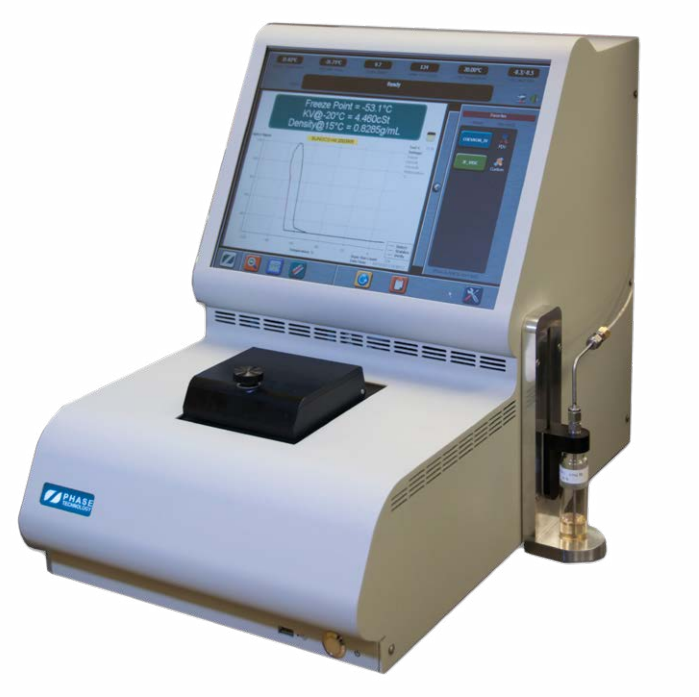
JFA-70Xi for Sustainable Aviation Fuel

SAF (Sustainable Aviation Fuels; sometimes known as renewable jet fuels or biojets) have widely been accepted as the major contributor to the global reduction of GHG emission and decarbonization effort by the aviation industry. Some major oil companies such as Neste, TotalEnergies, and World Energy have started processing SAF during the past few years, and many more are investing in new biorefineries or converting existing facilities to do the same.

All SAF's are designed to be drop-in jet fuels, meaning that their chemical compositions are similar to those of conventional fossil-based jet fuels and therefore do not require modifications in aircraft engines or supply infrastructure. However, the fact that the feedstock is non-conventional and frequently bio-based means that some additional requirements are necessary to ensure that the fuels are strictly regulated and fit for purpose.

The HEFA (Hydroprocessed Esters & Fatty Acids) production pathway defined in ASTM D7566 Annex 2 is the dominant process used by current commercial-scale SAF producers. This process uses hydrogenation, cracking, and isomerization to convert vegetable oils, waste oils and residue fats into jet-fuel like molecules. Alternatively, another approved pathway is co-processing defined in ASTM D1655 and Def Stan 91-091, where the same raw bio-ingredients are processed along with conventional crude oils.

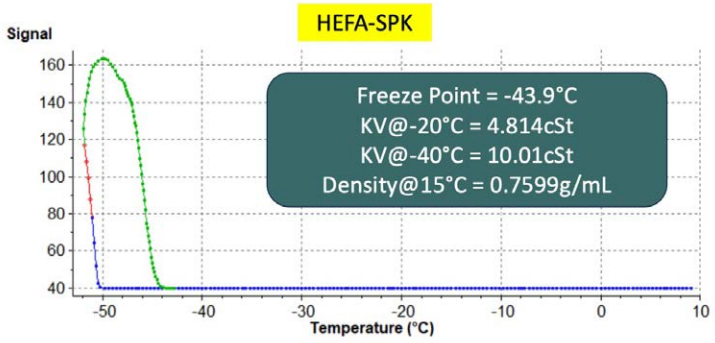
When SAF is produced via the HEFA pathway, whether singly or co-processed, the possibility of unconverted esters and fatty acids can impact critical parameters such as thermal stability, low temperature viscosity, or freezing point. Accordingly, these parameters are specifically mentioned as additional requirements in specifications such as D7566 Table A2.1, D1655 Table A1.1, or Def Stan 91-091 Table 3.



Phase Technology's JFA-70Xi is a 3-in-1 analyzer specifically designed for the jet fuel industry to measure three critical parameters: freezing point according to international test methods IP 435 / ASTM D5972, kinematic viscosity at both -20°C and -40°C according to ASTM D7945, and also density. Together these parameters define the low temperature fluidity of jet fuels, critical to the safe operations of aircraft. The instrument and associated test methods have been approved in applicable global specifications of jet fuels (ASTM D1655 Table 1, ASTM D7566 Table 1, Def Stan 91-091 Annex E).

The key advantage of JFA-70Xi is the ability to measure the three critical parameters in only 15 minutes with best-in-class precision. With the superior advantage of the ASTM D5972/IP 435 automatic freezing point method to detect low levels of incidental materials and other contaminants, it is currently the referee method when SAF is co-processed to ensure that the freezing point will not be negatively impacted by levels of unconverted raw materials (see D1655-20c Table A1.1 note H; or Def Stan 91-091 Issue 14 Table 3 Note 5). For the required viscosity testing at both -20°C and -40°C of SAF, the ASTM D7945 method is an approved alternate viscosity test method in all of ASTM D1655, ASTM D7566 and Def Stan 91-091 global jet fuel specifications.

Another advantage of JFA-70Xi is the phase plot that is generated for every test, showing the temperature vs. optical signal changes during the cooling and warming cycles. This helps the user verify if there is any abnormal behavior during the test. An example shown here displays a SAF sample produced through the HEFA-SPK process.



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