

科目： 291007

知能類： K1.01 [2.6/2.7]

序號： B637 (P2135)

High differential pressure in a demineralizer could be caused by all of the following except...

- A. resin exhaustion.
- B. resin overheating.
- C. crud buildup.
- D. high flow rate.

ANSWER: A.

下列何者不是一除礦器中之高差壓的形成因素？

- A. 樹脂耗竭
- B. 樹脂過熱
- C. 污垢累積
- D. 高流量

答案： A.

科目： 291007

知能類： K1.01 [2.6/2.7]

序號： B737 (P935)

A demineralizer is being used in a water purification system. How will accumulation of suspended solids in the demineralizer affect performance of the demineralizer?

- A. The rate of resin depletion will increase.
- B. The flow rate of water through the demineralizer will increase.
- C. The differential pressure across the demineralizer will decrease.
- D. The rate of unwanted ion removal from the system will decrease.

ANSWER: D.

一除礦器用於一淨水系統。此除礦器中之懸浮固體累積，對於除礦器性能之影響為何？

- A. 樹脂耗竭率會增加
- B. 通過除礦器的流量會增加
- C. 除礦器的差壓會減小
- D. 系統離子移除率會減小

答案： D.

科目： 291007

知能類： K1.02 [2.8/2.9]

序號： B152 (P1835)

The ion exchange efficiency of a condensate demineralizer can be determined by...

- A. sampling the inlet and outlet of the demineralizer to determine the change in conductivity.
- B. performing a calculation based on the ratio between the inlet pH divided by the outlet pH.
- C. sampling the inlet and outlet of the demineralizer to determine the difference in activity.
- D. performing a calculation based on the change in differential pressure across the demineralizer.

ANSWER: A.

冷凝水除礦器的離子交換效率可藉由何種方式決定？

- A. 在除礦器的進口與出口取樣，以其導電度的改變來決定
- B. 由進口處pH值除以出口處pH值所得之比例進行計算
- C. 在除礦器的進口與出口取樣，以其活性的差異來決定
- D. 根據通過除礦器的差壓變化而進行計算

答案： A.

科目： 291007

知能類： K1.02 [2.5/2.6]

序號： B839 (P835)

The demineralization factor of a demineralizer can be expressed as...

- A. (Inlet Conductivity) - (Outlet Conductivity).
- B. (Outlet Conductivity) - (Inlet Conductivity).
- C. (Inlet Conductivity)  $\div$  (Outlet Conductivity).
- D. (Outlet Conductivity)  $\div$  (Inlet Conductivity).

ANSWER: C.

除礦器之除礦係數因子可以表示為

- A. (進口導電度) - (出口導電度)
- B. (出口導電度) - (進口導電度)
- C. (進口導電度)  $\div$  (出口導電度)
- D. (出口導電度)  $\div$  (進口導電度)

答案： C.

科目： 291007

知能類： K1.02 [2.5/2.6]

序號： B1437 (P2236)

To determine the demineralization factor for a demineralizer, the two parameters that must be monitored are inlet and outlet...

- A. pH.
- B. conductivity.
- C. suspended solids.
- D. pressure.

ANSWER: B.

為決定一除礦器之除礦係數因子，則需要監控之兩參數為進口與出口處之

- A. pH值
- B. 導電度
- C. 懸浮固體
- D. 壓力

答案： B.

科目： 291007

知能類： K1.02 [2.5/2.6]

序號： B2737 (P2735)

What percentage of impurities is being removed from the water passing through an ion exchanger if the ion exchanger has a decontamination factor of 25?

A. 99%

B. 96%

C. 88%

D. 75%

ANSWER: B.

若離子交換器之除污係數因子為25，則通過此離子交換器之水中雜質移除百分率為

A. 99%

B. 96%

C. 88%

D. 75%

答案： B.

科目： 291007

知能類： K1.02 [2.5/2.6]

序號： B2837 (P936)

The ion exchange efficiency of a condensate demineralizer is determined by performing a calculation using the...

- A. change in conductivity at the outlet of the demineralizer over a period of time.
- B. change in pH at the outlet of the demineralizer over a period of time.
- C. demineralizer inlet and outlet conductivity.
- D. demineralizer inlet and outlet pH.

ANSWER: C.

冷凝水除礦器的離子交換效率是由對何者進行計算求得？

- A. 除礦器出口於某段時間所發生的導電度變化
- B. 除礦器出口於某段時間所發生的pH值變化
- C. 除礦器進口與出口之導電度
- D. 除礦器進口與出口之pH值

答案： C.

科目： 291007

知能類： K1.02 [2.5/2.6]

序號： B3238 (P3235)

What percentage of ionic impurities is being removed from the water passing through an ion exchanger if the ion exchanger has a decontamination factor of 50?

A. 98%

B. 96%

C. 75%

D. 50%

ANSWER: A.

若離子交換器之除污係數因子為50，則通過此離子交換器之水中離子雜質移除百分率為

A. 98%

B. 96%

C. 75%

D. 50%

答案： A.



科目： 291007

知能類： K1.02 [2.5/2.6]

序號： B3437 (P3435)

The decontamination factor (also called the demineralization factor) of a condensate demineralizer has just been determined to be 50, based on conductivity measurements.

If condensate having a conductivity of 20  $\mu\text{mho/cm}$  is flowing into this demineralizer, which one of the following is the conductivity of the condensate at the outlet of the demineralizer?

- A. 0.4  $\mu\text{mho/cm}$
- B. 1.0  $\mu\text{mho/cm}$
- C. 4.0  $\mu\text{mho/cm}$
- D. 10.0  $\mu\text{mho/cm}$

ANSWER: A.

根據導電度測量，某冷凝水除礦器之除污係數因子（亦稱為除礦係數因子）為50。若導電度為20  $\mu\text{mho/cm}$ 之冷凝水流過此除礦器，則此除礦器出口處之冷凝水導電度為何？

- A. 0.4  $\mu\text{mho/cm}$
- B. 1.0  $\mu\text{mho/cm}$
- C. 4.0  $\mu\text{mho/cm}$
- D. 10.0  $\mu\text{mho/cm}$

答案： A.

科目： 291007

知能類： K1.02 [2.5/2.6]

序號： B3637 (P3636)

The decontamination factor (or demineralization factor) of a condensate demineralizer has just been determined to be 10, based on conductivity measurements.

If condensate having a conductivity of 20  $\mu\text{mho/cm}$  is flowing into this demineralizer, which one of the following is the conductivity of the condensate at the outlet of the demineralizer?

- A. 0.5  $\mu\text{mho/cm}$
- B. 2.0  $\mu\text{mho/cm}$
- C. 5.0  $\mu\text{mho/cm}$
- D. 10.0  $\mu\text{mho/cm}$

ANSWER: B.

根據導電度測量，某冷凝水除礦器之除污係數因子（亦稱為除礦係數因子）為10。若導電度為20  $\mu\text{mho/cm}$ 之冷凝水流過此除礦器，則此除礦器出口處之冷凝水導電度為何？

- A. 0.5  $\mu\text{mho/cm}$
- B. 2.0  $\mu\text{mho/cm}$
- C. 5.0  $\mu\text{mho/cm}$
- D. 10.0  $\mu\text{mho/cm}$

答案： B.

科目： 291007

知能類： K1.03 [2.8/2.9]

序號： B38

What adverse effect occurs due to channeling in a demineralizer?

- A. Increased demineralizer outlet conductivity because much of the resin is essentially bypassed
- B. Loss of resin due to agitation resulting from increased fluid velocity through the Demineralizer
- C. Resin dryout and cracking because much of the resin is essentially bypassed
- D. Resin damage due to the increased velocity of fluid through the demineralizer

ANSWER: A.

除礦器發生通道效應(channeling)，則會產生下列何者不利結果？

- A. 除礦器出口處導電度提高，因為大部分的樹脂發生旁通現象
- B. 因為通過除礦器的流量增加產生攪拌現象導致樹脂損失
- C. 樹脂乾枯與破裂，因為大部分的樹脂發生旁通現象
- D. 樹脂受損，因為通過除礦器的流量增加

答案： A.

科目： 291007

知能類： K1.03 [2.5/2.6]

序號： B236

Channeling in a demineralizer is undesirable because the...

- A. ability of the resin bed to remove undesirable ions will decrease and cause outlet conductivity to increase.
- B. ability of the resin bed to remove suspended solids will decrease and cause outlet pH to increase.
- C. resulting high velocity fluid flow will cause agitation of the resin beads and the release of unwanted ions.
- D. resulting high velocity fluid flow can cause significant damage to resin retention elements.

ANSWER: A.

不欲看見除礦器發生通道效應(channeling)，乃因為

- A. 樹脂床移除離子的能力會下降，同時導致出口處的導電度提高
- B. 樹脂床移除懸浮固體的能力會下降，同時導致出口處的pH值提高
- C. 所產生的高速流體將會導致樹脂顆粒發生攪拌現象，同時釋放出不要的離子
- D. 所產生的高速流體將會導致樹脂滯留元件(resin retention elements)受損

答案： A.

科目： 291007

知能類： K1.03 [2.8/2.9]

序號： B838 (P1636)

Which one of the following, if processed through a demineralizer, will rapidly reduce the effectiveness of the demineralizer?

- A. Oily water
- B. Condensate
- C. Makeup water
- D. Radioactive water

ANSWER: A.

下列何者若經由除礦器處理，則會快速地降低除礦器的效率？

- A. 油性水
- B. 冷凝水
- C. 補給水
- D. 放射性水

答案： A.

科目： 291007

知能類： K1.03 [2.8/2.9]

序號： B1038.

Which one of the following refers to the condition in which large portions of a demineralizer resin bed are bypassed, thereby allowing waterborne impurities to reach the outlet?

- A. Channeling
- B. Leaching
- C. Exhaustion
- D. Mineralization

ANSWER: A.

一除礦器樹脂床大部分發生旁通，而使得水中雜質到達出口處，則此現象稱為

- A. 通道現象(channeling)
- B. 瀝濾現象(Leaching)
- C. 耗竭現象(Exhaustion)
- D. 礦物化現象(mineralization)

答案： A.

科目： 291007

知能類： K1.03 [2.8/2.9]

序號： B1237 (P2035)

Which one of the following conditions will lead to channeling in a demineralizer?

- A. Suspended solids and insoluble particles forming a mat on the surface of the resin bed
- B. A sudden 10°F decrease in the temperature of the influent to the demineralizer
- C. Exhaustion of the resin bed due to high conductivity of the demineralizer influent
- D. Operation of the demineralizer with influent flow rate at 10% below design flow rate

ANSWER: A.

下列何種狀況會導致除礦器發生通道現象？

- A. 懸浮固體與不溶粒子在樹脂床表面形成氈狀結構
- B. 除礦器的流入物溫度突然降低10°F
- C. 因為除礦器的流入物的高導電度所造成的樹脂床耗竭
- D. 除礦器在流入流量較設計流量低10%情況下運轉

答案： A.

科目： 291007

知能類： K1.04 [2.8/2.9]

序號： B118

The purpose of a mixed-bed demineralizer is to...

- A. raise the conductivity of water with little effect on pH.
- B. reduce the conductivity of water with little effect on pH.
- C. increase the pH of water by reducing the number of positively charged ions in it.
- D. decrease the pH of water by increasing the number of negatively charged ions in it.

ANSWER: B.

混合床除礦器的目的是

- A. 在對pH值影響不大情況下，提高水的導電度
- B. 在對pH值影響不大情況下，降低水的導電度
- C. 藉由減少水中正電離子的數量而提高水的 pH值
- D. 藉由增加水中負電離子的數量而降低水的 pH值

答案： B.



科目： 291007

知能類： K1.05 [2.4/2.5]

序號： B1138 (P1535)

A condensate demineralizer differential pressure (D/P) gauge indicates 4 psid at 50% flow. Over the next two days plant power changes have caused condensate flow to vary between 25% and 100%. Which one of the following combinations of condensate flow and demineralizer D/P, observed during the power changes, indicates an increase in the accumulation of corrosion products in the demineralizer?

<u>CONDENSATE DEMINERALIZER</u>	<u>FLOW D/P (PSID)</u>
A. 100%	15.0
B. 75%	9.0
C. 60%	5.0
D. 25%	2.0

ANSWER: D.

在50%流量下，一冷凝水除礦器差壓指示為4 psid。在其後兩天中因電廠功率變化，使得冷凝水流量在25%與100%間變動。在電廠功率變化時，下列何種冷凝水流量與除礦器差壓的數據組合，表示除礦器中有腐蝕產物的堆積增加？

冷凝水流量    除礦器差壓 (psid)

A. 100%	15.0
B. 75%	9.0
C. 60%	5.0
D. 25%	2.0

答案： D.

科目： 291007

知能類： K1.05 [2.4/2.5]

序號： B1539 (P1537)

A higher than expected differential pressure across an operating demineralizer will be caused by...

- A. depletion of the cation resin.
- B. channeling through the resin bed.
- C. insufficient resin backwash.
- D. decreased demineralizer outlet conductivity.

ANSWER: C.

下列何者將導致通過一運轉中除礦器的差壓較預期為高？

- A. 陽離子樹脂耗竭
- B. 離子床發生通道效應(channeling)
- C. 樹脂逆洗不足
- D. 除礦器出口導電度下降

答案： C.

科目： 291007

知能類： K1.05 [2.4/2.5]

序號： B1736 (P1736)

A condensate demineralizer differential pressure (D/P) gauge indicates 6 psid at 50% flow rate.

Which one of the following combinations of condensate flow and demineralizer D/P observed later at various power levels indicates an increase in the accumulation of insoluble corrosion products in the demineralizer?

	<u>CONDENSATE DEMINERALIZER</u>	<u>FLOW D/P (PSID)</u>
A.	100%	23.5
B.	75%	16.5
C.	60%	8.5
D.	25%	1.5

ANSWER: B.

50%流量下，冷凝水除礦器差壓量測指示為6 psid。在後續電廠各種功率水平下，下列何種冷凝水流量與除礦器差壓的數據組合，表示除礦器中有不溶解的腐蝕產物堆積增加？

冷凝水流量    除礦器差壓 (psid)

A.	100%	23.5
B.	75%	16.5
C.	60%	8.5
D.	25%	1.5

答案： B.

科目： 291007

知能類： K1.05 [2.4/2.5]

序號： B2237 (P635)

How does demineralizer differential pressure indicate the condition of a demineralizer resin bed?

- A. Low differential pressure indicates flow blockage in the demineralizer.
- B. Low differential pressure indicates that the demineralizer resin bed is exhausted.
- C. High differential pressure indicates flow blockage in the demineralizer.
- D. High differential pressure indicates that the demineralizer resin bed is exhausted.

ANSWER: C.

除礦器差壓如何代表除礦器樹脂床之狀況？

- A. 低差壓代表除礦器內流體阻塞
- B. 低差壓代表除礦器樹脂床耗竭
- C. 高差壓代表除礦器內流體阻塞
- D. 高差壓代表除礦器樹脂床耗竭

答案： C.

科目： 291007

知能類： K1.05 [2.4/2.5]

序號： B2338 (P2335)

A condensate demineralizer differential pressure (D/P) gauge indicates 4.0 psid at 50% flow.

Over the next two days plant power changes have caused condensate flow to vary between 25% and 100%.

Which one of the following combinations of condensate flow and demineralizer D/P, observed during the power changes, indicates an increased accumulation of corrosion products in the demineralizer?

	<u>CONDENSATE DEMINERALIZER</u>	<u>FLOW D/P (PSID)</u>
A.	100%	15.0
B.	75%	9.0
C.	40%	3.0
D.	25%	1.0

ANSWER: C.

在50%流量下，冷凝水除礦器差壓量測指示為4 psid。在其後兩天中電廠功率發生變化，導致冷凝水流量在25%與100%間波動。在電廠功率改變下，下列何種冷凝水流量與除礦器差壓的數據組合，表示除礦器中有腐蝕產物的堆積增加？

冷凝水流量    除礦器差壓 (psid)

A.	100%	15.0
B.	75%	9.0
C.	40%	3.0
D.	25%	1.0

答案： C.

科目： 291007

知能類： K1.05 [2.4/2.5]

序號： B2638 (P2235)

A condensate demineralizer differential pressure (D/P) gauge indicates 4 psid at 50% flow rate. Which one of the following combinations of condensate flow and demineralizer D/P observed at various power levels indicates an increase in the accumulation of insoluble corrosion products in the demineralizer?

<u>CONDENSATE DEMINERALIZER</u>	<u>FLOW D/P (PSID)</u>
A. 25%	1.0
B. 60%	6.5
C. 75%	9.0
D. 100%	15.5

ANSWER: B.

在50%流量下，冷凝水除礦器差壓量測指示為4 psid。在電廠功率改變下，下列何種冷凝水流量與除礦器差壓的數據組合，表示除礦器中有不溶解的腐蝕產物堆積增加？

<u>冷凝水流量</u>	<u>除礦器差壓(psid)</u>
A. 25%	1.0
B. 60%	6.5
C. 75%	9.0
D. 100%	15.5

答案： B.

科目： 291007

知能類： K1.05 [2.4/2.5]

序號： B2938

A condensate demineralizer differential pressure (D/P) gauge indicates 9 psid at 50% flow. Over the next two days, plant power changes cause condensate flow to vary between 10% and 100%.

Which one of the following combinations of condensate flow and demineralizer D/P, if observed during the power changes, would indicate a detectable increase in the accumulation of corrosion products in the demineralizer?

<u>CONDENSATE DEMINERALIZER</u>	<u>FLOW D/P (PSID)</u>
A. 10%	0.3
B. 25%	3.3
C. 75%	20.3
D. 100%	35.3

ANSWER: B.

在50%流量下，冷凝水除礦器差壓量測指示為9 psid。在其後兩天中電廠功率發生變化，而使得冷凝水流量在10%與100%間產生波動。在功率變化時，下列何種冷凝水流量與除礦器差壓的數據組合，表示除礦器中可檢測到腐蝕產物累積量增加

<u>冷凝水流量</u>	<u>除礦器差壓(psid)</u>
A. 10%	0.3
B. 25%	3.3
C. 75%	20.3
D. 100%	35.3

答案： B.

科目： 291007

知能類： K1.06 [2.7/2.7]

序號： B238

The temperature of the water passing through a demineralizer must be controlled because excessively hot water will...

- A. increase the ion exchange rate for hydronium ions, thereby changing effluent pH.
- B. degrade the corrosion inhibitor applied to the inner wall of the demineralizer.
- C. result in excessive demineralizer retention element thermal expansion, thereby releasing resin.
- D. reduce the affinity of the demineralizer resin for ion exchange.

ANSWER: D.

通過除礦器的水，其溫度一定要受控制，因為過熱的水將會

- A. 增加對於水合氫離子的離子交換速率，因而改變流出物的pH值
- B. 使除礦器內壁的腐蝕抑制劑效能劣化
- C. 導致除礦器滯留元件(retention element)過度熱膨脹，因而釋出樹脂
- D. 降低除礦器離子交換樹脂之親和力

答案： D.



科目： 291007

知能類： K1.06 [2.7/2.7]

序號： B438

There is a temperature limit on the water entering a demineralizer because excessively hot water...

A. will decompose the resin beads.

B increases the potential for channeling.

C. causes the filter element to swell and release the resin.

D. will dislodge and wash the resin fines off the filter element.

ANSWER: A.

進入除礦器的水溫需有限制，因為過熱的水會

A. 分解樹脂顆粒(resin bead)

B. 增加通道效應(channeling)的可能性

C. 導致過濾元件膨脹，釋出樹脂

D. 使樹脂脫落，並將細樹脂沖洗出過濾元件

答案： A.

科目： 291007

知能類： K1.07 [2.3/2.5]

序號： B938

The cation resin in a mixed-bed demineralizer releases desirable \_\_\_\_\_ ions into solution while removing undesirable \_\_\_\_\_ ions from solution.

- A. negative; negative
- B. negative; positive
- C. positive; negative
- D. positive; positive

ANSWER: D.

混合床除礦器中之陽離子樹脂能將所要的\_\_\_\_\_離子釋放進入溶液內，而從溶液內移除不想要的\_\_\_\_\_離子。

- A. 陰；陰
- B. 陰；陽
- C. 陽；陰
- D. 陽；陽

答案： D.

科目： 291007

知能類： K1.07 [2.3/2.5]

序號： B1039

The anion resin in a mixed-bed demineralizer releases desirable \_\_\_\_\_ ions into solution while removing undesirable \_\_\_\_\_ charged ions from solution.

- A. hydroxide; negatively
- B. hydroxide; positively
- C. hydrogen; negatively
- D. hydrogen; positively

ANSWER: A.

混合床除礦器中之陰離子樹脂能將所要的\_\_\_\_\_離子釋放進入溶液內，而從溶液內移除不想要的\_\_\_\_\_離子。

- A. 氫氧；陰
- B. 氫氧；陽
- C. 氫；陰
- D. 氫；陽

答案： A.

科目： 291007

知能類： K1.07 [2.3/2.5]

序號： B1637

Which one of the following will decrease the time required for a demineralizer to reduce by onehalf the ionic impurities in a closed process water system?

- A. Divert 50% of the process water to bypass the demineralizer.
- B. Reverse the flow of process water through the demineralizer.
- C. Increase the temperature of the process water from 100°F to 110°F.
- D. Decrease the flow rate of the process water from 105 gpm to 90 gpm.

ANSWER: C.

在一密閉水處理系統中，下列何者會減少除礦器將離子雜質減半所需的時間？

- A. 分流50%的待處理水，使其旁通過除礦器
- B. 將通過除礦器的待處理水逆流
- C. 將待處理水的溫度從100°F增加到110°F
- D. 將待處理水流量從105gpm降低至90gpm

答案： C.

科目： 291007

知能類： K1.07 [2.3/2.5]

序號： B1639

If a dilute sodium chloride water solution is passed through an ideal mixed-bed demineralizer, the effluent stream would consist of...

- A. a sodium hydroxide solution.
- B. a hydrogen chloride solution.
- C. a sodium hypochlorite solution.
- D. pure water.

ANSWER: D.

若一稀釋的氯化鈉水溶液通過一理想之混合床除礦器，則出口流將包含

- A. 氫氧化鈉溶液
- B. 氯化氫溶液
- C. 次氯酸鈉溶液
- D. 純水

答案： D.

科目： 291007

知能類： K1.07 [2.3/2.5]

序號： B1738

Which one of the following describes the process of backwashing a mixed-resin deep bed demineralizer?

- A. Alternating the flow of dilute acidic and caustic solutions through the demineralizer to remove suspended solids and colloidal matter
- B. Alternating the flow of dilute acidic and caustic solutions through the demineralizer to remove ionic impurities
- C. Reversing flow of pure water through the demineralizer to remove suspended solids and colloidal matter
- D. Reversing flow of pure water through the demineralizer to remove ionic impurities

ANSWER: C.

於一混合樹脂深床除礦器，下列何者描述逆洗程序？

- A. 將稀釋之酸、鹼溶液交錯通過除礦器，以移除懸浮固體與膠體物質
- B. 將稀釋之酸、鹼溶液交錯通過除礦器，以移除離子雜質
- C. 將純水反向通過除礦器，以移除懸浮固體與膠體物質
- D. 將純水反向通過除礦器，以移除離子雜質

答案： C.

科目： 291007

知能類： K1.07 [2.3/2.5]

序號： B1838

When a mixed-bed demineralizer resin is exhausted, the resin should be replaced or regenerated because...

- A. ions previously removed by the resin will be released into solution.
- B. the resin will fracture and possibly escape through the retention screens.
- C. particles previously filtered out of solution will be released.
- D. the resin will physically bond together, thereby causing a flow blockage.

ANSWER: A.

當一混合床除礦器樹脂耗竭時，此樹脂應該替換或再生，因為

- A. 原本經由樹脂移除之離子將會被釋放進入溶液中
- B. 樹脂將會破裂而穿透濾網(retention screen)流失
- C. 原先自溶液中被過濾的粒子將會被釋放
- D. 樹脂會發生物理性結合，因此導致流體阻塞

答案： A.

科目： 291007

知能類： K1.07 [2.3/2.5]

序號： B2138 (P2836)

Refer to the drawing of a parallel demineralizer loop that is currently aligned for normal flow direction through the demineralizer (see figure below).

A minor seawater leak has occurred into the process water system, which is a closed system.

Which one of the following will decrease the time required for the demineralizer loop to reduce the concentration of ionic impurities in the process water system?

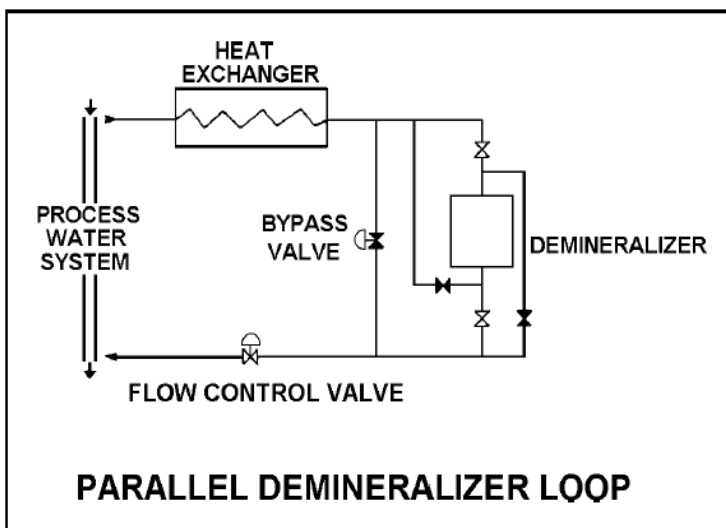
- A. Reverse the flow direction through the demineralizer.
- B. Divert 50% of the loop flow to bypass the demineralizer.
- C. Increase the flow rate in the loop from 95 gpm to 105 gpm.
- D. Decrease the temperature in the loop from 110°F to 100°F.

ANSWER: C.

參考目前排列為正常流向之並接式除礦器環路圖示（見下圖）。一微量之海水滲漏發生而進入密閉之水處理系統中。下列何者將會減少除礦器環路用於降低水處理系統中離子雜質濃度所需的時間？

- A. 將通過除礦器的流向逆轉
- B. 將50%的環路流分流旁通除礦器
- C. 將環路中水流量從95gpm增加至105gpm
- D. 將環路中水的溫度從110°F降低到100°F

答案： C.





科目： 291007

知能類： K1.07 [2.3/2.5]

序號： B2438

Which one of the following describes the process of regenerating a mixed-resin deep bed demineralizer? (Assume the demineralizer has already been backwashed.)

- A. Alternating the flow of acidic and caustic solutions through the demineralizer to remove suspended solids and colloidal matter.
- B. Alternating the flow of acidic and caustic solutions through the demineralizer to remove ionic impurities.
- C. Reversing flow of pure water through the demineralizer to remove suspended solids and colloidal matter.
- D. Reversing flow of pure water through the demineralizer to remove ionic impurities.

ANSWER: B.

下列何者描述了混合樹脂深床除礦器的再生程序？（假設除礦器已經經過逆洗。）

- A. 將酸、鹼溶液交錯通過除礦器，以移除懸浮固體與膠體物質
- B. 將酸、鹼溶液交錯通過除礦器，以移除離子雜質
- C. 將純水反向通過除礦器，以移除懸浮固體與膠體物質
- D. 將純水反向通過除礦器，以移除離子雜質

答案： B.

科目： 291007

知能類： K1.07 [2.3/2.5]

序號： B3739 (P3736)

Refer to the drawing of a parallel demineralizer loop that is currently aligned for normal flow direction through the demineralizer (see figure below).

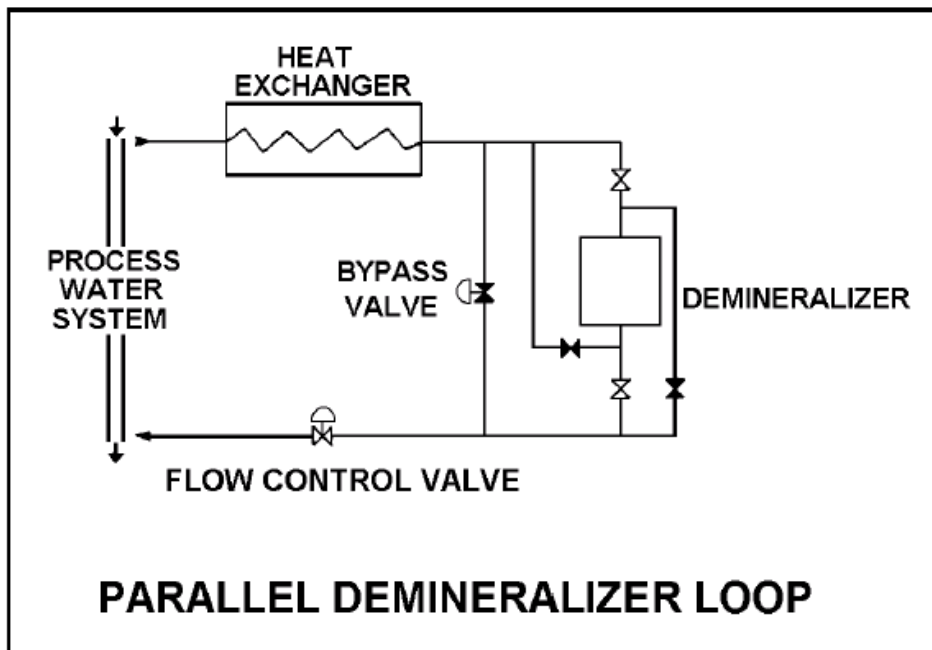
Which one of the following is most likely to cause a decrease in the demineralizer decontamination factor for ionic impurities?

- A. Divert 50% of the demineralizer loop flow to bypass the demineralizer.
- B. Decrease the process water system pressure from 125 psig to 115 psig.
- C. Decrease the flow rate in the demineralizer loop from 105 gpm to 65 gpm.
- D. Increase the temperature in the demineralizer loop from 140°F to 200°F.

ANSWER: D.

參考目前排列為正常流向之並接式除礦器環路圖示（見下圖）。下列何者最可能降低除礦器離子雜質除污係數因子？

- A. 將50%的環路流分流旁通除礦器
- B. 將水處理系統壓力從125psig降低至75psig
- C. 將除礦器環路流量從105gpm降低至65gpm
- D. 將除礦器環路溫度從140°F增加到200°F
- E. 答案： D.



科目： 291007

知能類： K1.08 [2.6/2.6]

序號： B337 (P1836)

A demineralizer that is continuously exposed to flowing water with high concentrations of suspended solids will first develop an increase in the...

- A. conductivity at the demineralizer outlet.
- B. decontamination factor of the demineralizer.
- C. differential pressure across the demineralizer.
- D. pH at the demineralizer outlet.

ANSWER: C.

一持續暴露於高懸浮固體濃度水流之除礦器，將會先發生何者的增加

- A. 除礦器出口的導電度
- B. 除礦器的除污係數因子
- C. 通過除礦器的差壓
- D. 除礦器出口的pH值

答案： C.

科目： 291007

知能類： K1.08 [2.6/2.6]

序號： B539 (P836)

A lower than expected differential pressure across a mixed-bed demineralizer is an indication of...

- A. depletion of the resin.
- B. channeling through the resin bed.
- C. improper resin regeneration.
- D. a decrease in inlet conductivity.

ANSWER: B.

通過混合床除礦器的差壓較預期為小，代表了

- A. 樹脂的消耗
- B. 樹脂床發生通道效應(channeling)
- C. 樹脂再生不當
- D. 進口導電度下降

答案： B.

科目： 291007

知能類： K1.08 [2.6/2.6]

序號： B639 (P1036)

As the operating time of a demineralizer increases, the differential pressure across the demineralizer...

- A. decreases due to resin breakdown.
- B. decreases due to resin bead surface erosion.
- C. increases due to trapping of suspended solids.
- D. increases due to depletion of ion exchange sites.

ANSWER: C.

除礦器的運轉時間增加，則通過除礦器的差壓會

- A. 因為樹脂的分解而降低
- B. 因為樹脂顆粒表面沖蝕而降低
- C. 因懸浮固體堵住而增加
- D. 因離子交換樹脂的消耗而增加

答案： C.

科目： 291007

知能類： K1.09 [2.7/2.7]

序號： B39 (P535)

Which one of the following is an indication of resin exhaustion in a demineralizer:

- A. An increase in suspended solids in the effluent
- B. A decrease in the flow rate through the demineralizer
- C. An increase in the conductivity of the effluent
- D. An increase in the differential pressure across the demineralizer

ANSWER: C.

下列何者為除礦器樹脂耗竭的指標？

- A. 出口水流的懸浮固體增加
- B. 通過除礦器的流量減小
- C. 出口水流的導電度增加
- D. 通過除礦器的差壓增加

答案： C.

科目： 291007

知能類： K1.09 [2.7/2.7]

序號： B239 (P2637)

A result of proper demineralizer operation on water with ionic impurities is that the exiting water will always have a...

- A. higher pH.
- B. lower pH.
- C. higher conductivity.
- D. lower conductivity.

ANSWER: D.

以除礦器適當處理含離子雜質的水，則其出口水質將會有

- A. 較高之pH值
- B. 較低之pH值
- C. 較高之導電度
- D. 較低之導電度

答案： D.

科目/題號：291007/1 (2016 新增)

知能類：K1.02 [ 2.5/2.6 ]

序號：B4219 (P4219)

The decontamination factor of a condensate demineralizer has just been determined to be 5.0, based on conductivity measurements.

If condensate having a conductivity of 20  $\mu\text{mho/cm}$  is flowing into this demineralizer, which one of the following is the conductivity of the condensate at the outlet of the demineralizer?

- A. 0.4  $\mu\text{mho/cm}$
- B. 4.0  $\mu\text{mho/cm}$
- C. 10.0  $\mu\text{mho/cm}$
- D. 100.0  $\mu\text{mho/cm}$

ANSWER: B.

根據導電度測量，某冷凝水除礦器之除污因子為5.0。若導電度為20  $\mu\text{mho/cm}$ 之冷凝水流過此除礦器，則此除礦器出口處之冷凝水導電度為何？

- A. 0.4  $\mu\text{mho/cm}$
- B. 4.0  $\mu\text{mho/cm}$
- C. 10.0  $\mu\text{mho/cm}$
- D. 100.0  $\mu\text{mho/cm}$

答案： B



科目/題號：291007/2 (2016 新增)

知能類：K1.02 [ 2.5/2.6 ]

序號：B4719 (P4718)

What percentage of ionic impurities is being removed from the water passing through an ion exchanger if the ion exchanger has a decontamination factor of 1.0?

A. 100 percent

B. 99 percent

C. 1 percent

D. 0 percent

ANSWER: D.

若離子交換器之除污因子為1.0，則通過此離子交換器之水中離子雜質移除百分比為？

A. 100%

B. 99%

C. 1%

D. 0%

答案：D

科目/題號：291007/3 (2016 新增)

知能類：K1.06〔2.7/2.7〕

序號：B7685 (P7685)

A mixed-bed ion exchanger is being used to process reactor coolant. The ion exchanger has been in service for 6 months at 100 percent power. A temperature controller malfunction causes the ion exchanger influent temperature to exceed the resin's maximum temperature limit before being manually restored to normal. Ion exchanger water chemistry analyses are being performed to check for resin decomposition.

Which one of the following water chemistry test results would indicate that significant resin decomposition has occurred?

- A. A significant decrease in the ion exchanger's effluent conductivity.
- B. A significant increase in the ion exchanger's effluent radioactivity.
- C. A significant increase in the ion exchanger's decontamination factor.
- D. A significant increase in the ion exchanger's effluent dissolved gases.

ANSWER: B.

某混合床離子交換器用來處理反應爐冷卻水，該離子交換器已經在全功率發電情況下運轉了6個月。由於一只溫度控制器的故障，導致在手動操作恢復正常前，該離子交換器的進水溫度已超過樹脂的最高溫度限值。之後採取該離子交換器的出水樣本作化學分析，判斷其樹脂是否已經分解。

下列各採樣化學分析結果，何者將可顯示樹脂已經嚴重分解？

- A. 該離子交換器的出水導電度明顯降低
- B. 該離子交換器的出水輻射強度明顯升高
- C. 該離子交換器的除污因子明顯升高
- D. 該離子交換器的出水溶解氣體含量明顯升高

答案： B

科目/題號：291007/4 (2016 新增)

知能類：K1.07 [ 2.3/2.5 ]

序號：B5419

Water is passing through an ion exchanger that contains only anion exchange resin. Currently, every available ion exchange site in the resin has exchanged its original anion and is occupied by a chloride ( $\text{Cl}^-$ ) anion. Assuming that water temperature does not change, what will be the effect on the ion exchanger if a new anion impurity is introduced into the water entering the ion exchanger?

- A. The new anions will bypass the occupied ion exchange sites under all circumstances.
- B. The new anions will take the place of the  $\text{Cl}^-$  anions on the ion exchange sites under all circumstances.
- C. The new anions will take the place of the  $\text{Cl}^-$  anions on the ion exchange sites only if the new anions have a greater negative charge than the  $\text{Cl}^-$  anions.
- D. The new anions will take the place of the  $\text{Cl}^-$  anions on the ion exchange sites only if the new anions have a greater affinity for the anion exchange resin.

ANSWER: D.

水通過某僅含陰離子樹脂的離子交換器，目前樹脂內所有離子交換位置的陰離子皆已被氯( $\text{Cl}^-$ )離子所取代。假設進水溫度不變，若引進離子交換器的水含有新的陰離子雜質，請問對該離子交換器的影響為何？

- A.任何情況下，這些新的陰離子會旁通已被氯( $\text{Cl}^-$ )離子取代的離子交換位置
- B.任何情況下，這些新的陰離子會取代離子交換位置的氯( $\text{Cl}^-$ )離子
- C.只有新的陰離子比氯陰離子帶有更大的負電荷時，這些新的陰離子才會取代離子交換位置的氯( $\text{Cl}^-$ )離子
- D.只有新的陰離子對陰離子交換樹脂有更高的親和力時，這些新的陰離子才會取代離子交換位置的氯( $\text{Cl}^-$ )離子

答案： D

科目/題號：291007/5 (2016 新增)

知能類：K1.07 [ 2.3/2.5 ]

序號：B5720

If water containing positively charged ionic impurities passes through a mixed-bed ion exchanger, the positively charged ionic impurities will be removed by the \_\_\_\_\_ exchange resin, with the corresponding release of \_\_\_\_\_ ions into the water.

- A. anion; negative
- B. anion; positive
- C. cation; negative
- D. cation; positive

ANSWER: D.

若含有陽離子雜質的水通過某混合床離子交換器，該陽離子雜質將被\_\_\_\_\_交換樹脂移除，然後釋出\_\_\_\_\_離子進入水中。

- A.陰離子；負
- B.陰離子；正
- C.陽離子；負
- D.陽離子；正

答案： D

科目/題號：291007/6 (2016 新增)

知能類：K1.07 [ 2.3/2.5 ]

序號：B5820 (P5819)

During a nuclear power plant cooldown, the reactor experiences a large crud burst. After 10 minutes, with stable reactor coolant chemistry parameters, the operators begin to record parameters for the in-service reactor coolant purification ion exchanger. The ion exchanger was recently filled with fresh resin.

Assuming no additional operator actions, what trend will the recorded parameters show during the next few hours?

- A. Increasing ion exchanger inlet water conductivity.
- B. Increasing ion exchanger outlet water conductivity.
- C. Increasing flow rate through the ion exchanger.
- D. Increasing radiation levels around the ion exchanger.

ANSWER: D.

某核電廠在降溫的過程中，反應爐內發生一次大型的積垢迸裂(crud burst)。十分鐘後反應爐冷卻水化學參數穩定，運轉員記錄反應爐冷卻水淨化離子交換器之參數。該離子交換器最近才剛換過新的樹脂。

倘若運轉員未採行其他的行動，則所記錄的參數在未來的數小時內將顯現怎樣的趨勢？

- A.離子交換器進水導電度升高
- B.離子交換器出水導電度升高
- C.通過離子交換器的水流量率增加
- D.離子交換器周圍的輻射強度升高

答案： D

科目/題號：291007/7 (2016 新增)

知能類：K1.07 [ 2.3/2.5 ]

序號：B6320 (P3537)

After 12 months of operation at 100 percent power, a reactor was shut down and a plant cooldown is in progress. An operator reports that the general area radiation level near the in-service reactor coolant ion exchanger has increased significantly since the cooldown began several hours ago.

Which one of the following is a typical cause of these indications, resulting from the cooldown?

- A. Increased radioactive tritium in the reactor coolant.
- B. Increased radioactive oxygen-16 dissolved in the reactor coolant.
- C. Increased radioactive nitrogen-16 dissolved in the reactor coolant.
- D. Increased radioactive corrosion products suspended in the reactor coolant.

ANSWER: D.

反應器以全功率運轉一年後停機，此時正進行降溫冷卻。運轉員通報從數小時前開始降溫起，使用中之反應器冷卻水離子交換器周圍的區域輻射強度大增。下列何者是造成此輻射強度大增的原因？

- A. 反應器冷卻水中的放射性氚增加
- B. 溶解於反應器冷卻水中的放射性氧-16增加
- C. 溶解於反應器冷卻水中的放射性氮-16增加
- D. 懸浮於反應器冷卻水的放射性腐蝕產物增加

答案： D

科目/題號：291007/8 (2016 新增)

知能類：K1.07 [ 2.3/2.5 ]

序號：B6419

Water is passing through an ion exchanger that contains only cation exchange resin. Currently, every available ion exchange site in the resin has exchanged its original cation and is occupied by a sodium ( $\text{Na}^+$ ) ion. Assuming that water temperature does not change, what will be the effect on the ion exchanger if a new cation impurity, other than  $\text{Na}^+$ , is introduced into the water entering the ion exchanger?

- A. The new cations will bypass the occupied ion exchange sites under all circumstances.
- B. The new cations will take the place of the  $\text{Na}^+$  ions on the ion exchange sites under all circumstances.
- C. The new cations will take the place of the  $\text{Na}^+$  ions on the ion exchange sites only if the new cations have a greater positive charge than the  $\text{Na}^+$  ions.
- D. The new cations will take the place of the  $\text{Na}^+$  ions on the ion exchange sites only if the resin has a greater affinity for the new cations.

ANSWER: D.

水流經一僅含陽離子樹脂的離子交換器，目前樹脂內所有離子交換位置之陽離子皆已被鈉( $\text{Na}^+$ )離子所取代。假設進水溫度不變，若引進離子交換器的水含有新的陽離子雜質，但不含鈉( $\text{Na}^+$ )離子，則對該離子交換器的影響為何？

- A.任何情況下，這些新的陽離子會旁通已被鈉( $\text{Na}^+$ )離子取代的離子交換位置
- B.任何情況下，這些新的陽離子會取代離子交換位置的鈉( $\text{Na}^+$ )離子
- C.只有在新的陽離子比鈉( $\text{Na}^+$ )離子帶有更大的正電荷時，這些新的陽離子才會取代離子交換位置的鈉( $\text{Na}^+$ )離子
- D.只有在樹脂對新的陽離子有更大的親和力時，這些新的陽離子才會取代離子交換位置的鈉( $\text{Na}^+$ )離子

答案： D

科目/題號：291007/9 (2016 新增)

知能類：K1.07 [ 2.3/2.5 ]

序號：B6620

Water containing dissolved sodium ( $\text{Na}^+$ ) and chloride ( $\text{Cl}^-$ ) ionic impurities is passing through an ion exchanger that contains only anion exchange resin. How are the ionic impurities being affected as the water flows through the ion exchanger?

- A. Sodium ions are being exchanged, but the chloride ions are unaffected.
- B. Chloride ions are being exchanged, but the sodium ions are unaffected.
- C. Sodium ions are being exchanged, and chloride ions are being removed by filtration.
- D. Chloride ions are being exchanged, and sodium ions are being removed by filtration.

ANSWER: B.

含有鈉( $\text{Na}^+$ )與氯( $\text{Cl}^-$ )離子雜質的水，流經一僅含陰離子樹脂之離子交換器。當水流通過此離子交換器時，水中的離子雜質會受何影響？

- A. 鈉離子被交換，而氯離子則不受影響
- B. 氯離子被交換，而鈉離子則不受影響
- C. 鈉離子被交換，而氯離子則被過濾移除
- D. 氯離子被交換，而鈉離子則被過濾移除

答案： B



科目/題號：291007/10 (2016 新增)

知能類：K1.07 [ 2.3/2.5 ]

序號：B7220

Water containing dissolved sodium ( $\text{Na}^+$ ) and chloride ( $\text{Cl}^-$ ) ionic impurities is passing through an ion exchanger that contains only cation exchange resin. How are the ionic impurities being affected as the water flows through the ion exchanger?

- A. Sodium ions are being exchanged, but the chloride ions are unaffected.
- B. Chloride ions are being exchanged, but the sodium ions are unaffected.
- C. Sodium ions are being exchanged, and chloride ions are being removed by filtration.
- D. Chloride ions are being exchanged, and sodium ions are being removed by filtration.

ANSWER: A.

含有鈉( $\text{Na}^+$ )與氯( $\text{Cl}^-$ )離子雜質的水，流經一僅含陽離子樹脂之離子交換器。當水流通過此離子交換器時，水中的離子雜質會受何影響？

- A. 鈉離子被交換，而氯離子則不受影響
- B. 氯離子被交換，而鈉離子則不受影響
- C. 鈉離子被交換，而氯離子則被過濾移除
- D. 氯離子被交換，而鈉離子則被過濾移除

答案： A

科目/題號：291007/11)/242 (2016 新增)

知能類：K1.07 [ 2.3/2.5 ]

序號：B7606 (P7606)

A mixed-bed ion exchanger is being used to process reactor coolant. The ion exchanger has been in service for 6 months at 100 percent power. A temperature controller malfunction causes the ion exchanger influent temperature to exceed the resin's maximum temperature limit before being manually restored to normal. Ion exchanger water chemistry analyses are being performed to check for resin decomposition.

Which one of the following water chemistry test results does not indicate that significant resin decomposition has occurred?

- A. A significant decrease in the ion exchanger's decontaminator factor.
- B. A significant increase in the ion exchanger's effluent conductivity.
- C. A significant increase in the ion exchanger's effluent radioactivity.
- D. A significant increase in the ion exchanger's effluent dissolved gases.

ANSWER: D.

某一混合床離子交換器用來處理反應器冷卻水，該離子交換器已經在全功率發電情況下使用了6個月。由於一只溫度控制器故障，導致在手動操作恢復正常前，該離子交換器的進水溫度已超過樹脂的最高溫度限值。之後採取該離子交換器的水樣本作化學分析，判斷其樹脂是否已經分解。

下列各採樣化學分析結果，何者不能顯示樹脂已經嚴重分解？

- A. 該離子交換器的除污因子明顯降低
- B. 該離子交換器的出水導電度明顯升高
- C. 該離子交換器的出水輻射強度明顯升高
- D. 該離子交換器的出水溶解氣體量明顯升高

答案： D

科目/題號：291007/12 (2016 新增)

知能類：K1.07 [ 2.3/2.5 ]

序號：B7656 (P7656)

Demineralizer 1A was removed from service after it became saturated with chloride ions while processing condensate with 10 times the normal chloride concentration. Replacement demineralizer 1B has restored the condensate chloride concentration to normal. Demineralizer 1A has not been processed in any way since being removed from service.

If demineralizer 1A is returned to service to replace demineralizer 1B, the downstream condensate system chloride concentration will...

- A. remain the same, because demineralizer 1A resin has already been conditioned by previous operation.
- B. remain the same, because demineralizer 1A resin can no longer remove chloride ions from the condensate.
- C. increase, only due to the volume of water contained in demineralizer 1A mixing with the incoming condensate.
- D. increase, due to both the volume of water contained in demineralizer 1A mixing with the incoming condensate and the release of chloride ions from the resin.

ANSWER: D.

經過處理十倍正常氯濃度的冷凝水後，除礦器1A就因氯離子飽和而必須退出使用，接替的除礦器1B再將該冷凝水處理至正常的氯濃度。除礦器1A自退出運轉後就未進行任何後續處置。

倘若除礦器1A又再併入系統取代除礦器1B使用，此時下游冷凝水系統的氯濃度會如何？

- A. 由於除礦器1A的樹脂經過先前使用，因此下游冷凝水的氯濃度不變
- B. 由於除礦器1A的樹脂無法再將氯離子從冷凝水中移除，因此下游冷凝水的氯濃度不變
- C. 由於除礦器1A內殘存的水體與進來的冷凝水相互混合，因此下游冷凝水的氯濃度會增加
- D. 由於除礦器1A內殘存的水體與進來的冷凝水相互混合，且樹脂會釋放氯離子，因此下游冷凝水的氯濃度會增加

答案： D

科目/題號：291007/13 (2016 新增)

知能類：K1.08 [ 2.6/2.6 ]

序號：B7645 (P7645)

Which one of the following describes a possible cause and effect associated with a lower-than-normal differential pressure across a demineralizer during otherwise normal system flow conditions?

- A. The resin has developed low resistance flow paths, which can decrease the decontamination factor for the demineralizer.
- B. The resin has developed low resistance flow paths, which can increase the decontamination factor for the demineralizer.
- C. The resin has become compacted, which can reduce the flow rate through the demineralizer and decrease the decontamination factor for the demineralizer.
- D. The resin has become compacted, which can reduce the flow rate through the demineralizer and increase the decontamination factor for the demineralizer.

ANSWER: A.

在正常系統流量的情況下，除礦器進出口間的差壓低於正常值。下列何者說明是可能的原因及效應？

- A. 除礦器內的樹脂已經形成低阻力的水流通路，除礦器的除污因子因此降低
- B. 除礦器內的樹脂已經形成低阻力的水流通路，除礦器的除污因子因此升高
- C. 除礦器內的樹脂變得緊密，通過除礦器的水流量率因而降低，除污因子因此降低
- D. 除礦器內的樹脂變得緊密，通過除礦器的水流量率因而降低，除污因子因此升高

答案： A