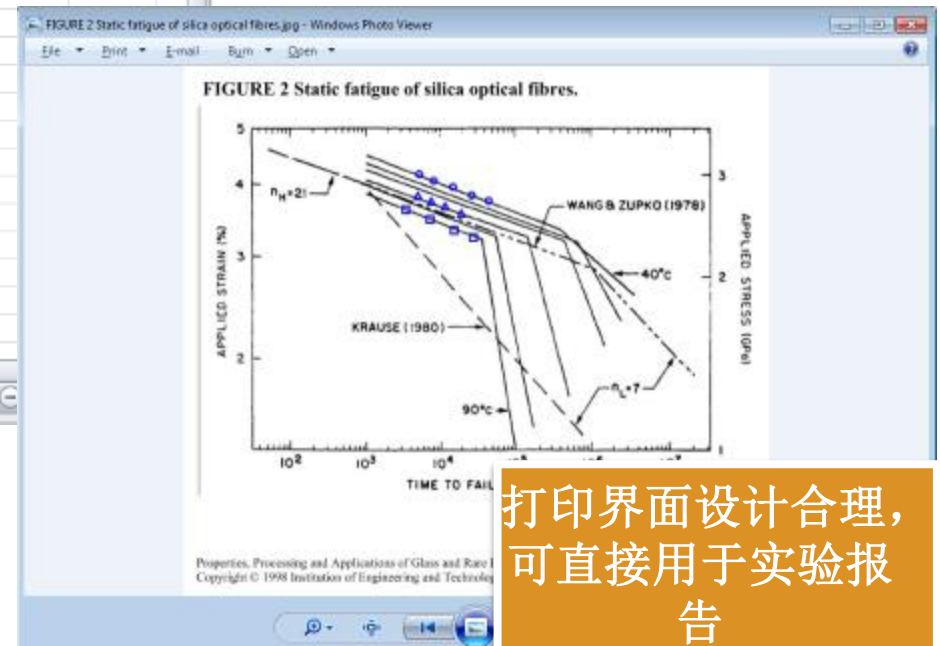
打印界面设计合理，可直接用于实验报告

场景三：互动方程式（工程计算可以如此简单）

云计算的互动方程式

K Knovel® *Equation Solver*

KNOVEL SEARCH SHARE

WORKSHEET EDIT CALCULATE INSERT UNITS

Density of Steam ... Density of Steam ...
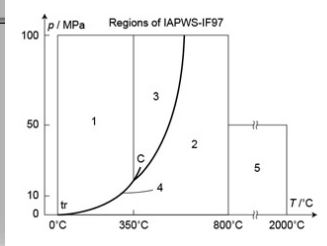
Density of Steam (Region 2 of the IAPWS-IF97 Formulation) as a Function of Pressure and Specific Entropy

The function wspD2PS defined in the collapsible area below calculates the density of steam as a function of pressure and specific entropy as specified for Region 2 of the Revised Release of the IAPWS Industrial Formulation 1997 for the Thermodynamic Properties of Water and/or Steam. The equations for steam temperature as a function of pressure and specific entropy for subregions of Region 2 of the IAPWS-IF97 is shown in the dimensionless form.

- Arithmetic
- Matrices
- Boolean
- *f* Functions
- Plot
- Programming
- αω Lowercase Greek
- AΩ Uppercase Greek

Regions of IAPWS-IF97

for the subregion 2a $\dfrac{T(p,s)}{1 \cdot K} = \theta(\pi, \sigma) = \sum_{i=1}^{46} \left[n_i \cdot pi^{I_i} \cdot (\sigma - 2)^{J_i} \right]$

for the subregion 2b $\dfrac{T(p,s)}{1 \cdot K} = \theta(\pi, \sigma) = \sum_{i=1}^{44} \left[n_i \cdot pi^{I_i} \cdot (10 - \sigma)^{J_i} \right]$

for the subregion 2c $\dfrac{T(p,s)}{1 \cdot K} = \theta(\pi, \sigma) = \sum_{i=1}^{30} \left[n_i \cdot pi^{I_i} \cdot (2 - \sigma)^{J_i} \right]$

Legend with variables and units

p   is the pressure of steam   MPa

π   is the dimensionless pressure of steam $\pi = \dfrac{p}{1 \cdot MPa}$ dimensionless

s   is the specific entropy of steam $\dfrac{kJ}{kg\ K}$

σ   is the dimensionless specific entropy   dimensionless

p   is the pressure of steam   MPa

π   is the dimensionless pressure of steam $\pi = \dfrac{p}{1 \cdot MPa}$ dimensionless

s   is the specific entropy of steam $\dfrac{kJ}{kg\ K}$

σ   is the dimensionless specific entropy   dimensionless

for the subregion 2a $\sigma = \dfrac{s}{2 \frac{kJ}{kg\ K}}$

for the subregion 2b $\sigma = \dfrac{s}{0.7853 \frac{kJ}{kg\ K}}$

for the subregion 2c $\sigma = \dfrac{s}{2.9251 \frac{kJ}{kg\ K}}$

T   is the temperature of steam   °C
θ   is the dimensionless temperature $\theta = \dfrac{T}{1\ K}$ dimensionless

n, I and J are the coefficients   dimensionless
(see the function below)

直接填数计算或编辑公式，让方程式成为工程师们日常必不可缺的工具

谢谢！