{{NoteTA|G1=化學}}

{{Elementbox

| number=54 | symbol=Xe | name=氙 | left=[[碘]] | right=[[铯]]

| pronounce={{IPAc-en|ˈ|z|ɛ|n|ɒ|n}} {{respell|ZEN|on}}<ref>

{{cite dictionary

|editor1-last=Simpson |editor1-first=J. A.

|editor2-last=Weiner |editor2-first=E. S. C.

|year=1989

|title=Xenon

|encyclopedia=[[Oxford English Dictionary]]

|edition=2nd

|volume=20

|publisher=[[Clarendon Press]]

|isbn=0-19-861232-X

}}</ref> <br />or {{IPAc-en|ˈ|z|iː|n|ɒ|n}} {{respell|ZEE|non}}<ref>

{{cite web

|url=http://dictionary.reference.com/browse/xenon

|title=Xenon

|year=2010

|work=Dictionary.com Unabridged

|accessdate=2010-05-06

}}</ref>

| above=[[氪]] |below=[[氡]]

| series=稀有气体

| group=18 | period=5 | block=p

|series color=c0ffff

|phase color=

| appearance=无色气体，在高压放电管中呈现蓝色

|image name=Xenon discharge tube.jpg

|image comment=裝有淺藍色發光氣體的玻璃管

|image name 2=Xenon Spectrum.jpg

|image name 2 comment=氙的光谱线

|atomic mass=131.293(6)

|electron configuration=&#91;[[氪]]&#93; 5s<sup>2</sup> 4d<sup>10</sup> 5p<sup>6</sup>

|electrons per shell= 2, 8, 18, 18, 8

|phase=气态

|density gplstp=5.894

|density gpcm3bp=3.057<ref>

{{cite web

|url=http://encyclopedia.airliquide.com/Encyclopedia.asp?LanguageID=11&GasID=40

|title=Krypton

|work=Gas Encyclopedia

|publisher=[[Air Liquide]]

|year=2009

}}</ref>

|melting point K=161.4

|melting point C=-111.7

|melting point F=-169.1

|melting point pressure=101.325&nbsp;kPa

|boiling point K=165.03

|boiling point C=-108.12

|boiling point F=-162.62

|boiling point pressure=101.325&nbsp;kPa

|triple point K=161.405

|triple point kPa=81.6<ref>Section 4 "Properties of the Elements and Inorganic Compounds; Melting,

boiling, triple, and critical temperatures of the elements" in {{RubberBible86th}}</ref>

|critical point K=289.77

|critical point MPa=5.841

|heat fusion= 2.27

|heat fusion pressure=101.325 kPa

|heat vaporization= 12.64

|heat vaporization pressure=101.325 kPa

|heat capacity=5[[气体常数|R]]/2 = 20.786

|vapor pressure 1=83

|vapor pressure 10= 92

|vapor pressure 100= 103

|vapor pressure 1 k= 117

|vapor pressure 10 k= 137

|vapor pressure 100 k= 165

|vapor pressure comment=

|crystal structure= 面心立方

|oxidation states= '''0''', +1, +2, +4, +6, +8

|oxidation states comment=很少大于0）<br />（氧化物具弱酸性

|electronegativity=2.6

|number of ionization energies=3

|1st ionization energy=1170.4

|2nd ionization energy=2046.4

|3rd ionization energy=3099.4

|covalent radius=140±9

|Van der Waals radius=216

|magnetic ordering=[[抗磁性]]<ref>[http://www-d0.fnal.gov/hardware/cal/lvps\_info/engineering/elementmagn.pdf Magnetic susceptibility of the elements and inorganic compounds], in {{RubberBible86th}}</ref>

|thermal conductivity= 5.65×10<sup>-3</sup>&nbsp;

|speed of sound=（液态）1090 m/s；（气态）169

|CAS number=7440-63-3

|isotopes=

{{Elementbox\_isotopes\_decay | mn=124 | sym=Xe | na=0.095% | hl=>4.8×10<sup>16</sup>&nbsp;[[年]] | dm=[[双重β衰变|β<sup>+</sup>β<sup>+</sup>]] | de=0.825 | pn=124 | ps=[[碲|Te]] }}

{{Elementbox\_isotopes\_decay | mn=125 | sym=Xe

| na=[[放射性同位素|人造]] | hl=16.9&nbsp;小时

| dm=[[电子捕获|ε]] | de=1.652 | pn=125 | ps=[[碘|I]] }}

{{Elementbox\_isotopes\_stable | mn=126 | sym=Xe | na=0.089% | n=72 }}

{{Elementbox\_isotopes\_decay | mn=127 | sym=Xe

| na=[[放射性同位素|人造]] | hl=36.345&nbsp;[[天]]

| dm=[[电子捕获|ε]] | de=0.662 | pn=127 | ps=[[碘|I]] }}

{{Elementbox\_isotopes\_stable | mn=128 | sym=Xe | na=1.91% | n=74 }}

{{Elementbox\_isotopes\_stable | mn=129 | sym=Xe | na=26.4% | n=75 }}

{{Elementbox\_isotopes\_stable | mn=130 | sym=Xe | na=4.07% | n=76 }}

{{Elementbox\_isotopes\_stable | mn=131 | sym=Xe | na=21.2% | n=77 }}

{{Elementbox\_isotopes\_stable | mn=132 | sym=Xe | na=26.9% | n=78 }}

{{Elementbox\_isotopes\_decay | mn=133 | sym=Xe

| na=[[放射性同位素|人造]] | hl=5.247&nbsp;[[天]]

| dm=[[β衰变|β<sup>−</sup>]] | de=0.427 | pn=133 | ps=[[铯|Cs]] }}

{{Elementbox\_isotopes\_decay | mn=134 | sym=Xe | na=10.4% | hl=>1.1×10<sup>16</sup>&nbsp;[[年]] | dm=[[双重β衰变|β<sup>−</sup>β<sup>−</sup>]] | de=2.864 | pn=134 | ps=[[钡|Ba]] }}

{{Elementbox\_isotopes\_decay | mn=135 | sym=Xe

| na=[[放射性同位素|人造]] | hl=9.14&nbsp;[[小时]]

| dm=[[β衰变|β<sup>−</sup>]] | de=1.16 | pn=135 | ps=[[铯|Cs]]}}

{{Elementbox\_isotopes\_decay | mn=136 | sym=Xe | na=8.86% |hl = 2.11×10<sup>21</sup>&nbsp;[[年]]<ref name="EXO">

{{cite journal

|last=Ackerman |first=N.

|coauthors=''et.al''

|year=2011

|title=Observation of Two-Neutrino Double-Beta Decay in <sup>136</sup>Xe with the EXO-200 Detector

|journal=[[Physical Review Letters]]

|volume=107 |issue=21 |page=212501

|doi=10.1103/PhysRevLett.107.212501

|bibcode = 2011PhRvL.107u2501A }}</ref> |dm = [[双重β衰变|β<sup>−</sup>β<sup>−</sup>]]|de = 2.45783<ref>{{cite journal|doi=10.1103/PhysRevLett.98.053003}}</ref> | pn = 136| ps =[[钡|Ba]] }}

|discovered by=[[威廉·拉姆齊]]和莫里斯·特拉弗斯

|discovery date=1898

|first isolation by=威廉·拉姆齊和莫里斯·特拉弗斯

|first isolation date=1898

}}

'''氙'''（舊譯作'''氠'''、'''氥'''）是一種[[化學元素]]，[[化學符號]]為'''Xe'''，[[原子序]]為54。氙是一種無色、無味的[[稀有氣體]]。[[地球大氣層]]中含有痕量的氙。 <ref>{{cite web

|author=Staff|year=2007

|url=http://www.infoplease.com/ce6/sci/A0852881.html

|title=Xenon|work=Columbia Electronic Encyclopedia

|edition=6th|publisher=Columbia University Press

|accessdate=2007-10-23}}</ref>雖然氙的化學活性很低，但是它仍然能夠進行[[化學反應]]，例如形成[[六氟合鉑酸氙]]──首個被合成的[[稀有氣體化合物]]。<ref name="lanl">{{cite web

|author=Husted, Robert; Boorman, Mollie

|date=December 15, 2003

|url=http://periodic.lanl.gov/54.shtml|title=Xenon

|publisher=Los Alamos National Laboratory, Chemical Division

|accessdate=2007-09-26

}}</ref><ref>{{cite book

|last=Rabinovich|first=Viktor Abramovich

|coauthors=Vasserman, A. A.; Nedostup, V. I.; Veksler, L. S.|title=Thermophysical properties of neon, argon, krypton, and xenon|year=1988|edition=English-language

|publisher=Hemisphere Publishing Corp.

|location=Washington, DC|isbn=0-89116-675-0

|url=http://adsabs.harvard.edu/abs/1988wdch...10.....R

|accessdate=2009-04-02}}—National Standard Reference Data Service of the USSR. Volume 10.</ref><ref name="beautiful" />

自然產生的氙由[[氙的同位素|8種穩定同位素]]組成。氙還有40多種能夠進行[[放射性衰變]]的不穩定同位素。氙同位素的相對比例對研究[[太陽系]]早期歷史有重要的作用。<ref name="kaneoka" />具放射性的[[氙-135]]是[[核反應爐]]中最重要的[[中子吸收劑]]，可通過[[碘-135]]的[[核裂變]]產生。<ref name="stacey" />

氙可用在[[氙閃光燈|閃光燈]]<ref name="burke" />和[[氙弧燈|弧燈]]中，<ref name="mellor" />或作[[全身麻醉藥]]。<ref name="Sanders">{{cite journal

|author=Sanders, Robert D.; Ma, Daqing; Maze, Mervyn

|title=Xenon: elemental anaesthesia in clinical practice

|journal=British Medical Bulletin

|year=2005|volume=71|issue=1|pages=115–35

|doi=10.1093/bmb/ldh034

|pmid=15728132}}</ref>最早的[[准分子激光]]設計以氙的[[二聚體]]分子（Xe<sub>2</sub>）作為激光介質，<ref name="basov" />而早期[[激光]]設計亦用氙閃光燈作激光抽運。<ref name="toyserkani" />氙還可以用來尋找[[大質量弱相互作用粒子]]<ref name="ball" />，或作[[航天器]][[離子推力器]]的[[推進劑]]。<ref name="saccoccia" />

==歷史==

[[英國]]化學家[[威廉·拉姆齊]]和[[莫里斯·特拉弗斯]]在發現了[[氪]]和[[氖]]後，於1898年7月12日在蒸發液態空氣後的殘留物中發現了氙。<ref>{{cite journal

|author=Ramsay, W.; Travers, M. W.

|title=On the extraction from air of the companions of argon, and neon|journal=Report of the Meeting of the British Association for the Advancement of Science

|year=1898|page=828}}</ref><ref>{{cite web

|url=http://education.jlab.org/itselemental/ele054.html

|title=It's Elemental – Xenon|accessdate=2007-06-16

|last=Gagnon|first=Steve|publisher=Thomas Jefferson National Accelerator Facility}}</ref>拉姆齊建議把這一新元素命名為「xenon」，源自[[希臘語]]「ξένον」（xenon），即「ξένος」（xenos）的中性單數形，意為外來者、陌生人或異客。<ref>{{cite book

|author=Anonymous|editor=Daniel Coit Gilman, Harry Thurston Peck, Frank Moore Colby

|year=1904|title=The New International Encyclopædia

|publisher=Dodd, Mead and Company|page=906

}}</ref><ref>{{cite book

|author=Staff|year=1991|url=http://books.google.com/?id=IrcZEZ1bOJsC&pg=PA513

|title=The Merriam-Webster New Book of Word Histories

|page=513|publisher=Merriam-Webster, Inc.

|isbn=0-87779-603-3}}</ref>1902年，拉姆齊估算氙在地球大氣中的含量為2千萬分之一。<ref>{{cite journal

|last=Ramsay|first=William

|title=An Attempt to Estimate the Relative Amounts of Krypton and of Xenon in Atmospheric Air

|journal=Proceedings of the Royal Society of London

|year=1902|volume=71

|issue=467–476|pages=421–426

|doi=10.1098/rspl.1902.0121}}</ref>

1930年代，[[美國]]工程師[[哈羅德·尤金·艾杰頓]]（Harold Eugene Edgerton）開始為[[高速攝影]]研究[[頻閃燈]]，并發明了[[氙閃光燈]]。在氙閃光燈中，電流短暫通過含有氙氣的玻璃管，使其發光。到了1934年，艾杰頓已經能夠產生1[[微秒]]長的閃光。<ref name="burke" /><ref>{{cite web

|author=Anonymous|title=History

|url=http://www.millisecond-cine.com/history.html

|archiveurl=http://web.archive.org/web/20060822141910/http://www.millisecond-cine.com/history.html

|archivedate=2006-08-22

|publisher=Millisecond Cinematography

|accessdate=2007-11-07

}}</ref><ref>{{cite web

|last=Paschotta|first=Rüdiger

|date=November 1, 2007

|url=http://www.rp-photonics.com/lamp\_pumped\_lasers.html

|title=Lamp-pumped lasers

|work=Encyclopedia of Laser Physics and Technology

|publisher=RP Photonics|accessdate=2007-11-07}}</ref>

1939年，美國醫生[[阿爾伯特·本克]]（Albert R. Behnke Jr.）著手研究深海潛水員有「酒醉感」的原因。他在測試對象所呼吸的氣體中調整各種氣體的比例，并發現潛水員對深度的感覺有所變化。他以此推論，氙氣能夠用於[[麻醉]]。[[俄羅斯]]毒理學家尼克拉·拉薩列夫（Nikolay V. Lazarev）曾在1941年研究過氙麻醉藥，但直到1946年美國醫學家約翰·勞倫斯（John H. Lawrence）才發表了他對老鼠進行的一項實驗研究，首次證實了氙作為麻醉藥的效用。1951年，美國麻醉師斯圖爾特·科林（Stuart C. Cullen）第一次使用氙麻醉藥，并成功為兩名病人進行了手術。<ref>{{cite journal

|author=Marx, Thomas; Schmidt, Michael; Schirmer, Uwe; Reinelt, Helmut|title=Xenon anesthesia

|journal=Journal of the Royal Society of Medicine

|year=2000|volume=93|pages=513–7

|url=http://www.jrsm.org/cgi/reprint/93/10/513.pdf

|accessdate=2007-10-02 |format=PDF

|pmid=11064688|issue=10|pmc=1298124}}</ref>

氙以及其他稀有氣體曾一直被認為是完全惰性的，無法形成[[化合物]]。不過，化學家[[尼爾·巴特萊特]]（Neil Bartlett）在[[不列顛哥倫比亞大學]]任教時，發現[[六氟化鉑]]（PtF<sub>6</sub>）氣體是一種強[[氧化劑]]，能夠氧化[[氧氣]]（O<sub>2</sub>），形成[[六氟合鉑酸氧]]（O<sub>2</sub><sup>+</sup>[PtF<sub>6</sub>]<sup>–</sup>）。<ref>{{cite journal|title=Dioxygenyl hexafluoroplatinate (V), O<sub>2</sub><sup>+</sup>[PtF<sub>6</sub>]<sup>–</sup>

|author=Bartlett, Neil; Lohmann, D. H.

|journal=Proceedings of the Chemical Society

|publisher=Chemical Society|location=London

|issue=3|page=115|year=1962

|doi = 10.1039/PS9620000097}}</ref>因為O<sub>2</sub>和氙的第一[[電離能]]幾乎相同，所以巴特萊特猜想，氙也有可能可以被六氟化鉑氧化。1962年3月23日，他將這兩種氣體混合，產生了第一種稀有氣體化合物[[六氟合鉑酸氙]]。<ref name="bartlettxe">{{cite journal

|title=Xenon hexafluoroplatinate (V) Xe<sup>+</sup>[PtF<sub>6</sub>]<sup>–</sup>|author=Bartlett, N.

|journal=Proceedings of the Chemical Society

|publisher=Chemical Society|location=London

|issue=6|page=218|year=1962

|doi=10.1039/PS9620000197}}</ref><ref name="beautiful">{{cite web|url=http://www.chem.umn.edu/class/2301/barany03f/fun/beautiful1.pdf

|title=Chemistry at its Most Beautiful

|accessdate=2007-09-13|last=Freemantel|first=Michael

|date=August 25, 2003|format=PDF

|publisher=Chemical & Engineering News}}</ref>他當時認為該氣體產物為Xe<sup>+</sup>[PtF<sub>6</sub>]<sup>–</sup>，但之後的分析表明該氣體很可能是多種氙鹽的混合物。<ref name="grahm">{{cite journal

|last=Graham|first=L.|year=2000

|coauthors=Graudejus, O.; Jha N.K.; Bartlett, N.

|title=Concerning the nature of XePtF<sub>6</sub>

|journal=Coordination Chemistry Reviews|volume = 197

|issue=1

|pages=321–334|doi=10.1016/S0010-8545(99)00190-3}}</ref><ref>{{cite book

|first=A. F.|last=Holleman|coauthors=Wiberg, Egon

|editors=Bernhard J. Aylett|year=2001

|others=translated by Mary Eagleson and William Brewer

|title=Inorganic Chemistry|location=San Diego

|publisher=Academic Press|isbn=0-12-352651-5}}; translation of ''Lehrbuch der Anorganischen Chemie'', originally founded by A. F. Holleman, [http://books.google.com/books?id=vEwj1WZKThEC&pg=PA395 continued by Egon Wiberg], edited by Nils Wiberg, Berlin: de Gruyter, 1995, 34th edition, ISBN 3-11-012641-9.</ref><ref>{{cite web

|last=Steel|first=Joanna|year=2007

|url=http://chemistry.berkeley.edu/publications/news/2006/bio\_bartlett.php

|title=Biography of Neil Bartlett

|publisher=College of Chemistry, University of California, Berkeley|accessdate=2007-10-25}}</ref>此後，許多其他的氙化合物也陸續被發現，<ref>{{cite journal

|last=Bartlett|first=Neil|date=2003-09-09

|url=http://pubs.acs.org/cen/80th/noblegases.html

|title=The Noble Gases|journal=Chemical & Engineering News

|volume=81|issue=36|publisher=American Chemical Society

|accessdate=2007-10-01}}</ref>而同時被發現的還包括[[氬]]、[[氪]]和[[氡]]等稀有氣體的化合物，如[[氟氬化氫]]（HArF）、<ref>{{cite journal

|first=Leonid|last=Khriachtchev|coauthors=Pettersson, Mika; Runeberg, Nino; Lundell, Jan; Räsänen, Markku

|date =2000-08-24|title = A stable argon compound

|journal = Nature|volume = 406|pages = 874–6

|doi = 10.1038/35022551|url = http://www.nature.com/nature/journal/v406/n6798/abs/406874a0.html|accessdate=2008-06-04

|pmid=10972285|issue=6798}}</ref>[[二氟化氪]]（KrF<sub>2</sub>）<ref>{{cite book

|author=Lynch, C. T.; Summitt, R.; Sliker, A.

|year=1980|title=CRC Handbook of Materials Science

|publisher=CRC Press|isbn=0-87819-231-X}}</ref><ref>{{cite journal

|title=Krypton Difluoride: Preparation and Handling

|author=MacKenzie, D. R.|year=1963|journal=Science

|volume=141|issue=3586|page=1171

|doi=10.1126/science.141.3586.1171|pmid=17751791|bibcode = 1963Sci...141.1171M }}</ref>及[[二氟化氡]]。<ref>{{cite journal

|author=Paul R. Fields, Lawrence Stein, and Moshe H. Zirin

|title=Radon Fluoride

|journal=Journal of the American Chemical Society

|year=1962|volume=84|issue=21|pages=4164–4165

|doi=10.1021/ja00880a048}}</ref>到了1971年，已知的氙化合物已經超過了80種。<ref name="CRC">{{cite web

|url=http://www.chemnetbase.com/periodic\_table/elements/xenon.htm|title=Xenon|work=Periodic Table Online

|publisher=CRC Press|accessdate=2007-10-08| archiveurl = http://web.archive.org/web/20070410040717/http://chemnetbase.com/periodic\_table/elements/xenon.htm| archivedate = April 10, 2007}}</ref><ref>{{cite journal|last=Moody|first=G. J.

|title=A Decade of Xenon Chemistry

|journal=Journal of Chemical Education|year=1974|volume=51|issue=10

|pages=628–630|url=http://www.eric.ed.gov/ERICWebPortal/recordDetail?accno=EJ111480|accessdate=2007-10-16

|doi=10.1021/ed051p628|bibcode = 1974JChEd..51..628M }}</ref>

==特性==

[[Image:Xenon-flash.jpg|frame|left|[[氙閃光燈]]（[[:Image:Xenon-flash.gif|可動圖像版]]）]]

氙的[[原子序]]為54，即氙原子核中共有54顆[[質子]]。在[[標準溫度和壓力]]下，純氙氣的密度為5.761&nbsp;kg/m<sup>3</sup>，也就是地球地面大氣密度（1.217&nbsp;kg/m<sup>3</sup>）的4.5倍左右。<ref>{{cite web

|last=Williams|first=David R.|date=April 19, 2007

|url=http://nssdc.gsfc.nasa.gov/planetary/factsheet/earthfact.html|title=Earth Fact Sheet|publisher=NASA

|accessdate=2007-10-04}}</ref>當處於液態時，氙的密度可高達3.100&nbsp;g/mL，最高密度在[[三相點]]處達到。<ref name="detectors">{{cite book|first=Elena|last=Aprile|coauthors=Bolotnikov, Aleksey E.; Doke, Tadayoshi

|title=Noble Gas Detectors|publisher=Wiley-VCH|year=2006

|isbn=3-527-60963-6|url=http://books.google.com/?id=tsnHM8x6cHAC&pg=PT1|pages=8–9}}</ref>固態氙的密度為3.640&nbsp;g/cm<sup>3</sup>，比[[花崗岩]]的2.75&nbsp;g/cm<sup>3</sup>更高。<ref name="detectors" />當[[壓力]]超過10億[[帕斯卡]]時，氙會呈金屬態。<ref>{{cite journal

|last=Caldwell|first=W. A.|year=1997|coauthors=Nguyen, J.; Pfrommer, B.; Louie, S.; Jeanloz, R.

|title = Structure, bonding and geochemistry of xenon at high pressures

|journal=Science|volume=277

|issue=5328|pages=930–933

|doi=10.1126/science.277.5328.930}}</ref>

在大約140&nbsp;GPa壓力下，固體氙的晶體結構會從[[面心立方]]轉變為[[六方密排]]，并開始呈現金屬特性。氙在155&nbsp;GPa壓力以上完全進入金屬態。這時候的氙會吸收紅光，因此會呈天藍色。這一特性在金屬中較為罕見，原因是氙在金屬態下的電子能帶寬度較小。<ref>{{cite web|first=E.|last=Fontes

|title=Golden Anniversary for Founder of High-pressure Program at CHESS|publisher=Cornell University

|url=http://news.chess.cornell.edu/articles/2006/RuoffAnnv.html|accessdate=2009-05-30}}</ref><ref>{{cite journal

|author=Eremets, Mikhail I.; Gregoryanz, Eugene A.; Struzhkin, Victor V.; Mao, Ho-Kwang; Hemley, Russell J.; Mulders, Norbert; Zimmerman, Neil M.|title=Electrical Conductivity of Xenon at Megabar Pressures

|journal=Physical Review Letters|volume=85

|issue=13|pages=2797–800|year=2000

|doi=10.1103/PhysRevLett.85.2797|pmid=10991236 |bibcode=2000PhRvL..85.2797E}}</ref>

氙的[[化合價]]為0，與其他零價元素同屬於[[稀有氣體]]，亦稱惰性氣體。氙對大部份化學反應都呈惰性（如燃燒反應），因為它有8個[[價電子]]。這使外層電子處於最低能量組態，因此非常穩定。<ref>{{cite web

|last=Bader|first=Richard F. W.

|url=http://miranda.chemistry.mcmaster.ca/esam/

|title=An Introduction to the Electronic Structure of Atoms and Molecules

|publisher=McMaster University|accessdate=2007-09-27}}</ref>但是，氙可以被強氧化劑[[氧化]]。迄今人們已合成了多種氙化合物。

當[[電弧]]通過裝有氙氣的玻璃管時，氙會被激發而發出藍至淡紫色光。氙的發射[[譜線]]橫跨整個[[可見光譜]]，<ref>{{cite web

|last=Talbot|first=John|url=http://web.physik.rwth-aachen.de/~harm/aixphysik/atom/discharge/index1.html

|title=Spectra of Gas Discharges

|publisher=Rheinisch-Westfälische Technische Hochschule Aachen|accessdate=2006-08-10}}</ref>其最強的光譜線位於藍光部份，所以整體發藍光。<ref>{{cite book

|first=William Marshall|last=Watts|year=1904

|title=An Introduction to the Study of Spectrum Analysis

|publisher=Longmans, Green, and co.

|location=London}}</ref>

==存量及生產==

氙是[[地球大氣層]]中的一種微量氣體，含量約為10億分之87±1（nL/L），亦即1150萬分之一。<ref name="kirk">{{cite book

|last=Hwang|first=Shuen-Cheng

|coauthors=Robert D. Lein, Daniel A. Morgan

|chapter=Noble Gases

|title=Kirk-Othmer Encyclopedia of Chemical Technology

|publisher=Wiley|year=2005|edition=5th

|doi=10.1002/0471238961.0701190508230114.a01

|isbn=0-471-48511-X}}</ref>某些天然礦泉也會釋放出含有氙的氣體。

氙是空氣氮氧分離過程的副產品。這一過程一般在雙柱式分餾塔中進行，所產生的[[液氧]]中會含有少量的氪和氙。再進行更多的分餾步驟之後，液氧中的氪和氙含量可以提高至0.1至0.2%。這些氪和氙可以通過[[硅膠]]吸附或蒸餾提取出來，混合物再經蒸餾分離成氪和氙。<ref>{{cite book

|first=Frank G.|last=Kerry|year=2007

|title=Industrial Gas Handbook: Gas Separation and Purification|pages=101–103|publisher=CRC Press

|isbn=0-8493-9005-2|url=http://books.google.com/?id=cXNmyTTGbRIC&pg=PA101

}}</ref><ref>{{cite web

|url=http://www.c-f-c.com/specgas\_products/xenon.htm

|title=Xenon – Xe|accessdate=2007-09-07

|date=August 10, 1998|publisher=CFC StarTec LLC

}}</ref>從大氣層中提取一升氙氣需要220[[千瓦小時|瓦小時]]的能量。<ref name="singh">{{cite web

|last=Singh|first=Sanjay|date=May 15, 2005

|url=http://www.expresshealthcaremgmt.com/20050515/criticare10.shtml

|title=Xenon: A modern anaesthetic

|publisher=Indian Express Newspapers Limited

|accessdate=2007-10-10

|archiveurl=http://web.archive.org/web/20070813212536/http://www.expresshealthcaremgmt.com/20050515/criticare10.shtml <!--Added by H3llBot-->

|archivedate=2007-08-13}}</ref>1998年，全球氙產量為5千至7千&nbsp;m<sup>3</sup>。<ref name="ullmann">{{cite book

|last=Häussinger|first=Peter

|coauthors=Glatthaar, Reinhard; Rhode, Wilhelm; Kick, Helmut; Benkmann, Christian; Weber, Josef; Wunschel, Hans-Jörg; Stenke, Viktor; Leicht, Edith; Stenger, Hermann

|chapter=Noble Gases

|title=Ullmann's Encyclopedia of Industrial Chemistry

|publisher=Wiley|year=2001|edition=6th

|doi=10.1002/14356007.a17\_485|isbn=3-527-20165-3}}</ref>由於含量稀少，氙的價格比其他更輕的稀有氣體高許多：1999年歐洲的氙氣價格為每升10[[歐元]]，氪氣每升1歐元，氖氣每升0.20歐元，<ref name="ullmann" />而存量高得多的氬氣則更加便宜。

在[[太陽系]]以內，氙元素的[[核素]]比例為{{Nowrap|1.56 × 10<sup>−8</sup>}}，質量[[化學元素豐度|豐度]]為63萬分之一。<ref>{{cite book

|first=David|last=Arnett|year=1996

|title=Supernovae and Nucleosynthesis

|publisher=Princeton University Press

|location=Princeton, New Jersey

|isbn=0-691-01147-8|url=http://books.google.com/?id=PXGWGnPPo0gC&pg=PA30}}</ref>[[太陽]]大氣層、[[地球]]、[[小行星]]及[[彗星]]中的氙含量很低。[[木星]]大氣層含有異常高的氙元素，含量約為太陽的2.6倍。<ref name="mahaffy">{{cite journal

|last=Mahaffy|first=P. R.

|coauthors=Niemann, H. B.; Alpert, A.; Atreya, S. K.; Demick, J.; Donahue, T. M.; Harpold, D. N.; Owen, T. C.

|title=Noble gas abundance and isotope ratios in the atmosphere of Jupiter from the Galileo Probe Mass Spectrometer

|journal=Journal of Geophysical Research

|year=2000|volume=105|issue=E6|pages=15061–15072

|bibcode=2000JGR...10515061M

|doi = 10.1029/1999JE001224}}</ref><ref group="注">計算所用的太陽系平均原子質量為1.29 [[原子質量單位|amu]]。</ref>這一現象的原因不詳，但有可能是因為在[[太陽系的形成與演化|太陽系形成]]早期[[太陽星雲]]溫度提升之前，[[微行星]]迅速堆積所致。<ref>{{cite journal

|last=Owen|first=Tobias|coauthors=Mahaffy, Paul; Niemann, H. B.; Atreya, Sushil; Donahue, Thomas; Bar-Nun, Akiva; de Pater, Imke|title=A low-temperature origin for the planetesimals that formed Jupiter

|journal=Nature|year=1999|volume=402

|issue=6759|pages=269–70

|bibcode=1999Natur.402..269O|doi = 10.1038/46232

|pmid=10580497}}</ref>地球上的氙存量很低，這可能是由於氙和氧在[[石英]]中產生[[共價鍵]]，從而減少氙釋出大氣層的量。<ref>{{cite journal

|author=Sanloup, Chrystèle ''et al.''

|title=Retention of Xenon in Quartz and Earth's Missing Xenon|journal=Science|year=2005|volume=310

|issue=5751|pages=1174–7|doi=10.1126/science.1119070

|pmid=16293758

|bibcode = 2005Sci...310.1174S }}</ref>

與輕稀有氣體不同的是，[[恒星核合成]]過程無法製造氙元素。所有包括氙在內比[[鐵-56]]更重的元素經核聚變合成時，會產生凈能量損失，因此無法在恒星內部形成。<ref>{{cite book

|first=Donald D.|last=Clayton|year=1983

|title=Principles of Stellar Evolution and Nucleosynthesis

|publisher=University of Chicago Press

|isbn=0-226-10953-4|url=http://books.google.com/?id=imjwZdXExQIC&pg=PA604}}</ref>能夠形成氙的自然過程包括：[[超新星]]爆炸，<ref name="heymann">{{cite conference

|last=Heymann|first=D.|coauthors=Dziczkaniec, M.

|title=Xenon from intermediate zones of supernovae

|booktitle=Proceedings 10th Lunar and Planetary Science Conference

|pages=1943–1959|publisher=Pergamon Press, Inc.

|date=March 19–23, 1979|location=Houston, Texas

|bibcode=1979LPSC...10.1943H}}</ref>[[紅巨星]]用盡氫燃料進入漸近巨星分支後的慢中子捕獲過程（[[s-過程]]），<ref>{{cite journal

|author=Beer, H.; Kaeppeler, F.; Reffo, G.; Venturini, G.

|title=Neutron capture cross-sections of stable xenon isotopes and their application in stellar nucleosynthesis

|journal=Astrophysics and Space Science |volume=97

|issue=1 |month=November |year=1983 |pages=95–119

|doi=10.1007/BF00684613 |bibcode=1983Ap&SS..97...95B}}</ref>一般[[新星]]爆炸，<ref>{{cite journal

|last=Pignatari|first=M.

|coauthors=Gallino, R.; Straniero, O.; Davis, A.

|title=The origin of xenon trapped in presolar mainstream SiC grains

|journal=Memorie della Societa Astronomica Italiana

|year=2004|volume=75|pages=729–734

|bibcode=2004MmSAI..75..729P

|last2=Gallino

|last3=Straniero

|last4=Davis}}</ref>以及[[碘]]、[[鈾]]和[[鈈]]等元素的放射性衰變。 <ref name="caldwell" />

==同位素==

{{main|氙的同位素}}

自然形成的氙共由8種[[穩定同位素]]組成，在各元素中排第二位。第一位是[[錫]]，其穩定同位素共有10個。穩定同位素數量高於7個的元素只有氙和錫。<ref>{{cite book

|first=J. B.|last=Rajam|year=1960

|title=Atomic Physics|edition=7th

|publisher=S. Chand and Co.|location=Delhi

|isbn=81-219-1809-X}}</ref>同位素<sup>124</sup>Xe和<sup>134</sup>Xe根據預測能夠進行[[雙重β衰變]]，但這未經實驗證明，因此這兩種同位素仍被認為是穩定的。<ref>{{cite journal

|last=Barabash|first=A. S.

|title=Average (Recommended) Half-Life Values for Two-Neutrino Double-Beta Decay

|journal=Czechoslovak Journal of Physics

|year=2002|volume=52|issue=4|pages=567–573

|doi=10.1023/A:1015369612904|arxiv = nucl-ex/0203001 |bibcode = 2002CzJPh..52..567B }}</ref>除這些穩定同位素之外，氙還有40多種不穩定同位素。其中壽命最長的為<sup>136</sup>Xe，它會進行雙β衰變，[[半衰期]]為2.11{{e|21}}年。<ref name="EXO" />[[碘|<sup>129</sup>I]]在[[β衰變]]後，會產生<sup>129</sup>Xe同位素。該反應的半衰期為1600萬年。另外<sup>131m</sup>Xe、<sup>133</sup>Xe、<sup>133m</sup>Xe和<sup>135</sup>Xe都是[[鈾|<sup>235</sup>U]]和[[鈈|<sup>239</sup>Pu]]的[[核裂變]]產物，<ref name="caldwell">{{cite web

|last=Caldwell|first=Eric|month=January|year=2004

|url=http://wwwrcamnl.wr.usgs.gov/isoig/period/xe\_iig.html

|title=Periodic Table – Xenon|work=Resources on Isotopes

|publisher=USGS|accessdate=2007-10-08}}</ref>因此被用作探測核爆炸的發生。

氙的其中兩種穩定同位素<sup>129</sup>Xe和<sup>131</sup>Xe具有非零的固有[[角動量]]（[[自旋]]，可用於[[核磁共振]]）。利用圓[[極化光]]和[[銣]]氣體，氙的核自旋對齊可以超越普通的極化。<ref>{{cite journal

|last=Otten|first=Ernst W.|year=2004

|title=Take a breath of polarized noble gas

|journal=Europhysics News|volume=35|issue=1|doi=10.1051/epn:2004109

|page=16|bibcode = 2004ENews..35...16O }}</ref>如此產生的[[自旋極化]]能夠超過其最高可能值的50%，遠遠大於[[玻爾茲曼分佈]]的平衡值（在[[室溫]]下通常不超過最高值的0.001%）。這種非平衡態的自旋對齊是短暫的，稱為[[超極化 (物理學)|超極化]]現象。對氙進行超極化的過程叫做光抽運（但不同於激光抽運）。<ref>{{cite journal

|journal=Physical Review Letters|volume=96

|issue=5|page=053002

|year=2006|title = Optical Pumping System Design for Large Production of Hyperpolarized <sup>129</sup>Xe

|first=I. C.|last=Ruset|coauthors=Ketel, S.; Hersman, F. W.|doi=10.1103/PhysRevLett.96.053002 |bibcode=2006PhRvL..96e3002R}}</ref>

由於<sup>129</sup>Xe原子核的自旋為1/2，所以其[[電場|電]][[四極矩]]為零，故<sup>129</sup>Xe核在與其他原子撞擊時，不會有任何四極相互作用。這使得它的超極化狀態能夠持續更長的時間，甚至在激光束關閉及鹼氣體在室溫表面冷凝後，仍能保留該狀態。<sup>129</sup>Xe的自旋極化在[[血液]]中能持續數秒，<ref>{{

cite journal

|first=J.|last=Wolber

|coauthors=Cherubini, A.; Leach, M. O.; Bifone, A.

|title = On the oxygenation-dependent <sup>129</sup>Xe ''T''<sub>1</sub> in blood

|year = 2000|journal = NMR in Biomedicine

|volume = 13|issue = 4|pages = 234–7

|doi = 10.1002/1099-1492(200006)13:4<234::AID-NBM632>3.0.CO;2-K

|pmid=10867702}}</ref>在[[氣態]]下持續數小時，<ref>{{ cite journal

|first=B.|last=Chann|coauthors=Nelson, I. A.; Anderson, L. W.; Driehuys, B.; Walker, T. G.

|title=<sup>129</sup>Xe-Xe molecular spin relaxation

|year=2002|journal=Physical Review Letters

|volume=88|issue=11|pages=113–201

|doi=10.1103/PhysRevLett.88.113201 |bibcode=2002PhRvL..88k3201C}}</ref>并在深度冷凍的固態下持續數天。<ref>{{cite encyclopedia

|first=Gustav Konrad|last=von Schulthess

|coauthors=Smith, Hans-Jørgen; Pettersson, Holger; Allison, David John

|year=1998|title=The Encyclopaedia of Medical Imaging

|page=194|publisher=Taylor & Francis

|isbn=1-901865-13-4|url=http://books.google.com/books?id=zvDY5unRC4oC&pg=PA194}}</ref>相比之下，<sup>131</sup>Xe的核自旋為3/2，四極矩不為零，其''T''<sub>1</sub>弛豫時間位於[[毫秒]]至[[秒]]區間內。<ref>{{cite journal

|first=W. W.|last=Warren|coauthors=Norberg, R. E.

|title=Nuclear Quadrupole Relaxation and Chemical Shift of Xe<sup>131</sup> in Liquid and Solid Xenon

|year=1966|journal=Physical Review

|volume=148|issue=1|pages=402–412

|doi=10.1103/PhysRev.148.402|bibcode = 1966PhRv..148..402W }}</ref>

氙的某些同位素，如<sup>133</sup>Xe和<sup>135</sup>Xe，可在[[核反應爐]]中對[[可以裂變物質]]進行[[中子]]照射產生。<ref name="lanl" />[[氙-135|<sup>135</sup>Xe]]在核裂變反應爐中具有重要的作用。<sup>135</sup>Xe的[[熱中子]][[中子截面|截面]]很高（2.6×10<sup>6</sup>[[靶恩]]），<ref name="stacey">{{cite book

|first=Weston M.|last=Stacey|year=2007

|title=Nuclear Reactor Physics|page=213

|url=http://books.google.com/?id=y1UgcgVSXSkC&pg=PA213|publisher=Wiley-VCH|isbn=3-527-40679-4}}</ref>因此可用作[[中子吸收劑]]或[[中子毒物]]，從而減慢或停止連鎖反應。美國[[曼哈頓計劃]]中用來產生[[鈈]]元素的最早期反應爐就用到了氙的這一作用。<ref>{{cite web

|author=Staff|url=http://www.cfo.doe.gov/me70/manhattan/hanford\_operational.htm

|archiveurl=http://web.archive.org/web/20091210094859/http://www.cfo.doe.gov/me70/manhattan/hanford\_operational.htm

|archivedate=2009-12-10

|title=Hanford Becomes Operational

|work=The Manhattan Project: An Interactive History

|publisher=U.S. Department of Energy

|accessdate=2007-10-10}}</ref><sup>135</sup>Xe在反應爐中作為中子毒物，對[[切爾諾貝爾核事故]]有著重要的影響。<ref>{{cite book

|title=Modern Physics: An Introductory Text|year=2000

|first=Jeremy I.|last=Pfeffer|coauthors=Nir, Shlomo

|pages=421 ff.|publisher=Imperial College Press

|isbn=1-86094-250-4|url=http://books.google.com/?id=KmMYWP56t98C&pg=PA421}}</ref>反應爐的關閉或功率的降低可以造成<sup>135</sup>Xe的積聚，使反應爐進入所謂的[[碘坑]]（或稱氙坑）狀態。

在不利條件下，高濃度的放射性氙同位素可以從核反應爐中釋放出來，來源包括裂變產物從開裂的[[燃料棒]]中釋出，<ref>{{cite book

|first=Edwards A.|last=Laws|year=2000

|title=Aquatic Pollution: An Introductory Text

|page=505|publisher=John Wiley and Sons

|isbn=0-471-34875-9|url=http://books.google.com/?id=11LI7XyEIsAC&pg=PA505}}</ref>或冷卻水中的鈾進行裂變。<ref>{{cite news

|author=Staff|date=April 9, 1979

|title=A Nuclear Nightmare|publisher=Time

|url=http://www.time.com/time/magazine/article/0,9171,920196-4,00.html

|accessdate=2007-10-09}}</ref>

[[隕石]]中的氙同位素比例可以用來研究[[太陽系的形成和演化]]。[[碘氙定年法|碘氙]][[放射性定年法]]可以測定[[核合成]]至[[太陽星雲]]中固體物體縮合之間的時間。1960年，物理學家[[約翰·雷諾]]（John H. Reynolds）發現某些[[隕石]]中的氙-129含量異常高。他推斷這是[[碘-129]]的[[衰變產物]]。這一同位素可經[[宇宙射線散裂]]和[[核裂變]]緩慢產生，但只有在[[超新星]]爆炸中才能大量產生。由於<sup>129</sup>I的半衰期（1600萬年）相對宇宙時長來說非常短，因此可推論從超新星爆炸到隕石凝固之間經過的時間很短。一顆超新星在[[太陽系]]形成前不久爆炸，產生<sup>129</sup>I同位素之餘，可能也導致了前太陽氣體雲的收縮。<ref>{{cite book

|first=Donald D.|last=Clayton|year=1983

|title=Principles of Stellar Evolution and Nucleosynthesis

|page=75|edition=2nd|url=http://books.google.com/?id=imjwZdXExQIC&pg=PA604

|publisher=University of Chicago Press|isbn=0-226-10953-4}}</ref><ref>{{cite web

|author=Bolt, B. A.; Packard, R. E.; Price, P. B.

|year=2007|url=http://content.cdlib.org/xtf/view?docId=hb1r29n709&doc.view=content&chunk.id=div00061&toc.depth=1&brand=oac&anchor.id=0

|title=John H. Reynolds, Physics: Berkeley

|publisher=The University of California, Berkeley

|accessdate=2007-10-01}}</ref>

利用類似的方法，其他氙同位素比例也可以用來研究行星分化和氣體釋放過程，包括<sup>129</sup>Xe/<sup>130</sup>Xe和<sup>136</sup>Xe/<sup>130</sup>Xe。<ref name="kaneoka">{{cite journal

|last=Kaneoka|first=Ichiro|title=Xenon's Inside Story

|journal=Science|year=1998|volume=280|issue=5365

|pages=851–852|doi=10.1126/science.280.5365.851b}}</ref>例如，[[火星大氣層]]的氙含量與地球相似，約為百萬分之0.08，<ref>{{cite web

|last=Williams|first=David R.

|date=September 1, 2004|url=http://nssdc.gsfc.nasa.gov/planetary/factsheet/marsfact.html

|title=Mars Fact Sheet|publisher=NASA

|accessdate=2007-10-10}}</ref>但其<sup>129</sup>Xe比例比地球和太陽高。這一同位素是由放射性衰變產生的，所以火星很可能在形成後約1億年以內喪失了大部份的原始大氣。<ref>{{cite web

|last=Schilling|first=James

|url=http://humbabe.arc.nasa.gov/mgcm/HTML/FAQS/thin\_atm.html|title=Why is the Martian atmosphere so thin and mainly carbon dioxide?

|publisher=Mars Global Circulation Model Group

|accessdate=2007-10-10}}

</ref><ref>{{cite journal

|last=Zahnle|first=Kevin J.

|title=Xenological constraints on the impact erosion of the early Martian atmosphere

|journal=Journal of Geophysical Research

|year=1993|volume=98|issue=E6|pages=10,899–10,913

|doi=10.1029/92JE02941 |bibcode=1993JGR....9810899Z}}</ref>美國[[新墨西哥州]][[二氧化碳]]井氣中所發現的高比例<sup>129</sup>Xe是地球形成不久後經[[地幔]]核衰變產生的氣體之一。<ref name="caldwell" /><ref>{{cite journal

|last=Boulos|first=M. S.|coauthors=Manuel, O.K.

|title=The xenon record of extinct radioactivities in the Earth|journal=[[Science (journal)|Science]]

|volume=174|issue=4016|pages=1334–6|year=1971

|doi=10.1126/science.174.4016.1334|pmid=17801897|bibcode = 1971Sci...174.1334B }}</ref>

==化合物==

{{Category see also|氙化合物}}

尼爾·巴特萊特在1962年發現氙能夠形成化合物之後，許多其他的氙化合物也陸續被發現和研究。幾乎所有氙化合物都含有[[電負性]]高的[[氟]]或者[[氧]]。<ref name="harding1"/>

===鹵化物===

[[Image:Xenon-tetrafluoride-3D-vdW.png|thumb|[[四氟化氙]]|alt=平面型分子模型，中間為氙原子，與四個氟原子對稱鍵合。]]

[[Image:Xenon tetrafluoride.JPG|thumb|XeF<sub>4</sub>晶體（1962年）|alt=平皿中有多個正方體透明晶體。]]

氙共有三種已知[[氟化物]]：[[二氟化氙]]（{{chem|XeF|2}}）、[[四氟化氙]]（{{chem|XeF|4}}）及[[六氟化氙]]（{{chem|XeF|6}}）。理論預測XeF是不穩定的。<ref>{{Cite journal | title = Probable nonexistence of xenon monofluoride as a chemically bound species in the gas phase | author = Dean H Liskow, Henry F I I I Schaefer, Paul S Bagus, Bowen Liu | journal = J Amer Chem Soc | year = 1973 | volume = 95 | issue = 12 | pages = 4056–4057 | doi = 10.1021/ja00793a042}}</ref>幾乎所有氙化合物的合成都要從這些氟化物開始。

二氟化氙（{{chem|XeF|2}}）是一種固體晶體，在氟與氙混合物經[[紫外光]]照射後形成，<ref>{{cite journal

|author=Weeks, James L.; Chernick, Cedric; Matheson, Max S.

|title=Photochemical Preparation of Xenon Difluoride

|journal=Journal of the American Chemical Society

|volume=84

|issue=23|page=4612|doi=10.1021/ja00882a063

|year=1962}}</ref>用一般日光就已足夠。<ref>{{cite journal

|author=Streng, L. V.; Streng, A. G.

|title=Formation of Xenon Difluoride from Xenon and Oxygen Difluoride or Fluorine in Pyrex Glass at Room Temperature|journal=Inorganic Chemistry

|year=1965|volume=4|issue=9|pages=1370–1371

|doi=10.1021/ic50031a035}}</ref>{{chem|XeF|2}}在高溫下用{{chem|NiF|2}}[[催化劑]]長時間加溫會產生{{chem|XeF|6}}。<ref name="tramsek">{{cite journal

|author=Tramšek, Melita; Žemva, Boris

|title=Synthesis, Properties and Chemistry of Xenon(II) Fluoride|journal=Acta Chimica Slovenica

|date=December 5, 2006|volume=53|issue=2

|pages=105–116|format=PDF|doi=10.1002/chin.200721209

|url=http://acta.chem-soc.si/53/53-2-105.pdf

|accessdate=2009-07-18}}</ref>{{chem|XeF|6}}在[[氟化鈉|NaF]]中經[[熱裂解]]後可以形成高純度{{chem|XeF|4}}。<ref>{{cite journal

|author=Ogrin, Tomaz; Bohinc, Matej; Silvnik, Joze

|title=Melting-point determinations of xenon difluoride-xenon tetrafluoride mixtures

|journal=Journal of Chemical and Engineering Data

|year=1973|volume=18|issue=4|page=402

|doi=10.1021/je60059a014}}</ref>

氙的氟化物都可以作為氟離子受體和予體，形成如{{chem|XeF|+}}和{{chem|Xe}}{{su|b=2}}{{chem|F|3|+}}等正離子，以及{{chem|XeF|5|-}}、{{chem|XeF|7|-}}和{{chem|XeF|8|2-}}等負離子。{{chem|XeF|2}}經氙氣還原後，會形成綠色的[[順磁性]]{{chem|Xe|2|+}}離子。<ref name="harding1">{{cite book|author=Harding, Charlie; Johnson, David Arthur; Janes, Rob|title = Elements of the ''p'' block

|pages=93–94|publisher=Royal Society of Chemistry

|location=Great Britain|year=2002

|isbn=0-85404-690-9|url=http://books.google.com/?id=W0HW8wgmQQsC&pg=PA93}}</ref>

{{chem|XeF|2}}可以與[[過渡金屬]]離子形成[[配合物]]。已知的配合物已超過30種。<ref name="tramsek" />

雖然人們對氙的氟化物已有一定的了解，但是對其他的鹵化物則幾乎一無所知。唯一已知的鹵化物為[[二氯化氙]]（XeCl<sub>2</sub>）。二氯化氙是一種吸熱的無色晶體，在80°C以上會分解成其組成元素。對氙、氟及[[四氯化硅]]或[[四氯化碳]]的混合物進行高頻率光照射會形成二氯化氙。<ref name="scott1">{{cite encyclopedia

|author=Scott, Thomas; Eagleson, Mary

|title = Xenon Compounds|year=1994

|encyclopedia=Concise encyclopedia chemistry

|publisher=Walter de Gruyter

|isbn=3-11-011451-8|url=http://books.google.com/books?id=Owuv-c9L\_IMC&pg=PA1183|page=1183}}</ref>但是人們未知{{chem|XeCl|2}}是確實的化合物，還是由氙原子和{{chem|Cl|2}}分子弱結合形成的[[范德華分子]]。<ref>{{cite journal

|author=Proserpio, Davide M.; Hoffmann, Roald; Janda, Kenneth C.

|title=The xenon-chlorine conundrum: van der Waals complex or linear molecule?|year=1991|volume=113

|journal=Journal of the American Chemical Society

|issue=19

|page=7184|doi=10.1021/ja00019a014}}</ref>理論計算指出，直線型{{chem|XeCl|2}}分子比范德華分子較不穩定。<ref>{{cite journal

|author=Richardson, Nancy A.; Hall, Michael B.|year=1993

|title=The potential energy surface of xenon dichloride

|journal=The Journal of Physical Chemistry|volume=97

|issue=42

|page=10952|doi=10.1021/j100144a009}}</ref>

===氧化物及鹵氧化物===

氙共有三種已知氧化物：[[二氧化氙]]（{{chem|XeO|2}}）、[[三氧化氙]]（{{chem|XeO|3}}）及[[四氧化氙]]（{{chem|XeO|4}}）。二氧化氙在2011年被發現，[[配位數]]為4，<ref>{{cite journal

|author=Brock, D.S..; Schrobilgen, G.J.

|title=Synthesis of the missing oxide of xenon, XeO<sub>2</sub>, and its implications for earth's missing xenon

|journal=[[Journal of the American Chemical Society]]

|year=2011 |doi=10.1021/ja110618g

|volume=133

|issue=16

|pmid=21341650

|pages=6265–9}}</ref> XeO<sub>2</sub>是在四氟化氙與水冰反應後形成的。其晶體結構特殊，有可能能夠取代[[硅酸鹽]]礦物中的[[硅]]。<ref name="ChemistryWhere2011">{{cite doi|10.1038/471138d}}</ref>科學家利用[[紅外光譜學|紅外光譜分析]]在固體[[氬]]當中發現了XeOO<sup>+</sup>正離子。<ref>{{cite journal

|author=Zhou, M.; Zhao, Y.; Gong, Y.; Li, J.

|title=Formation and Characterization of the XeOO<sup>+</sup> Cation in Solid Argon

|journal=[[Journal of the American Chemical Society]]

|year=2006|volume=128

|issue=8

|pmid=16492012|pages=2504–5

|doi= 10.1021/ja055650n}}</ref>三氧化氙與四氧化氙均為具爆炸性的強氧化劑。

氙不會和氧直接進行反應。三氧化氙是經{{chem|XeF|6}}的[[水解]]反應形成的：<ref>{{cite book

|first=John H.|last=Holloway|coauthors=Hope, Eric G.

|editor=A. G. Sykes|year=1998|publisher=Academic

|title=Advances in Inorganic Chemistry Press

|isbn=0-12-023646-X|page=65|url=http://books.google.com/?id=6iqXRtz6p3QC&pg=PA65}}</ref>

:{{chem|XeF|6}} + 3 {{chem|H|2|O}} → {{chem|XeO|3}} + 6 HF

{{chem|XeO|3}}具弱酸性，會在鹼中溶解成含{{chem|HXeO|4|−}}負離子的不穩定氙酸鹽。這些不穩定鹽會很快[[歧化反應|歧化]]成氙氣和含{{chem|XeO|6|4−}}負離子的[[高氙酸鹽]]。<ref name="henderson">{{cite book

|first=W.|last=Henderson

|title = Main group chemistry|year=2000

|publisher=Royal Society of Chemistry|pages=152–153

|location=Great Britain|isbn=0-85404-617-8

|url=http://books.google.com/?id=twdXz1jfVOsC&pg=PA152}}</ref>

高氙酸鋇在濃[[硫酸]]中會產生四氧化氙氣體：<ref name="scott1" />

: {{chem|Ba|2|XeO|6}} + 2 {{chem|H|2|SO|4}} → 2 {{chem|BaSO|4}} + 2 {{chem|H|2|O}} + {{chem|XeO|4}}

四氧化氙在−35.9&nbsp;°C以上會爆炸成氙氣和氧氣，因此反應後需迅速冷凍形成淺黃色固體以避免分解。

氙有多個已知的氟氧化物，包括二氟一氧化氙（{{chem|XeOF|2}}）、[[四氟一氧化氙]]（{{chem|XeOF|4}}）、二氟二氧化氙（{{chem|XeO|2|F|2}}）及二氟三氧化氙（{{chem|XeO|3|F|2}}）。[[二氟化氧]]（{{chem|OF|2}}）與氙氣在低溫下反應會形成{{chem|XeOF|2}}；{{chem|XeF|4}}的部份水解也可產生{{chem|XeOF|2}}。它在−20&nbsp;°C以上會歧化成{{chem|XeF|2}}和{{chem|XeO|2|F|2}}。<ref name="mackay1">{{cite book

|author=Mackay, Kenneth Malcolm; Mackay, Rosemary Ann; Henderson, W.

|title=Introduction to modern inorganic chemistry

|year=2002|edition=6th|publisher=CRC Press

|isbn=0-7487-6420-8|url=http://books.google.com/?id=LpJPWKT3PNcC&pg=PA497|pages=497–501}}</ref>{{chem|XeF|6}}的部份水解會產生{{chem|XeOF|4}}<ref>{{cite journal

|last=Smith|first=D. F.|year=1963

|title=Xenon Oxyfluoride

|pmid=17810680|journal=Science|volume=140

|doi=10.1126/science.140.3569.899

|issue=3569|bibcode=1963Sci...140..899S

|pages=899–900}}</ref>；{{chem|XeF|6}}與高氙酸鈉（{{chem|Na|4|XeO|6}}）反應後也可形成{{chem|XeOF|4}}。第二種反應會同時產生少量的{{chem|XeO|3|F|2}}。{{chem|XeOF|4}}與[[氟化銫|CsF]]反應後會形成{{chem|XeOF|5|−}}負離子，<ref name="mackay1" /><ref>{{ cite journal | title = On the Structure of the [XeOF<sub>5</sub>]<sup>−</sup> Anion and of Heptacoordinated Complex Fluorides Containing One or Two Highly Repulsive Ligands or Sterically Active Free Valence Electron Pairs | author = K. O. Christe, D. A. Dixon, J. C. P. Sanders, G. J. Schrobilgen, S. S. Tsai, W. W. Wilson | journal = [[Inorganic Chemistry (journal)|Inorg. Chem.]] | year = 1995 | volume = 34 | issue = 7 | pages = 1868–1874 | doi = 10.1021/ic00111a039 }}</ref>而XeOF<sub>3</sub>會和[[氟化鉀|KF]]、[[氟化銣|RbF]]和CsF反應形成{{chem|XeOF|4|−}}負離子。<ref>{{ cite journal | title = Chlorine trifluoride oxide. V. Complex formation with Lewis acids and bases | author = K. O. Christe, C. J. Schack, D. Pilipovich | journal = [[Inorganic Chemistry (journal)|Inorg. Chem.]] | year = 1972 | volume = 11 | issue = 9 | pages = 2205–2208 | doi = 10.1021/ic50115a044 }}</ref>

===其他化合物===

科學家近期開始研究氙能否與電負性比氟和氧低的元素形成化合物，其中特別包括[[碳]]。<ref>{{cite book

|title=Advances in Inorganic Chemistry

|author=Holloway, John H.; Hope, Eric G.

|others=Contributor A. G. Sykes|publisher=Academic Press

|year=1998|isbn=0-12-023646-X|url=http://books.google.com/?id=6iqXRtz6p3QC&pg=PA61|pages=61–90}}</ref>要使這些化合物穩定，必須使用吸電子基團，如經氟取代形成的基團。<ref name="henderson" />已知的含碳化合物包括：<ref name="mackay1" /><ref>{{cite journal

|title=C<sub>6</sub>F<sub>5</sub>XeF, a versatile starting material in xenon–carbon chemistry

|year=2004|last=Frohn|first=H

|journal=Journal of Fluorine Chemistry|volume=125

|issue=6|page=981

|doi=10.1016/j.jfluchem.2004.01.019

|last2=Theißen

|first2=Michael}}</ref>

\* {{chem|C|6|F|5|–Xe|+|–N≡C–CH|3}}，其中的C<sub>6</sub>F<sub>5</sub>是五氟苯基。

\* {{chem|[C|6|F|5|]|2|Xe}}

\* {{chem|C|6|F|5|–Xe–X}}，X可以是[[腈|CN]]、F或Cl。

\* {{chem|R–C≡C–Xe|+}}，R可以是{{chem|C|2|F|5|-}}或[[丁基|叔丁基]]。

\* {{chem|C|6|F|5|–XeF|2|+}}

\* {{chem|(C|6|F|5|Xe)|2|Cl|+}}

其他含有電負性較低的氙化合物包括{{chem|F–Xe–N(SO|2|F)|2}}和{{chem|F–Xe–BF|2}}。{{chem|F–Xe–BF|2}}可以從四氟硼酸[[二氧基|二氧]]{{chem|O|2|BF|4}}在−100&nbsp;°C溫度下合成。<ref name="mackay1" /><ref>{{cite journal

|doi=10.1021/ja00764a022|title=Reaction of xenon with dioxygenyl tetrafluoroborate. Preparation of FXe-BF<sub>2</sub>

|year=1972

|last=Goetschel|first=Charles T.|coauthors=Loos, Karl R.

|journal=Journal of the American Chemical Society

|volume=94

|issue=9|page=3018}}</ref>

[[四氙合金(II)離子]]（{{chem|AuXe|4|2+}}）非常特殊，它含有氙﹣金鍵。<ref name="waikeeli2">{{cite book

|title = Advanced Structural Inorganic Chemistry

|author=Li, Wai-Kee; Zhou, Gong-Du; Mak, Thomas C. W.

|editors=Gong-Du Zhou; Thomas C. W. Mak

|publisher=Oxford University Press|year=2008

|isbn=0-19-921694-0|url=http://books.google.com/?id=2qAa5hp6KX4C&pg=PA678|page=678}}</ref>氙和金都是極不活躍的元素，成鍵時以氙作為過渡金屬配位體。之一離子出現在{{chem|AuXe|4|(Sb|2|F|11|)|2}}當中。

{{chem|Xe|2|Sb|2|F|11}}含有氙﹣氙鍵，這是兩個元素間已知最長的鍵（308.71 [[皮米|pm]] = 3.0871 [[埃|Å]]）。<ref>{{cite book

| title = Advanced Structural Inorganic Chemistry

| first1 = Wai-Kee

| last1 = Li

| first2 = Gong-Du

| last2 = Zhou,

| first3 = Thomas C. W.

| last3 = Mak

| publisher = Oxford University Press

| year = 2008

| isbn = 0-19-921694-0

| page = 674

}}</ref>

1995年，[[芬蘭]][[赫爾辛基大學]]的馬爾庫·拉薩寧（Markku Räsänen）等人宣佈成功合成HXeH，并其後宣佈合成HXeOH、HXeCCH以及其他氙化合物分子。<ref>{{cite journal

|last=Gerber|first=R. B.|year=2004

|doi=10.1146/annurev.physchem.55.091602.094420

|title=Formation of novel rare-gas molecules in low-temperature matrices

|journal=Annual Review of Physical Chemistry

|volume=55

|issue=1|pages=55–78|pmid=15117247|bibcode = 2004ARPC...55...55G }}</ref>2008年，利奧尼德·赫里亞切夫（Leonid Khriachtchev）等人宣佈，他們在低溫氙基體內對水進行[[光解]]後合成了HXeOXeH。<ref>{{cite journal

|last=Khriachtchev|first=Leonid

|coauthors=Isokoski, Karoliina; Cohen, Arik; Räsänen, Markku; Gerber, R. Benny

|title=A Small Neutral Molecule with Two Noble-Gas Atoms: HXeOXeH

|journal=Journal of the American Chemical Society

|year=2008|volume=130|issue=19|pages=6114–8

|doi=10.1021/ja077835v|pmid=18407641}}</ref>他們也合成了含[[氘]]的分子，如HXeOD和DXeOH。<ref>{{cite journal

|last=Pettersson|first=Mika|coauthors=Khriachtchev, Leonid; Lundell, Jan; Räsänen, Markku

|title=A Chemical Compound Formed from Water and Xenon: HXeOH|year=1999

|journal=Journal of the American Chemical Society

|volume=121|issue=50|pages=11904–11905

|doi=10.1021/ja9932784}}</ref>

===包合物及準分子===

除了可以在化合物中形成[[化學鍵]]之外，氙原子還能嵌在另一種化合物的[[晶體結構]]當中，形成[[包合物]]。這包括[[水合氙]]（Xe•5.75 H<sub>2</sub>O），其中氙原子位於水分子形成的晶體結構空隙中。<ref>{{cite journal

|doi=10.1126/science.134.3471.15|title=A molecular theory of general anesthesia

|authorlink=Linus Pauling|journal=Science|volume=134

|issue=3471

|year=1961|pages=15–21|pmid=13733483

|last=Pauling|first=L.|bibcode = 1961Sci...134...15P }} Reprinted as {{cite book

|pages=1328–1334|title=Linus Pauling: Selected Scientific Papers|volume=2|editor=Pauling, Linus; Kamb, Barclay

|place=River Edge, New Jersey|publisher=World Scientific

|year=2001|isbn=981-02-2940-2|url=http://books.google.com/?id=2QduA19d\_X8C&pg=PA1329}}</ref>這種包合物的熔點為24&nbsp;°C。<ref name="henderson2">{{cite book

|title=Main group chemistry

|last=Henderson|first=W.|year=2000

|publisher=Royal Society of Chemistry

|location=Great Britain|isbn=0-85404-617-8

|url=http://books.google.com/?id=twdXz1jfVOsC&pg=PA148|page=148}}</ref>科學家也改用[[氘]]合成了該包合物。<ref>{{cite journal

|first=Tomoko|last=Ikeda|coauthors=Mae, Shinji; Yamamuro, Osamu; Matsuo, Takasuke; Ikeda, Susumu; Ibberson, Richard M.

|title=Distortion of Host Lattice in Clathrate Hydrate as a Function of Guest Molecule and Temperature

|journal=Journal of Physical Chemistry A

|date=November 23, 2000|volume=104|issue=46

|pages=10623–10630|doi=10.1021/jp001313j}}</ref>這類[[水合包合物]]可以在高壓條件下自然形成，例如[[南極洲]]冰蓋下的[[沃斯托克湖]]。<ref>{{cite journal

|last=McKay|first=C. P.|coauthors=Hand, K. P.; Doran, P. T.; Andersen, D. T.; Priscu, J. C.

|title=Clathrate formation and the fate of noble and biologically useful gases in Lake Vostok, Antarctica

|journal=Geophysical Letters|year=2003

|volume=30|issue=13|page=35|doi=10.1029/2003GL017490 |bibcode=2003GeoRL..30m..35M}}</ref>包合物的形成可以用在分餾過程中，以分離氙、氬和氪。<ref>{{cite journal

|last=Barrer|first=R. M.|coauthors=Stuart, W. I.

|title=Non-Stoichiometric Clathrate of Water

|journal=Proceedings of the Royal Society of London

|year=1957|volume=243

|issue=1233|pages=172–189

|doi=10.1098/rspa.1957.0213|bibcode = 1957RSPSA.243..172B }}</ref>

氙還可以形成[[內嵌富勒烯]]化合物，即內嵌氙原子的[[富勒烯]]分子。富勒烯裡面的氙原子可以通過<sup>129</sup>Xe[[核磁共振]]光譜分析來觀測。科學家可利用這種方法分析富勒烯分子的化學反應，因為其中的氙原子對周圍環境十分敏感，并進行[[化學位移]]。然而，氙原子也會對富勒烯的化學活性產生影響。<ref>{{cite journal

|last=Frunzi|first=Michael

|coauthors=Cross, R. James; Saunders, Martin

|title=Effect of Xenon on Fullerene Reactions

|journal=Journal of the American Chemical Society

|year=2007

|pmid=17924634|volume=129

|doi=10.1021/ja075568n

|issue=43|pages=13343–6}}</ref>

當氙原子處於[[基態]]的時候，會互相排斥，無法成鍵。但當它們受到激發後，就能夠形成[[準分子]]（激發態二聚體），直到電子回到基態。氙原子一般會填滿其最外[[電子層]]，鄰近的氙原子就可以為其提供電子。氙準分子的一般存留時長為1至5納秒，其衰變會釋放[[波長]]約為150和173納米的[[光子]]。<ref>{{cite book

|first=William Thomas|last=Silfvast

|year=2004|title=Laser Fundamentals

|publisher=Cambridge University Press

|isbn=0-521-83345-0|url=http://books.google.com/?id=x3VB2iwSaxsC&pg=RA1-PA152

}}</ref><ref>{{cite book

|first=John G.|last=Webster|year=1998

|title=The Measurement, Instrumentation, and Sensors Handbook

|publisher=Springer|isbn=3-540-64830-5

|url=http://books.google.com/?id=b7UuZzf9ivIC&pg=PT2427}}</ref>氙還能與其他元素結合成準分子，例如[[溴]]、[[氯]]及[[氟]]。<ref>{{cite book

|first=Charles|last=McGhee|year=1997

|coauthors=Taylor, Hugh R.; Gartry, David S.; Trokel, Stephen L.

|title=Excimer Lasers in Ophthalmology

|publisher=Informa Health Care

|isbn=1-85317-253-7|url=http://books.google.com/?id=pg0bUc\_GcVoC&pg=PA4}}</ref>

==應用==

儘管氙是一種稀有元素，從空氣中的抽取成本亦較高，但是它仍有多個實際用途。

===照明及光學===

====氣體放電燈====

氙可用於發光，應用包括：用於攝影的氙[[閃光燈]]，<ref name="burke">{{cite book

|first=James|last=Burke|year=2003

|title=Twin Tracks: The Unexpected Origins of the Modern World

|publisher=Oxford University Press

|isbn=0-7432-2619-4|page=33}}</ref>激發[[激光媒介]]以產生[[相干光]]，以及<ref>{{cite web

|author=Staff|year=2007

|url=http://www.praxair.com/praxair.nsf/1928438066cae92d85256a63004b880d/32f3a328e11bb600052565660052c139?OpenDocument

|title=Xenon Applications|publisher=Praxair Technology

|accessdate=2007-10-04}}</ref>殺菌燈等。<ref>{{cite journal

|last=Baltás|first=E.|coauthors=Csoma, Z.; Bodai, L.; Ignácz, F.; Dobozy, A.; Kemény, L.

|title=A xenon-iodine electric discharge bactericidal lamp

|journal=Technical Physics Letters

|year=2003|volume=29|issue=10|pages=871–872

|doi=10.1134/1.1623874|bibcode = 2003TePhL..29..871S }}</ref>1960年發明的首個固態[[激光器]]<ref name="toyserkani">{{cite book

|last=Toyserkani|first=E.|year=2004

|coauthors=Khajepour, A.; Corbin, S.|page=48

|title=Laser Cladding|publisher=CRC Press

|isbn=0-8493-2172-7|url=http://books.google.com/?id=zfvbyCHzVqMC&pg=PA48}}</ref>及推動[[慣性約束聚變]]的激光器都用到了氙閃光燈作激光抽運。<ref>{{cite journal

|last=Skeldon|first=M.D.

|coauthors=Saager, R.; Okishev, A.; Seka, W.

|title=Thermal distortions in laser-diode- and flash-lamp-pumped Nd:YLF laser rods

|journal=LLE Review|year=1997|volume=71

|pages=137–144|url=http://www.lle.rochester.edu/pub/review/v71/6\_thermal.pdf

|accessdate=2007-02-04 |format=PDF| archiveurl = http://web.archive.org/web/20031016171340/http://www.lle.rochester.edu/pub/review/v71/6\_thermal.pdf| archivedate = October 16, 2003}}</ref>

[[Image:Xenon short arc 1.jpg|thumb|氙短弧燈|alt=橢球形玻璃容器中有兩條金屬電極指向對方，一個鈍，另一個尖。]]

[[Image:STS-135 Atlantis rollout 1.jpg|thumb|氙光照射下的[[亞特蘭提斯號太空穿梭機]]]]

[[Image:Xenon discharge tube.jpg|thumb|氙氣放電管]]

[[氙弧燈]]能夠連續發光，其[[色溫]]近似於正午的日光，因此被用於模擬陽光。1940年氙弧燈進入市場後，開始淘汰壽命較短的[[碳弧燈]]作為[[電影放映機]]的光源。<ref name="mellor">{{cite book

|first=David|last=Mellor|year=2000|page=186

|title=Sound Person's Guide to Video

|publisher=Focal Press

|isbn=0-240-51595-1|url=http://books.google.com/?id=g93XXNA8Wf4C&pg=PA186}}</ref>這種光源被用在一般[[35毫米膠片]]、[[IMAX]]和新型[[數碼投影機]]的電影投影、[[高強度氣體放電燈]]車頭燈、高端戰術電筒以及其他專業用途。這種弧燈能發出短波長[[紫外線]]，以及可被用於[[夜視]]裝置的近[[紅外線]]。

[[等離子顯示器]]中的發光體裝有氙和氖，并經[[電極]]轉化成[[等離子]]狀態。該等離子體與電極之間的作用會產生紫外光，從而激發顯示器前部的[[磷]]質塗層，發出可見光。<ref>{{cite web

|author=Anonymous

|url=http://www.plasmatvscience.org/theinnerworkings.html

|title=The plasma behind the plasma TV screen

|publisher=Plasma TV Science|accessdate=2007-10-14}}</ref><ref>{{cite news

|last=Marin|first=Rick|date=March 21, 2001

|title=Plasma TV: That New Object Of Desire

|publisher=The New York Times|url=http://www.nytimes.com/2001/03/25/style/plasma-tv-that-new-object-of-desire.html?sec=&spon=

|accessdate=2009-04-03}}</ref>

氙也被用於啟動高壓[[鈉燈]]。氙的[[熱導率]]和[[電離能]]是所有非放射性稀有氣體中最低的。其化學惰性能避免對化學反應的干預；低熱導率可降低燈在運作時的熱能損失；低電離能則使氙在非高溫狀態下的[[擊穿電壓]]相對較低，令燈更容易啟動。<ref>{{cite book

|first = John|last = Waymouth|year = 1971

|title = Electric Discharge Lamps|publisher = The M.I.T. Press

|location = Cambridge, MA|isbn = 0-262-23048-8}}</ref>

====激光====

1962年，[[貝爾實驗室]]研究人員發現了氙的激光作用，<ref>{{cite journal

|first=C. K. N.|last=Patel|coauthors=Bennett Jr., W. R.; Faust, W. L.; McFarlane, R. A.

|title=Infrared spectroscopy using stimulated emission techniques

|volume=9|issue=3|date=August 1, 1962|pages=102–104

|journal=Physical Review Letters

|doi=10.1103/PhysRevLett.9.102 |bibcode=1962PhRvL...9..102P}}</ref>又接著發現在激光介質中加入[[氦]]能夠提升激光增益。<ref>{{cite journal

|first=C. K. N.|last=Patel

|coauthors=Faust, W. L.; McFarlane, R. A.

|title=High gain gaseous (Xe-He) optical masers

|journal=Applied Physics Letters

|volume=1|issue=4|pages=84–85|date=December 1, 1962

|doi=10.1063/1.1753707

|bibcode = 1962ApPhL...1...84P }}</ref><ref>{{cite journal

|first=W. R.|last=Bennett, Jr.

|title=Gaseous optical masers

|journal=Applied Optics Supplement

|volume=1|year=1962|pages=24–61

|doi=10.1364/AO.1.000024|bibcode = 1962ApOpt...1S..24B }}</ref>首個[[準分子激光]]使用[[電子]]來激發氙的[[二聚體]]（Xe<sub>2</sub>），以產生波長為176納米的紫外光，該過程稱為[[受激發射]]。<ref name="basov">{{cite journal

|doi=10.1070/QE1971v001n01ABEH003011

|last=Basov|first=N. G.

|coauthors=Danilychev, V. A.; Popov, Yu. M.

|title=Stimulated Emission in the Vacuum Ultraviolet Region

|journal=Soviet Journal of Quantum Electronics

|year=1971|volume=1|issue=1|pages=18–22|bibcode = 1971QuEle...1...18B }}</ref>氯化氙和氟化氙準分子也可用於激光器中。<ref>{{cite web

|url=http://www.safetyoffice.uwaterloo.ca/hse/laser/documents/laser\_types.html

|title=Laser Output|publisher=University of Waterloo

|accessdate=2007-10-07}}</ref>例如，皮膚病學就用到氯化氙準分子激光。<ref>{{cite journal

|doi=10.1111/j.1468-3083.2006.01495.x

|first=E.|last=Baltás

|coauthors=Csoma, Z.; Bodai, L.; Ignácz, F.; Dobozy, A.; Kemény, L.

|title=Treatment of atopic dermatitis with the xenon chloride excimer laser

|journal=Journal of the European Academy of Dermatology and Venereology

|year=2006|volume=20|issue=6|pages=657–60

|pmid=16836491}}</ref>

===醫學===

====麻醉====

氙是一種[[全身麻醉劑]]。氙較為昂貴，但由於回收循環技術的提升和成本的降低，使用氙的麻醉機將在不久後進入歐洲市場。<ref name="singh" /><ref>{{cite journal|last=Tonner|first=P. H.|title=Xenon: one small step for anaesthesia&nbsp;... ? (editorial review)|journal=Current Opinion in Anaesthesiology|year=2006|volume=19|issue=4|pages=382–4|doi=10.1097/01.aco.0000236136.85356.13|pmid=16829718}}</ref>

氙會和多種不同[[受體 (生物化學)|受體]]和[[離子通道]]相互作用。根據理論，這種多模態吸入性麻醉劑很可能具互補性。氙是一種具高親和力的[[甘氨酸]]結合部位[[NMDA受體拮抗劑]]。<ref name=nmda>{{cite journal|title=Competitive inhibition at the glycine site of the N-methyl-D-aspartate receptor mediates xenon neuroprotection against hypoxia-ischemia|journal=Anesthesiology|pmid=20124979|year=2010|last1=Banks|first1=P|last2=Franks|first2=NP|last3=Dickinson|first3=R|volume=112|issue=3|pages=614–22|doi=10.1097/ALN.0b013e3181cea398}}</ref>不過，與其他的NMDA受體拮抗劑不同的是，氙不具神經毒性，且能夠抑制[[氯胺酮]]和[[一氧化二氮]]的神經毒性。<ref>{{cite journal|title=Neuroprotective and neurotoxic properties of the 'inert' gas, xenon|journal=Br J Anaesth|pmid=12393773|year=2002|last1=Ma|first1=D|last2=Wilhelm|first2=S|last3=Maze|first3=M|last4=Franks|first4=NP|volume=89|issue=5|pages=739–46|doi=10.1093/bja/89.5.739}}</ref><ref>{{cite journal|title=Xenon inhibits but N(2)O enhances ketamine-induced c-Fos expression in the rat posterior cingulate and retrosplenial cortices|journal=Anesth Analg.|pmid=11159233|year=2001|last1=Nagata|first1=A|last2=Nakao Si|first2=S|last3=Nishizawa|first3=N|last4=Masuzawa|first4=M|last5=Inada|first5=T|last6=Murao|first6=K|last7=Miyamoto|first7=E|last8=Shingu|first8=K|volume=92|issue=2|pages=362–8|doi=10.1213/00000539-200102000-00016}}</ref>氙不會像氯胺酮和一氧化二氮一樣刺激[[伏隔核]]釋放[[多巴胺]]。<ref>{{cite journal|title=The differential effects of nitrous oxide and xenon on extracellular dopamine levels in the rat nucleus accumbens: a microdialysis study|journal=Anesth Analg|pmid=17122223|year=2006|last1=Sakamoto|first1=S|last2=Nakao|first2=S|last3=Masuzawa|first3=M|last4=Inada|first4=T|last5=Maze|first5=M|last6=Franks|first6=NP|last7=Shingu|first7=K|volume=103|issue=6|pages=1459–63|doi=10.1213/01.ane.0000247792.03959.f1}}</ref><!--有可能過於專業：Like nitrous oxide and cyclopropane xenon activates the two-pore domain potassium channel TREK-1. A related channel TASK-3 also implicated in anesthetic actions is insensitive to xenon.<ref>{{cite journal|title=Two-pore-domain K+ channels are a novel target for the anesthetic gases xenon, nitrous oxide, and cyclopropane|journal=Mol Pharmacol |pmid=14742687|year=2004|last1=Gruss|first1=M|last2=Bushell|first2=TJ|last3=Bright|first3=DP|last4=Lieb|first4=WR|last5=Mathie|first5=A|last6=Franks|first6=NP|volume=65|issue=2|pages=443–52|doi=10.1124/mol.65.2.443}}</ref> Xenon inhibits nicotinic acetylcholine alpha4beta2 receptors which contribute to spinally mediated analgesia.<ref>{{cite journal|title=Effects of gaseous anesthetics nitrous oxide and xenon on ligand-gated ion channels. Comparison with isoflurane and ethanol|journal=Anesthesiology|pmid=11020766|year=2000|last1=Yamakura|first1=T|last2=Harris|first2=RA|volume=93|issue=4|pages=1095–101|doi=10.1097/00000542-200010000-00034}}</ref><ref>{{cite journal|title=Tonic inhibitory role of alpha4beta2 subtype of nicotinic acetylcholine receptors on nociceptive transmission in the spinal cord in mice|journal=Pain|pmid=16781069|year=2006|last1=Rashid|first1=MH|last2=Furue|first2=H|last3=Yoshimura|first3=M|last4=Ueda|first4=H|volume=125|issue=1–2|pages=125–35|doi=10.1016/j.pain.2006.05.011}}</ref> Xenon is an effective inhibitor of plasma membrane Ca2+ ATPase. Xenon inhibits Ca+ ATPase by binding to a hydrophobic pore within the enzyme and preventing the enzyme from assuming active conformations.<ref>{{cite journal|coauthors=Maria M. Lopez and Danuta Kosk-Kosicka|title=How Do Volatile Anesthetics Inhibit Ca2+-ATPases?|journal=The Journal of Biological Chemistry, 270, 28239-28245.|year=1995|doi=10.1074/jbc.270.47.28239|url=http://www.jbc.org/content/270/47/28239.full|last1=Kosk-Kosicka|first1=D.|volume=270|issue=47|pages=28239}}</ref>

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氙是[[血清素]]5-HT3的競爭性抑製劑。這並不產生麻醉或鎮痛的效果，但可以減少麻醉劑相關的噁心和嘔吐感。<ref>{{cite journal|title=The diverse actions of volatile and gaseous anesthetics on human-cloned 5-hydroxytryptamine3 receptors expressed in Xenopus oocytes|journal=Anesthesiology|pmid=11873047|year=2002|last1=Suzuki|first1=T|last2=Koyama|first2=H|last3=Sugimoto|first3=M|last4=Uchida|first4=I|last5=Mashimo|first5=T|volume=96|issue=3|pages=699–704|doi=10.1097/00000542-200203000-00028}}</ref>

氙在40歲人體內的[[最小肺泡濃度]]為72%，所以麻醉效果比N<sub>2</sub>O強44%。<ref>{{Cite journal|last=Nickalls |first=R. W. D|coauthors=Mapleson, W.W.|title=Age‐related iso‐MAC charts for isoflurane, sevoflurane and desflurane in man|journal= British Journal of Anesthesiology|url=http://bja.oxfordjournals.org/content/91/2/170/T1.expansion.html}}</ref>因此相對氧氣的使用濃度無需太高，有助避免[[缺氧]]。另外與一氧化二氮不同的是，氙不是[[溫室氣體]]，所以較為環保。<ref name=Goto2003>{{Cite journal|last=Goto|first=T|coauthors=Nakata Y, Morita S|title=Will xenon be a stranger or a friend?: the cost, benefit, and future of xenon anesthesia|journal=Anesthesiology|volume=98|issue=1|pages=1–2|year=2003|pmid=12502969|url=http://journals.lww.com/anesthesiology/Fulltext/2003/01000/Will\_Xenon\_Be\_a\_Stranger\_or\_a\_Friend\_\_\_The\_Cost,.2.aspx|accessdate=2010-09-15|doi=10.1097/00000542-200301000-00002}}</ref>使用過後的氙可排放到大氣中，這是氙氣本身的來源，因此不會對環境造成破壞。

<!--可能太專業：

====神經保護劑====

Xenon induces robust cardioprotection and neuroprotection through a variety of mechanisms of action. Through its influence on Ca2+, K+, KATP\HIF and NMDA antagonism xenon is neuroprotective when administered before during & after ischemic insults.<ref>{{cite journal|title=Xenon Attenuates Cerebral Damage after Ischemia in Pigs|date=May 2005 | volume = 102 |issue= 5 |pages= 929–936|url=http://journals.lww.com/anesthesiology/fulltext/2005/05000/xenon\_attenuates\_cerebral\_damage\_after\_ischemia\_in.11.aspx}}</ref><ref>{{cite journal|title=Xenon Provides Short-Term Neuroprotection in Neonatal Rats When Administered After Hypoxia-Ischemia|journal=Stroke. 2006; 37: 501-506|url=http://stroke.ahajournals.org/content/37/2/501.abstract|pmid=16373643|doi=10.1161/01.STR.0000198867.31134.ac|year=2006|last1=Dingley|first1=J|last2=Tooley|first2=J|last3=Porter|first3=H|last4=Thoresen|first4=M|volume=37|issue=2|pages=501–6}}</ref> Xenon is a high affinity antagonist at the NMDA receptor glycine site.<ref name=nmda /> Xenon is cardioprotective in ischemia-reperfusion conditions by inducing pharmacologic non-ischemic preconditioning. Xenon is cardioprotective by activating PKC-epsilon & downstream p38-MAPK.<ref>{{cite journal|title=The noble gas xenon induces pharmacological preconditioning in the rat heart in vivo via induction of PKC-epsilon and p38 MAPK|journal=Br J Pharmacol|pmid=15644876|year=2005|last1=Weber|first1=NC|last2=Toma|first2=O|last3=Wolter|first3=JI|last4=Obal|first4=D|last5=Müllenheim|first5=J|last6=Preckel|first6=B|last7=Schlack|first7=W|volume=144|issue=1|pages=123–32|doi=10.1038/sj.bjp.0706063|pmc=1575984}}</ref> Xenon mimics neuronal ischemic preconditioning by activating ATP sensitive potassium channels.<ref>{{cite journal|title=Neuronal preconditioning by inhalational anesthetics: evidence for the role of plasmalemmal adenosine triphosphate-sensitive potassium channels|journal=Anesthesiology|pmid=19352153|year=2009|last1=Bantel|first1=C|last2=Maze|first2=M|last3=Trapp|first3=S|volume=110|issue=5|pages=986–95|doi=10.1097/ALN.0b013e31819dadc7|pmc=2930813}}</ref> Xenon allosterically reduces ATP mediated channel activation inhibition independently of the sulfonylurea receptor1 subunit, increasing KATP open-channel time and frequency.<ref>{{cite journal|title=Noble gas xenon is a novel adenosine triphosphate-sensitive potassium channel opener|journal=Anesthesiology|pmid=20179498|year=2010|last1=Bantel|first1=C|last2=Maze|first2=M|last3=Trapp|first3=S|volume=112|issue=3|pages=623–30|doi=10.1097/ALN.0b013e3181cf894a|pmc=2935677}}</ref>

Xenon upregulates hypoxia inducible factor 1 alpha (HIF1a).

Xenon gas was added as an ingredient of the [[Mechanical ventilation|ventilation mix]] for a newborn baby at [[St. Michael's Hospital, Bristol]], England, whose life chances were otherwise very compromised, and was successful, leading to the authorisation of [[clinical trial]]s for similar cases.<ref>{{cite news | author=Staff

| title=First baby given xenon gas to prevent brain injury

| work=BBC News | date=April 9, 2010

| url=http://news.bbc.co.uk/1/hi/england/bristol/8611130.stm

| accessdate=2010-04-09 }}</ref> The treatment is done simultaneously with [[Hypothermia therapy for neonatal encephalopathy|cooling]] the [[Thermoregulation|body temperature]] to {{nowrap|33.5 °C}}.<ref>{{cite web | accessdate=2011-10-19

| first=Sian | last=Newman | publisher=Swansea University

| url=http://www.swan.ac.uk/medicine/newsandevents/ilsnewsbulletinhiddenpages/drjohndingley-babyriley/

| title=Xenon gas used in a bid to reduce brain injury in newborns }}</ref>

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====成像====

[[放射性同位素]]<sup>133</sup>Xe的[[伽馬射線]]可用來對心、肺和腦進行成像，例如[[單光子發射電腦攝影]]。<sup>133</sup>Xe也被用於測量[[血流]]。<ref>{{cite book

|first=Ernst|last=Van Der Wall|year=1992

|title=What's New in Cardiac Imaging?: SPECT, PET, and MRI

|publisher=Springer|isbn=0-7923-1615-0|url=http://books.google.com/?id=PypZMUhqnK8C&pg=PA41

}}</ref><ref>{{cite journal

|last=Frank|first=John

|title=Introduction to imaging: The chest

|journal=Student BMJ|year=1999|volume=12|pages=1–44

|url=http://student.bmj.com/issues/04/01/education/8.php

|accessdate=2008-06-04

}}</ref><ref>{{cite web

|last=Chandak|first=Puneet K.|date=July 20, 1995

|url=http://brighamrad.harvard.edu/education/online/BrainSPECT/Theory/Xenon133.html

|title=Brain SPECT: Xenon-133|publisher=Brigham RAD

|accessdate=2008-06-04}}</ref>

氙是一種很好的[[磁共振成像]]（MRI）[[造影劑]]。氙氣可以用來對多孔組織的空間和肺泡進行成像。[[超極化 (物理學)|超極化]]的<sup>129</sup>Xe同位素在磁共振成像儀中更易檢測，所以被用於研究包括肺在內的各種器官，例如肺內氣體的流動。<ref>{{cite journal

|last=Albert|first=M. S.|coauthors=Balamore, D.

|title=Development of hyperpolarized noble gas MRI

|journal=Nuclear Instruments and Methods in Physics Research A

|year=1998|volume=402

|issue=2–3|pages=441–53

|doi=10.1016/S0168-9002(97)00888-7 |pmid=11543065

|bibcode = 1998NIMPA.402..441A }}</ref><ref>{{cite news

|last=Irion|first=Robert|date=March 23, 1999

|title=Head Full of Xenon?|publisher=Science News

|url=http://sciencenow.sciencemag.org/cgi/content/full/1999/323/3

|accessdate=2007-10-08| archiveurl = http://web.archive.org/web/20040117194538/http://sciencenow.sciencemag.org/cgi/content/full/1999/323/3| archivedate = January 17, 2004}}</ref>氙可溶於水，又可溶於[[疏水性]]溶劑，這有助於對軟組織進行成像。<ref>{{cite journal

|title=Intravascular delivery of hyperpolarized 129Xenon for in vivo MRI

|journal= Applied Magnetic Resonance |volume=15|issue=3–4

|year=1998|doi=10.1007/BF03162020

|pages=343–352|author=Wolber, J.

|last2=Rowland

|first2=I. J.

|last3=Leach

|first3=M. O.

|last4=Bifone

|first4=A.}}</ref><ref>{{cite journal

|pmid=19703880 |year=2009 |author=Driehuys, B.; Möller, H.E.; Cleveland, Z.I.; Pollaro, J.; Hedlund, L.W.;

|title=Pulmonary perfusion and xenon gas exchange in rats: MR imaging with intravenous injection of hyperpolarized 129Xe

|volume=252 |pages=386–93

|doi=10.1148/radiol.2522081550|pmc=2753782

|journal=Radiology

|issue=2|ssrn=2}}</ref><ref>{{cite journal

|pmid=19702286|year=2009

|author=Cleveland, Z.I.; Möller, H.E.; Hedlund, L.W.; Driehuys, B.

|title=Continuously infusing hyperpolarized 129Xe into flowing aqueous solutions using hydrophobic gas exchange membranes

|volume=113 |issue=37 |pages=12489–99

|doi=10.1021/jp9049582 |pmc=2747043

|journal=The journal of physical chemistry}}</ref>

氙的原子質量較高，與氪混合後可作[[X射線]]攝影的造影劑。

===核磁共振波譜法===

由於氙擁有較大、較敏感的外電子層，所以其核磁共振光譜會對氙原子周圍的化學條件有相應的變化。例如，溶於水、疏水性溶劑和某些[[蛋白質]]的氙可通過[[核磁共振波譜法]]區分開來。<ref>{{cite journal

|journal=Magnetic Resonance in Chemistry |volume=27

|issue=10 |page=950 |doi=10.1002/mrc.1260271009

|title=Interpretation of the solvent effect on the screening constant of Xe-129 |author=Luhmer, M.

|year=1989

|last2=Dejaegere

|first2=A.

|last3=Reisse

|first3=J.

}}</ref><ref>{{cite journal

|author=Rubin, Seth M.; Spence, Megan M.; Goodson, Boyd M.; Wemmer, David E.; Pines, Alexander

|title=Evidence of nonspecific surface interactions between laser-polarized xenon and myoglobin in solution

|journal=Proceedings of the National Academy of Science USA

|date=August 15, 2000 |volume=97

|pmid=10931956 |issue=17

|pmc=16888 |pages=9472–5

|doi=10.1073/pnas.170278897|bibcode = 2000PNAS...97.9472R }}</ref>

氙也應用在[[表面科學]]中。核磁共振一般很難檢測樣本的表面，因為表面底下的大量原子核會完全蓋過有用的信號。超極化的氙氣能夠將自身的[[自旋]]只傳遞到固體表面，使表面所發出的信號可以與樣本內部的信號區分開來。<ref>{{cite journal

|doi=10.1021/ja972035d |title=Optical Pumping and Magic Angle Spinning: Sensitivity and Resolution Enhancement for Surface NMR Obtained with Laser-Polarized Xenon

|year=1997 |author=Raftery, Daniel; MacNamara, Ernesto; Fisher, Gregory; Rice, Charles V.; Smith, Jay

|journal=Journal of the American Chemical Society

|volume=119

|issue=37 |page=8746

}}</ref><ref>{{cite journal

|author=Gaede, H. C.; Song, Y. -Q.; Taylor, R. E.; Munson, E. J.; Reimer, J. A.; Pines, A.

|doi=10.1007/BF03162652

|title=High-field cross polarization NMR from laser-polarized xenon to surface nuclei

|year=1995 |journal=Applied Magnetic Resonance

|volume=8

|issue=3–4 |page=373}}</ref>

===其他===

[[原子核物理學]]的[[氣泡室]]可以使用氙。<ref>{{cite book

|first=Peter Louis|last=Galison|year=1997

|title=Image and Logic: A Material Culture of Microphysics

|page=339|url=http://books.google.com/?id=HnRDiDtO5yoC&pg=PA339|publisher=University of Chicago Press|isbn=0-226-27917-0}}</ref>氙也可用於任何需要高分子（原子）質量、低反應性物質的用途。[[核武器]]試驗所產生的副產品中有具放射性的氙-133和氙-135。通過測量這些同位素，人們可以判斷是否有國家進行核試驗，<ref>{{cite journal

|author=Fontaine, J.-P.; Pointurier, F.; Blanchard, X.; Taffary, T.|title=Atmospheric xenon radioactive isotope monitoring|journal=Journal of Environmental Radioactivity

|volume=72|issue=1–2|pages=129–35|year=2004

|doi=10.1016/S0265-931X(03)00194-2

|pmid=15162864}}</ref>其中包括[[朝鮮]]。<ref>{{cite journal

|author=Garwin, Richard L.; von Hippel Frank N.

|title=A Technical Analysis: Deconstructing North Korea's October 9 Nuclear Test|publisher=Arms Control Association

|journal=Arms Control Today|volume=38|issue=9

|month=November|year=2006|accessdate=2009-03-26

|url=http://www.armscontrol.org/act/2006\_11/tech}}</ref>

[[Image:Xenon ion engine prototype.png|left|thumb|正在[[美國太空總署]][[噴氣對進實驗室]]進行測試的氙離子發動機。]]

科學家利用液態氙[[熱量計]]<ref>{{cite journal

|author=Gallucci, G.

|title=The MEG liquid xenon calorimeter

|journal=Journal of Physics: Conference Series

|volume=160

|issue=1

|year=2009

|doi=10.1088/1742-6596/160/1/012011

|page=012011

|bibcode = 2009JPhCS.160a2011G }}</ref>來測量[[伽馬射線]]，并用液態氙尋找[[大質量弱相互作用粒子]]（WIMP）。理論預測，當WIMP撞擊氙原子核，會移除一顆電子，產生閃爍。如果使用氙，這一閃爍可以輕易地從其他由[[宇宙射線]]所造成的能量爆發分辨開來。<ref name="ball">{{cite web

|last=Ball|first=Philip|date=May 1, 2002

|url=http://www.nature.com/news/2002/020429/full/news020429-6.html

|title=Xenon outs WIMPs|publisher=Nature

|accessdate=2007-10-08}}</ref>不過，意大利[[大薩索國家實驗室]]（Laboratori Nazionali del Gran Sasso）的「XENON」實驗以及英國伯比地底實驗室（Boulby Underground Laboratory）的ZEPLIN-II和ZEPLIN-III實驗都還沒有找到證實WIMP存在的證據。雖然沒有發現WIMP，但這些實驗有助於縮小[[暗物質]]的可能屬性範圍，以及改進相關的物理模型。<ref>{{cite web

|last=Schumann|first=Marc|date=October 10, 2007

|url=http://xenon.physics.rice.edu/

|title=XENON announced new best limits on Dark Matter

|publisher=Rice University|accessdate=2007-10-08

}}</ref><ref>{{cite journal | display-authors=1

| last1=Lebedenko | first1=V. N. | last2=Araújo | first2=H. M.

| last3=Barnes | first3=E. J. | last4=Bewick | first4=A.

| last5=Cashmore | first5=R. | last6=Chepel | first6=V.

| last7=Currie | first7=A. | last8=Davidge | first8=D.

| last9=Dawson | first9=J.

|title=Results from the first science run of the ZEPLIN-III dark matter search experiment

|journal=Physical Review D|volume=80|issue=5

|year=2009|doi=10.1103/PhysRevD.80.052010

|bibcode=2009PhRvD..80e2010L

|page=052010 |arxiv = 0812.1150 }}</ref>

[[氙]]的[[電離能]]很低，是一種很好的[[航天器]][[離子推力器]][[推進劑]]。氙在[[室溫]]下能夠以液態儲存，在推力器運作時可輕易轉化為氣體。由於氙的化學惰性，它不會對環境造成破壞，或像[[汞]]或[[銫]]等其他燃料一樣侵蝕離子推進器。1970年代，某些[[人造衛星]]開始使用氙離子推進器。<ref>{{cite web

|last=Zona|first=Kathleen|date=March 17, 2006

|url=http://www.nasa.gov/centers/glenn/about/fs08grc.html

|title=Innovative Engines: Glenn Ion Propulsion Research Tames the Challenges of 21st century Space Travel

|publisher=NASA|accessdate=2007-10-04}}</ref>美國的[[深空一號]]和[[曙光號]]探測器以及歐洲的[[SMART-1]]飛行器都用到了氙離子推進器。<ref name="saccoccia">{{cite news

|last=Saccoccia|first=G.

|coauthors=del Amo, J. G.; Estublier, D.

|title=Ion engine gets SMART-1 to the Moon

|date=August 31, 2006|publisher=ESA

|url=http://www.esa.int/SPECIALS/SMART-1/SEMLZ36LARE\_0.html|accessdate=2007-10-01}}</ref><ref>{{cite web

|url=http://www.jpl.nasa.gov/news/press\_kits/dawn-launch.pdf|format=PDF

|title=Dawn Launch: Mission to Vesta and Ceres

|publisher=NASA|accessdate=2007-10-01}}</ref>

[[高氙酸鹽]]可在[[分析化學]]中用作[[氧化劑]]。[[二氟化氙]]是一種[[硅]]的腐蝕劑，應用在[[微機電系統]]中。<ref>{{cite conference

|last=Brazzle|first=J. D.

|coauthors=Dokmeci, M. R.; Mastrangelo, C. H.

|title=Modeling and Characterization of Sacrificial Polysilicon Etching Using Vapor-Phase Xenon Difluoride

|booktitle=Proceedings 17th IEEE International Conference on Micro Electro Mechanical Systems (MEMS)

|pages=737–740

|publisher=IEEE

|date=July 28&nbsp;– August 1, 1975

|location=Maastricht, Netherlands

|isbn=978-0-7803-8265-7}}</ref>二氟化氙與[[尿嘧啶]]反應後，會產生抗癌藥物[[5-氟尿嘧啶]]。<ref>{{cite web |author=Staff|year=2007|url=http://portal.acs.org/portal/PublicWebSite/education/whatischemistry/landmarks/bartlettnoblegases/index.htm

|title=Neil Bartlett and the Reactive Noble Gases|publisher=American Chemical Society

|accessdate=June 5, 2012}}</ref>氙在[[X射線晶體學]]中可用來研究[[蛋白質]]的結構和功用。氙氣在壓力為0.5至5&nbsp;[[帕斯卡|MPa]]（5至50&nbsp;[[標準大氣壓|atm]]）的時候，其原子會結合到蛋白質晶體的[[疏水性]]孔穴中。這一產物含有更高質量的原子，但不改變原先的晶體結構，因此可被用於解[[相位問題]]。<ref>{{cite web

|author=Staff|date=December 21, 2004

|url=http://www.srs.ac.uk/px/facilities/xenon\_notes\_1.html

|archiveurl=http://web.archive.org/web/20050316174727/http://www.srs.ac.uk/px/facilities/xenon\_notes\_1.html

|archivedate=2005-03-16

|title=Protein Crystallography: Xenon and Krypton Derivatives for Phasing

|publisher=Daresbury Laboratory, PX

|accessdate=2007-10-01

}}</ref><ref>{{cite book

|first=Jan|last=Drenth|coauthors=Mesters, Jeroen

|chapter=The Solution of the Phase Problem by the Isomorphous Replacement Method

|pages=123–171|doi=10.1007/0-387-33746-6\_7

|title=Principles of Protein X-Ray Crystallography

|publisher=Springer|location=New York

|isbn= 978-0-387-33334-2|edition=3rd

|year=2007}}</ref>

<div style="clear:both;"></div>

==安全==

許多含氧的氙化合物都是具有毒性的強氧化劑。同時因為很容易分解成氙元素和氧分子（O<sub>2</sub>），這些化合物還具有爆炸性。<ref name="finkel68">{{cite web

|last=Finkel|first=A. J.

|coauthors=Katz, J. J.; Miller, C. E.

|date=April 1, 1968

|url=http://ntrs.nasa.gov/search.jsp?R=306918&id=2&qs=No%3D40%26Ne%3D26%26N%3D297%2B140%26Ns%3DPublicationYear%257C0

|title=Metabolic and toxicological effects of water-soluble xenon compounds are studied

|publisher=NASA|accessdate=2007-10-04}}</ref>

氙氣在[[標準溫度和壓力]]下可以安全地存放在一般的玻璃或金屬容器中。由於氙可溶於大部份[[塑料]]和[[橡膠]]，因此會從這些材料的容器中慢慢逃逸出去。<ref>{{

cite journal

|last=LeBlanc|first=Adrian D.

|coauthors=Johnson, Philip C.

|title=The handling of xenon-133 in clinical studies

|year=1971|journal=Physics in Medicine and Biology

|volume=16|issue=1|pages=105–9

|doi=10.1088/0031-9155/16/1/310

|pmid=5579743|bibcode = 1971PMB....16..105L }}</ref>氙本身並不具毒性，但它可溶於血，並且可以穿透[[血腦屏障]]。氙與氧氣混合後吸入，可以達到手術[[麻醉劑]]的效果。<ref name="finkel68" />

氙氣中的[[音速]]為每秒169米，比空氣中的音速低。{{refn|group=注|在0&nbsp;°C，107&nbsp:KPa條件下，氙氣的音速為169.44&nbsp;m/s，空氣的音速為344&nbsp;m/s。<ref>{{cite journal

|last=Vacek|first=V.

|coauthors=Hallewell, G.; Lindsay, S.

|title=Velocity of sound measurements in gaseous per-fluorocarbons and their mixtures

|journal=Fluid Phase Equilibria

|year=2001|volume=185

|issue=1–2|pages=305–314

|doi = 10.1016/S0378-3812(01)00479-4}}</ref>}}這是由於氙原子較氧和氮分子重，因此平均速度較低。當[[聲道]]中充滿氙氣時，共振頻率會降低。因此吸入氙氣後說話的音色會比正常低沉，與吸入[[氦氣]]後音色提高的現象相反。氙的麻醉效果比[[一氧化二氮]]強，而過量吸入氙氣也會造成窒息。因此，許多大學在進行有關氣體改變音色的化學演示時，已不再使用氙氣，而改用分子量相近的[[六氟化硫]]氣體。雖然過量吸入六氟化硫仍會造成窒息，但是它不具麻醉效果。<ref>{{cite web

|first=Steve|last=Spangler|year=2007

|url=http://www.stevespanglerscience.com/experiment/from-donald-duck-to-barry-white-how-gases-change-your-voice

|title=Anti-Helium – Sulfur Hexafluoride

|publisher=Steve Spangler Science

|accessdate=2007-10-04}}</ref>

如果氙氣與氧氣混合，而氧氣含量至少有20%，那人體是可以安全吸入的。80%氙氣和20%氧氣的混合氣體會迅速使人失去意識，因此在醫學手術中被用作[[全身麻醉劑]]。呼吸作用會有效地混合不同密度的氣體，所以較重的氙氣並不會積聚在肺的底部，而是會和其他氣體一起呼出。<ref>{{cite journal

|last=Yamaguchi|first=K.

|coauthors=Soejima, K.; Koda, E.; Sugiyama, N

|title=Inhaling Gas With Different CT Densities Allows Detection of Abnormalities in the Lung Periphery of Patients With Smoking-Induced COPD

|journal=Chest Journal

|year=2001|volume=51|pages=1907–16

|doi= 10.1378/chest.120.6.1907|pmid=11742921|issue=6}}</ref>然而如果大量氙氣在密閉空間中洩漏出來，會在底部積聚。由於氙無色、無味，所以當人員進入該空間時，很可能會不經意地吸入大量的氙氣。一般的氙氣儲存量并不足以導致這種情況的發生，但在任何缺乏通風的空間中存放氙都具有以上的潛在危險。<ref>{{cite web

|author=Staff|date=August 1, 2007

|url=http://www-group.slac.stanford.edu/esh/hazardous\_substances/cryogenic/p\_hazards.htm

|title=Cryogenic and Oxygen Deficiency Hazard Safety

|publisher=Stanford Linear Accelerator Center

|accessdate=2007-10-10| archiveurl = http://web.archive.org/web/20070609173316/http://www-group.slac.stanford.edu/esh/hazardous\_substances/cryogenic/p\_hazards.htm| archivedate = June 9, 2007}}</ref>

==備註==

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\* [http://wwwrcamnl.wr.usgs.gov/isoig/period/xe\_iig.html USGS Periodic Table – Xenon]

\* [http://environmentalchemistry.com/yogi/periodic/Xe.html EnvironmentalChemistry.com – Xenon]

\* [http://www.anaesthetist.com/anaes/drugs/xenon.htm Xenon as an anesthetic]

\* [http://nobelprize.org/nobel\_prizes/chemistry/laureates/1904/ramsay-lecture.html Sir William Ramsay's Nobel-Prize lecture (1904)]

{{元素週期表}}

{{氙化合物}}

{{全身麻醉藥}}

[[Category:氙| ]]

[[Category:稀有气体]]

[[Category:第5周期元素|5R]]

[[Category:化学元素|5R]]

[[Category:火箭推进剂]]

[[Category:N-甲基-D-天冬氨酸受体拮抗剂]]

{{Link FA|de}}

{{Link FA|en}}

{{Link FA|sv}}

{{Link GA|ro}}