



# Helium Operators Familiarization Program

## Quizz

Doha, January 2013 | CARRIERE Céline, PICHOT Delphine, SCHULLER Audrey, GRABIE Véronique | Air Liquide

# Question 1

- Which unit is directly downstream the upgrader?
  - A: H2 removal unit
  - B: Pressure Swing Adsorption Unit
  - C: Liquefier

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■ Which unit is directly downstream the upgrader?

■ A: H<sub>2</sub> removal unit

■ B: Pressure Swing Adsorption Unit

■ C: Liquefier

## Question 2

■ What is the global helium recovery?

■ A: 70%

■ B: 99%

■ C: 95%

## Question 2

- What is the global helium recovery?
  - A: 70%
  - B: 99% Most of the unrecovered helium is lost in the upgrader
  - C: 95%

## Question 3

- When the oil pump of the inlet compressor 321-K001 is used?
  - A: In case of low PDT127
  - B: During normal operation
  - C: During start up and shutdown of the compressor

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## Question 4

- What happens if the upgrader expander inlet temperature gets below -160°C?
  - A: The RWN recycle valve opens
  - B: The expander pass valve opens
  - C: The first mixture separator liquid outlet valve closes



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## Question 5

- What happens if the level in the first mixture separator 322-V001 decreases?
  - A: The first mixture separator liquid outlet valve closes
  - B: The expander speed decreases
  - C: The expander speed increases

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## Question 6

■ What is the regeneration steps of the PSA offgas adsorbers?

■A:

LP isolation  
Pressurization  
Blowing  
Heating  
Cooling  
HP isolation  
Depressurization  
Parallel

■B:

HP isolation  
Depressurization  
Blowing  
Heating  
Cooling  
LP isolation  
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■C:

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## Question 7

- Why fresh air is mixed with waste nitrogen at the inlet of the CH<sub>4</sub> oxidizer?
  - A: To bring O<sub>2</sub> molecules needed for the oxidation reaction
  - B: To cool down the inlet flow
  - C: To dilute the methane contained in the waste nitrogen flow so that methane content in the mixed stream is below 1.25%
  - D: To be below 25% of LEL at the inlet of the CH<sub>4</sub> oxidizer

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## Question 8

- If the PSA feed flowrate increases what is the impact on the phase time?
  - A: The phase time increases
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## Question 9

- The PSA step box on PSA skid view displays “23”. What does it mean?
  - A: Normal run cycle - Vessel 2 in adsorption step 3.
  - B: Normal run cycle - Vessel 3 in adsorption step 2
  - C: Exceptional run cycle – Vessel 2 isolated, Vessel 3 in adsorption

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## Question 10

- When the PSA is frozen, the unfreeze of the PSA is :
  - A: automatic
  - B: manual, must be activated by the operator
  - C: can be either automatic or manual

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  - B: manual, must be activated by the operator
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## Question 11

- In which case(s) can you put the automatic valves in manual mode?
  - A: All valves of the skid in Normal Run
  - B: Stand-by repressurization valve
  - C: Valves of the isolated vessel in Exceptional Run
  - D: All valves of the skid in Isolation
  - E: All valves of the skid in Freeze
  - F: All valves of the skid in Exceptional Run

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## Question 12

- In which state can you do a quick restart of the PSA without launching a Start-Up sequence?
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  - B: FREEZE
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  - A: 1%
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## Question 16

■ Relation between the turbine power and its speed

■A:  $Power \propto Speed^3$

■B:  $Power \propto Speed$



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■ B:

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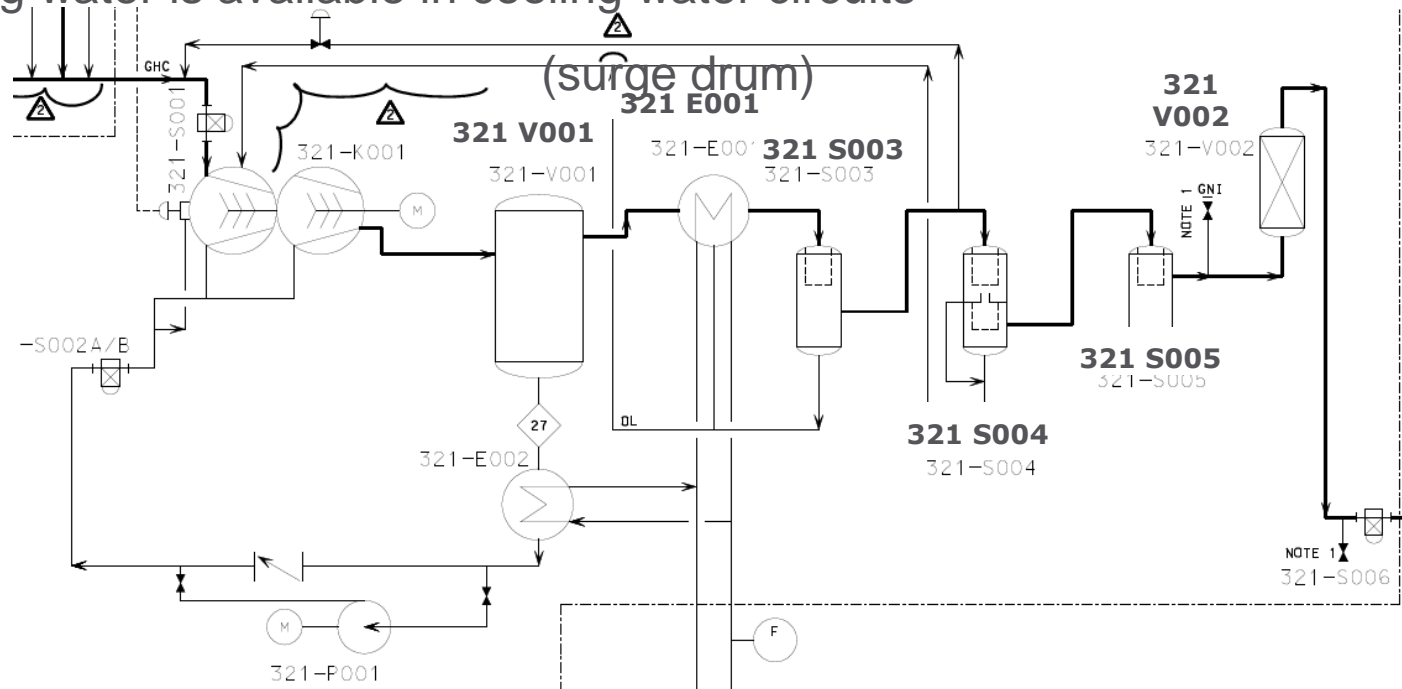
## Question 17

- What is the appropriate cool down speed of cold boxes?
  - ▣ A: 30°C per hour
  - ▣ B: 0.5°C per minute
  - ▣ C: 2°C per minute

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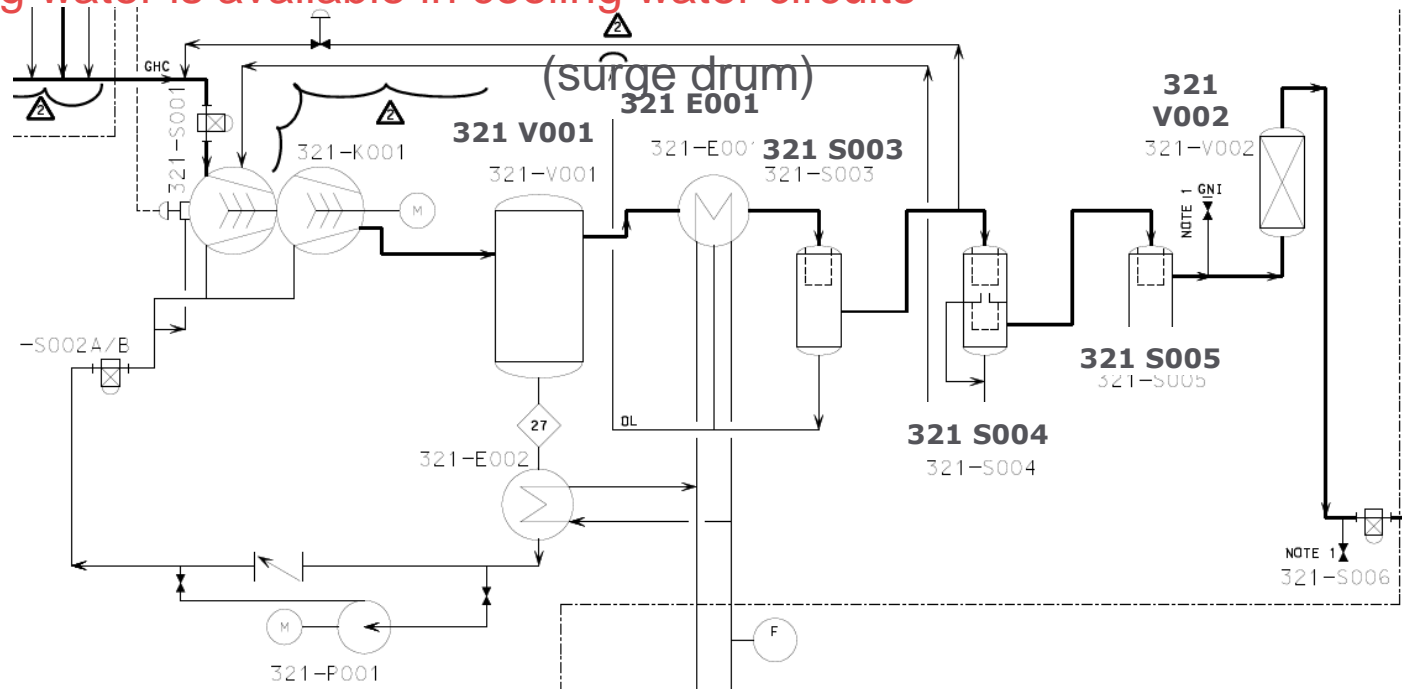
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- Which of the following conditions are RTS (Ready To Start) conditions for inlet compressor 321-K001 start-up?
- A: No high level in oil tank 321-V001      ■ D: No low level in oil separator 321-S005
- B: No high level in oil separator 321-S004      ■ E: No low level in motor oil tank
- C: Cooling water is available in cooling water circuits



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## Question 19

- Which statement is true?
  - ▣ LP compressors must be started up before HP compressors
  - ▣ HP compressors must be started up before LP compressors
  - ▣ HP compressors can be started up before or after LP compressors

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  - ▣ **HP compressors must be started up before LP compressors**
  - ▣ HP compressors can be started up before or after LP compressors

## Question 20

- How air flow (valve FV090) is controlled during H2 removal unit start-up?
  - A: It is automatically controlled by FT090
  - B: It is manually controlled: operator has to adjust it so that AT082 detects O2 that O2 content stays below 300 ppmv
  - C: It has a fixed opening
  - D: It is ramped up until full opening



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Congratulations!