

Gas Purification with PSA

Pressure Swing Adsorption (PSA)

2.00 days

RAF/PPSA-E

Overview

AUDIENCE

Engineers, shift leaders, panel operators and technical staff interested or involved in the purification of hydrogen by means of PSA (Pressure Swing Adsorption).

PURPOSE

This course provides a comprehensive understanding of the operating of PSA gas purification units.

LEARNING OBJECTIVES

Upon completion of the course, the participants will be able to:
know about PSA cycles and how gas flows between adsorbers,
grasp the essence of possible methods for improving operational reliability,
investigate how to switch to lower modes and operation within those modes,
understand the safety issues and operating risks involved in this process.

PREREQUISITE

No prerequisites for this course.

Agenda

PRINCIPAL FEATURES OF PSA CYCLES

0.25 d

Principles of gas adsorption on different solids called adsorbents.
Breathing capacity of an adsorbent and related limits.
Dynamic phenomena of adsorption and gas response.
Multi-beds units, cyclic adsorption/desorption and steps of a PSA process.

DETAILED STUDY OF PSA CYCLES

0.25 d

Representation of a PSA cycle: graphical or tabular.
Phase time and cycle time of a PSA.
Gas circulation from and to adsorbers for each step of the cycle.
Application: cycles study of a PSA unit operated by the participants.

DEFINITION OF OPERATING PARAMETERS

0.25 d

Separation yield and productivity of a PSA unit.
Influence of the different pressure levels on the cycle.
Purity-performance relationship, parameters for follow-up.
Application: study of PSA units operated by the participants.

PSA OPERATION & RELIABILITY

0.50 d

Good operational practice to increase the reliability of an industrial PSA.
Critical follow-up on the control display and anticipating actions.
Operational drift: leaking valve, progressive drop of purity, loss of production; identification of the causes and remedies.
Transition conditions to a lower mode or to shutdown.

Application: workshop related to operation with typical case studies.

START-UP STEPS

0.25 d

Typical start-up procedures and start-up conditions.
Related risks and precautions.

SWITCH OVER TO LOWER MODES

0.25 d

Transition from normal mode to lower modes and back.
Description of a lower mode due to failure of an adsorber or of a valve-set, optimization of lower modes, diagnosis and solutions.
Transition steps and related cycles. Impact on the production.
Application: case studies related to operation of lower modes.

SAFETY & RISKS ASSOCIATED TO HYDROGEN PSA

0.25 d

Pressure vessels, containment, ATEX risks.
Loading and unloading of adsorbents.